

Spring Wildflower Blooms and Research: a Self-guided Tour through Frautschi Point, the Biocore Prairie and Bill's Woods, UW-Madison Lakeshore Nature Preserve

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Overview:

- Introduction to phenology and wildflower blooming
- Self-guided tour of **Frautschi Point, the Biocore Prairie, and Bill's Woods**
- Additional resources

I. Phenology and Wildflower Blooming¹

Phenology is the study of seasonal biological phenomena.

Examples of phenological data include the first appearance of migratory birds, dates of tree budding, dates of egg-laying in amphibia and birds, and **first flowering times in blooming plants**.

Madison, Wisconsin has a notably rich historical record of such phenological flowering time data from ecologist, **Aldo Leopold**.

From 1935 to 1945, Leopold, his students and members of his family kept records of seasonal events in Wisconsin, primarily in Madison, Wisconsin and at his shack in Sauk County, Wisconsin. Data collection continued in these counties between 1977 and 2012 by his daughter, Nina Leopold Bradley, Dr. Stanley A. Temple of the University of Wisconsin–Madison, and staff from the Aldo Leopold Foundation.

The resultant 45-year-spanning datafile allowed researchers to discover the **long-term effects a changing climate may have on phenological events**. For example, analyses from Leopold's records revealed that plant species like spiderwort (*Tradescantia ohiensis*), prairie phlox (*Phlox pilosa*), and shooting star (*Primula meadia*) began flowering earlier in the season as average spring temperature increased over time. The spiderwort, prairie phlox, and shooting star plants demonstrated **phenotypic plasticity**, the ability to adapt to changing environmental conditions. We are unsure of the limits of each species' plasticity partly because each species' **physiological threshold** may be different due to the particular factors that elicit their developmental changes.

For example, **some plants may grow and flower dependent on temperature, while others may be reliant on daylength**.

The variability in phenotypic plasticity and developmental mechanisms has great ecological effects. Biological events in animals are also prompted by abiotic factors, which pose additional questions regarding their plasticity and physiological thresholds with climate change. Ultimately, **we fear that climate change may cause ecological mismatches between interacting species**, which could have greater implications. Climate change may influence the interactions between plants, pollinators and herbivores; it may affect water uptake, nutrition cycling, and carbon sequestration.

Consequently, scientists conclude we must continue studying seasonal relationships between climate and the timing of biological events.

One event of particular interest is the flowering times of the first spring ephemerals as these plants are the first source of food for early pollinators.

In this prepared wildflower tour, we aim to highlight some interesting ecological interactions between wildflowers and assorted fauna. We hope you will appreciate the intricacies and interconnectedness of the Preserve and remain conscious of how a changing climate may impact these relationships.

Finally, we encourage you all to actively contribute to phenological research by documenting and sharing observations you make during your independent walks in the Preserve. **Our team recommends using the iNaturalist app**, to which you can easily upload photos and learn about the different organisms you encounter during your outings, while also contributing to phenological research.

II. Self-guided Tour of Frautschi Point, the Biocore Prairie, and Bill's Woods



Blue trail to Bill's Woods; Maroon return path to Frautschi Point

***Note:** True to their name, spring ephemerals are fleeting beauties to behold. Meanwhile, the prairie forb (broadleaved, nonwoody plant) season is just beginning in May. To catch sight of the spring ephemerals, we recommend you take this self-guided tour during the first week of May. If you are interested in viewing more of the prairie forbs, we recommend visiting the Biocore Prairie throughout the month of May and the remainder of the summer.

Enter the Preserve from the **Frautschi Point parking lot, 2662 Lake Mendota Drive**. Pass between the end posts of the stone wall and take the wide path toward the lake. Make a **right at the sign onto Big Oak Trail**.

The first wildflower species of our tour is Wisconsin's state flower, the **common blue violet** (*Viola sororia*). You will encounter this adaptable and vibrant wildflower in patches lining either side of the Big Oak Trail as well as the other paths throughout this walk.

How many different colors of violets do you see? You may detect the **bicolored form** of the common blue violet, which is colored with a rich purple pigment that fades to white at the tips of each petal.

