

Premier Edition 2021

POLLINATOR

Action at the Grassroots



Female long-horned bee, (*Eumelissodes*). Photo: Laurie Schneider





POLLINATOR

A MAGAZINE FOR AND ABOUT
POLLINATOR CONSERVATION

White lined sphinx moth (*Hyles lineata*) on thistle, photo: Greg Lasley

BIODIVERSITY – Restore, Rewild, Regeneration

- 2** Letter from the Hive
By Craig Hansen
- 3** A Call to Action
By Laurie Schneider
- 5** Biodiversify Your Lawn
By Joanna Eckles
- 7** The Bur Oak, Grandmother of All Trees
By Stephen Thomforde
- 10** A Keystone Species, The Beloved Strawberry
By Stephen Thomforde
- 11** Meet our Friend the Eastern Cicada Killer Wasp
By Heather Holm
- 13** For the Love of Soil: Falling for Regenerative Farming
By Pam Arnold
- 15** Learn, Protect, Take Action
- 17** Five Star Film List

POLLINATOR

Premier Edition
Volume 1, Number 1 2021

Published by
Pollinator Friendly Alliance
PO Box 934
Stillwater, MN 55082

Pollinatorfriendly.org