Violets are one of the wildflowers species with an early spring blooming time, so they tend to be one of the first sources of nutrients for pollinators. Notably, violets are a crucial food source for fritillary butterfly larvae. Like many other butterfly species, fritillary butterfly larvae are selective about what they eat. While fritillary caterpillars require a diet of violet greens, the adult butterflies have fewer dietary constraints and drink nectar from a variety of native flowers.²

Common blue violet



Eve Emshwiller photo

Bicolored violet form



Olympia Mathiapananam photo

As you continue along the Big Oak trail, a shower of **shooting stars** (*Primula meadia*) appears on the right.

Some refer to shooting stars as the “spring ephemerals of the prairie.” These dazzling plants have basal leaves and delicate yet strong stems that reach skyward before curving into a perfect downwards arc—mimicking the trajectory of a falling star in the night sky. The petal pigment in shooting star blooms can range from deep magenta to pastel pink to white.

Reaching just knee-height, it’s fortunate that this flowering prairie species blooms early in the season—otherwise it would be tricky to spot among the taller grass and flowering prairie species.

Once the shooting star goes to seed, the stems of the plant turn a shade of mahogany and the former bloom at the end of each stem is replaced by an elegant cup-shaped pod which contains the seeds from [hopefully] a successful season of fertility. However, by midsummer, the dormant shooting stars are difficult to spot among the mature tallgrass and towering flowering plants of the prairie.

Shooting star white blooms



Glenda Denniston photo.

Shooting star magenta blooms



Olympia Mathiapananam photo.

Continuing along the Big Oak path, you will also see these wildflower species:

Wild geranium (*Geranium maculatum*)

The basal leaves have five to seven distinctive deep lobes. With pale pinkish-purple flowers, wild geranium is another beautiful wildflower that tends to paint the wooded understory in patches.

When wild geranium goes to seed, each seed pod is connected to a structure resembling a crane's bill. As the bill dries, this process triggers a jolt of movement, effectively catapulting the seed pods away from the parent plant.

Wild geranium in bloom



Olympia Mathiapananam photo

Jacob's ladder (*Polemonium reptans*)

This spring ephemeral is named after its compound leaves, which resemble that of a ladder. While it blooms for just a few weeks in April or May, Jacob's ladder is an unforgettable delicate and sprawling-looking plant with flowers that range from blue to pink in color.

Jacob's ladder in bloom. Note the "ladder-like" leaves in the photo on the right.



Olympia Mathiaporanam photos

Large-flowered bellwort (*Uvularia grandiflora*)

These droopy-appearing woodland flowers produce beautiful yellow blooms during the April to May period. It's no surprise that this species is a part of the lily family. The large-flowered bellwort provides an excellent source of pollen for pollinators including bumble bees, mason bees, halictid ("sweat") bees, and andrenid ("miner") bees. Notice how the bees are working the flowers!

Large-flowered bellwort in bloom



Olympia Mathiaporanam photo

Bear right at the first fork in the trail. You'll pass "shooting star hill" covered in those flowers. The trail toward Biocore Prairie winds through an area that had a controlled burn earlier this spring. The prescribed burn is part of the management plan to restore savanna around a ~200-year-old white oak, known as Second Oak, and the field edge. Some spring flowers have emerged and bloom on the recently burnt landscape.

Go right at the sign near Second Oak to the open field and then turn left. Walk along the field edge up the hill to Biocore Prairie. Turn right at the end of the prairie onto the wide green path to the picnic table.

III. The Biocore Prairie

From the picnic table, look into the prairie for the white flags which mark the locations of these flowers:

Shooting star (*Primula meadia*)

See the above information about shooting stars. In the prairie, you might be able to spot a few different color varieties.

Optimum viewing time for shooting star is in the first two weeks of May.

Prairie smoke (*Geum triflorum*)

Unlike most flowering species, prairie smoke is most captivating during its fruiting stage rather than its blooming state. This species does not produce flowers in the same sense that the aforementioned wildflower species do. Instead, the flowering state of prairie smoke resembles more of a "bud-like" appearance as shown in the photos below.

Once a prairie smoke flower is fertilized by pollinators and the plant sets seed, the bud-like structure unravels to reveal a coil of feathery strands within. Many describe this fruiting plant appearance as "smoke" suspended above ground, which is how the name was coined. Attached to the end of each feathery strand is a seed, which will rely on its fuzzy attachment to transport it via wind gusts to its own turf to germinate and flourish.

Optimum viewing time for prairie smoke is during the first three weeks of May.

Prairie smoke in bloom (left and middle) and setting seed (right)



Olympia Mathiaparagam photo

Wild lupine (*Lupinus perennis*)

This plant species dazzles onlookers with its palm-shaped leaves and clusters of purple, pealike flowers, but it makes great ecological contributions, too! As part of the legume family, lupine plants harbor rhizobia bacteria in their root nodules. In turn, these bacteria improve the overall health of native plant communities by “fixing” or capturing nutritious atmospheric nitrogen from the air and putting it into a form that plants can use. When the lupines or other legumes die and decay, that nitrogen enriches the soil for other plants to use.

Additionally, lupine is a host plant for the federally endangered Karner blue butterfly. Fresh lupine leaves are the first food source for newly hatched butterfly larvae, and pollen from mid-May blooms provides nutrition for the adult butterflies.

Peak blooming time of wild lupine is in mid-May. There’s a nice patch of lupine next to the purple martin house across the prairie, and another in the southernmost, wettest part of the Biocore Prairie.

Additionally, we encourage you to return to see lupine once the flowers have set seed. This plant species has a fun seed dispersal method: the seeds lie within peapod-like structures which violently spring open and thrust fertile seeds away from the mother plant. These pods are rigged to spring open 1) when the pod is dried, and/or 2) if a sufficiently dried pod is touched.

Wild lupine in bloom



Olympia Mathiaparanam photo

Ohio spiderwort (*Tradescantia ohiensis*)

This prolific prairie species has long, grass-like leaves and produces vibrant blue, red, and sometimes white three-petaled flowers. Spiderwort flowers tend to bloom in the morning and close up in the midday heat, which prolongs their blooming duration. One unique characteristic of spiderwort is the thick sap-like substance that seeps from wounded stems and leaves. Be careful not to damage these plants or you will be covered in a sticky ooze!

Spiderwort is best seen in bloom between mid-May and July.

Ohio spiderwort in bloom.



Olympia Mathiaparagam photo

Blue wild indigo (*Baptisia australis*)

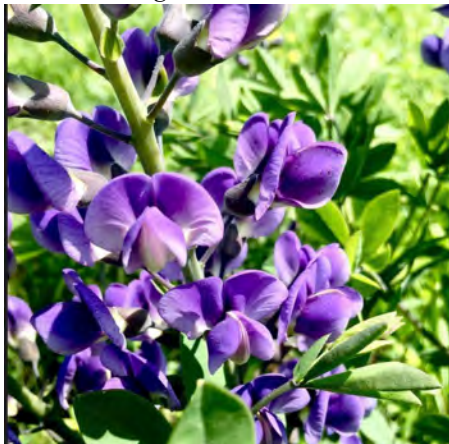
Like wild lupine, wild indigo species are members of the legume family. Their root systems have developed a mutualistic symbiosis with rhizobia bacteria, which fix nitrogen for the plant to consume.

These plants are tall and feature branching, pealike flowers which are deep purplish blue. During the first few years of development, wild indigo plants tend to focus their efforts below ground in their root systems. After a few years, the developmental focus transitions to make the leaves and blossoms appear fuller and bushier.

The wild indigo is a popular plant for many pollinators, including the Wild Indigo Duskywing butterfly during May, June, and even July. Unfortunately, this plant tends to host an unwelcome parasitic weevil as well. When wild indigo sets seed, peapod-like structures hold the invasive weevils as well as the fertile seeds. The weevil larvae feed on the wild indigo seeds and consequently deplete the number of viable seeds available to perpetuate the species. Adult weevils proceed to feed on the flowers and leaves of the wild indigo plants.

Optimum viewing time for blue wild indigo is between mid-May and July. In addition, keep your eye out for the other *Baptisia* species in our Biocore Prairie: cream wild indigo (*Baptisia bracteata*), white wild indigo (*Baptisia lactea*), and the rare yellow-wild indigo (*Baptisia tinctoria*).

Blue wild indigo in bloom



Olympia Mathiaparagam photo

Golden Alexander (*Zizia aurea*)

This dazzling prairie plant with yellow umbel flowers is a particularly important source of food for insects with shorter tongues, as these small flowers allow easy access to pollen. Additionally, the compound leaves are a food source for black swallowtail butterflies during their larval stage.

To best see golden Alexander, come between early and mid-May. In the prairie, you may also spot the heartleaf golden Alexander, *Zizia aptera*, which sports distinctive heart-shaped leaves.

Golden Alexander in bud



Olympia Mathiaparanam photo

Resume walking south alongside the Biocore Prairie. Turn left to pass the shed and a pile of woodchips on your right, and continue straight ahead across a former orchard, now populated with young oaks. At the road, turn right and pass the site of the Edward Young farmhouse, and the red elderberry (*Sambucus racemosa var. pubens*) bushes that are useful to wildlife.

Turn right onto the east-west road and go to the intersection of this road with the access road to the Picnic Point entrance. You're at the northeast corner of

IV. Bill's Woods.

Twenty years ago, in 2001, the newly formed Friends got a permit to work in the southeastern corner of Bill's Woods and gradually transformed this area into showcase of spring wildflowers. Under the leadership of Glenda Denniston and Mary Trewartha, volunteers began by removing thousands of invasive shrubs -- mostly buckthorn and honeysuckle -- and a sparse cover of non-native weeds. The volunteers found a few very small patches of wild geranium, white trout lily, mayapple and common violet, and scattered Jack-in-the-pulpits. With approval of University staff, they gradually replaced the invasives with native plants and understory trees and shrubs (including pagoda dogwood, red elderberry, witch hazel and serviceberry).

In the spring of 2001 and for several years afterward, the Friends planted many of the woodland wildflowers, largely ordered from native plant nurseries, that now thrive in Bills Woods.³ They positioned them widely over the area. The Friends were aided in this effort by an army -- of ants. The expanded territory now occupied by the ephemerals was achieved with our friends, the ants.

Many of the ephemerals make seeds with appendages or “elaiosomes,” that contain nutrients attractive to ants. When a fruit opens for seed dispersal, ants rapidly appear. Worker ants collect and carry seeds to their home colony, where the elaiosomes are removed and fed to ant larvae. The seed itself is discarded in the ants’ trash pile. This seed dispersal by ants is an ecologically significant interaction, called mutualism, across the planet. The seeds are protected from animal predators within the ant nest and are dispersed to favorable germination conditions in the ants’ trash pile. Up to 30% of the ephemerals in eastern North America (including bloodroot, false rue anemone, hepatica, spring beauty, trout lily, trillium and violet) have evolved to take advantage of ant dispersal.^{4, 5}

Now great patches of trout lily and mayapple have spread from the original small remnant patches, and other large patches extend from the wildflowers that were planted. Even the trillium, twinleaf and Jacob’s ladder are spreading. Thank you, ants!

Beginning at the corner and walking down the hill toward the Picnic Point entrance, you’ll see to your right, in succession,

Aunt Lucy (*Ellisia nyctelea*)

White baneberry (*Actaea pachypoda*)

Great water-leaf (*Hydrophyllum appendiculatum*)

Virginia bluebells (*Mertensia virginica*)



Olympia Mathiaparanam photo

Wild ginger (*Asarum canadense*) has an unusual 3-part maroon blossom hidden under its leaves next to the ground.

Wild ginger



Olympia Mathiaparanam photo

Twinleaf (*Jeffersonia diphylla*)

Trillium (white phase of red trillium) (*Trillium erectum*)

White trout lily (or fawn lily) (*Erythronium albidum*)



Olympia Mathiaparanam photo

Large-flowered bellwort (*Uvularia grandiflora*)

Spring beauty (*Claytonia virginica*) with delicate pink anthers on the white petals

Early meadow-rue (*Thalictrum dioicum*) with male and female flowers

More bluebells bloom at the lower corner.

Make a right onto the trail at the base of Bill's Woods.

Admire the 3 colors of violets and the wild geranium in bloom.

White (or large-flowered) trillium (*Trillium grandiflorum*) blossoms up the hill to your right.

White (or large-flowered) trillium



Glenda Denniston photo

Turn right at the sign onto Soil Pit Trail.

Trillium grandiflorum blooms on the left.

A large patch of **mayapple** (*Podophyllum peltatum*) grows at the crest of the hill to your right. A single flower will hang under the umbrella-like leaf.

Young mayapple



Eve Emshwiller photo

Turn left (north) at the fork in the trail.

A large patch of false rue anemone (*Enemion biternatum*) is on the right.

Volunteer improvements to Upper Bill's Woods began even before the Friends organization was formed, and this area was subsequently added to the original Friends project in the southeastern corner of the woods. Under the Field Manager's direction, it began as a rescue operation to repair an open area and adjacent woods which had been used as a dump for gravel, mulch, rocks and other materials. After Friends removed the waste, UW Grounds personnel graded the open area, which volunteers then seeded with native prairie plants. Woodland plants were established along the edges.⁶

Early buttercup, *Ranunculus fascicularis*, blooms to the left of the trail.

Bill's Woods has come a long way. Dappled shade has replaced heavy shade, wildflowers bloom prolifically in the spring, savanna plants thrive in the summer, and a diverse set of insects, birds, and other animals visit and reside in the area. This ongoing restoration project has been nurtured and well-documented by many members of the Friends of the Lakeshore Nature Preserve.

Emerge from Bill's Woods at the service road, opposite the Heritage Oak.

Turn right and then make a left shortly onto a narrow trail at the sign to "Biocore Prairie." The trail winds through maple woods.

Turn left along Biocore Prairie, and then right, keeping the Eagle Heights Community Gardens on your left, to rejoin the Big Oak Trail. Take the right loop (go east) at the trail's fork by Second Oak.

You'll pass young, great water-leaf (*Hydrophyllum appendiculatum*) leaves, maroon violets (probably *Viola sororia*), and many fallen trees, including some oaks that were sawn through to allow passage.

The cutleaf toothwort (*Cardamine concatenata*) flowers, on the right, are already past their prime.

At the fork in the trail, bear left toward the Lakeshore Path.

Join the Lakeshore Path. A sea of bluebells blooms on 3 sides of this intersection and a huge field of mayapples occupies the 4th side. The Frautschi Point Woods show the benefits of years of maintenance by staff and volunteers.

Turn left. A large, extended patch of shooting stars blooms on the right of the Lakeshore Path with views of Lake Mendota behind the flowers.

At the sign, **take the path to the left to return to the Frautschi Point entrance**. As you leave the Preserve, admire the red elderberry bush blooming by the entrance wall to your left, and the mass of blue-flowered Jacob's ladder by the information kiosk. Thanks for coming!

V. Resources

<https://justjournal.org/2019/02/10/spring-temperatures-and-flowering-times-of-native-wisconsin-prairie-plants/>

<https://www.fs.fed.us/wildflowers/pollinators/pollinator-of-the-month/fritillary.shtml>

According to Glenda Denniston, wildflowers planted in Bill's Woods include bellwort, bloodroot, blue cohosh, cutleaf toothwort, Dutchman's breeches, Hepatica, Jacob's ladder, miterwort, Solomon's seal, Sprengel's sedge, spring beauty, Trillium spp., true and false meadowrue, twinleaf, Virginia bluebells, wood anemone, wild ginger, and wood phlox.

"Elaiosome," *Wikipedia.org*

"The Natural Web," <https://the-natural-web.org/tag/myrmecochory/>

<https://www.friendslakeshorepreserve.com/friends-projects.html>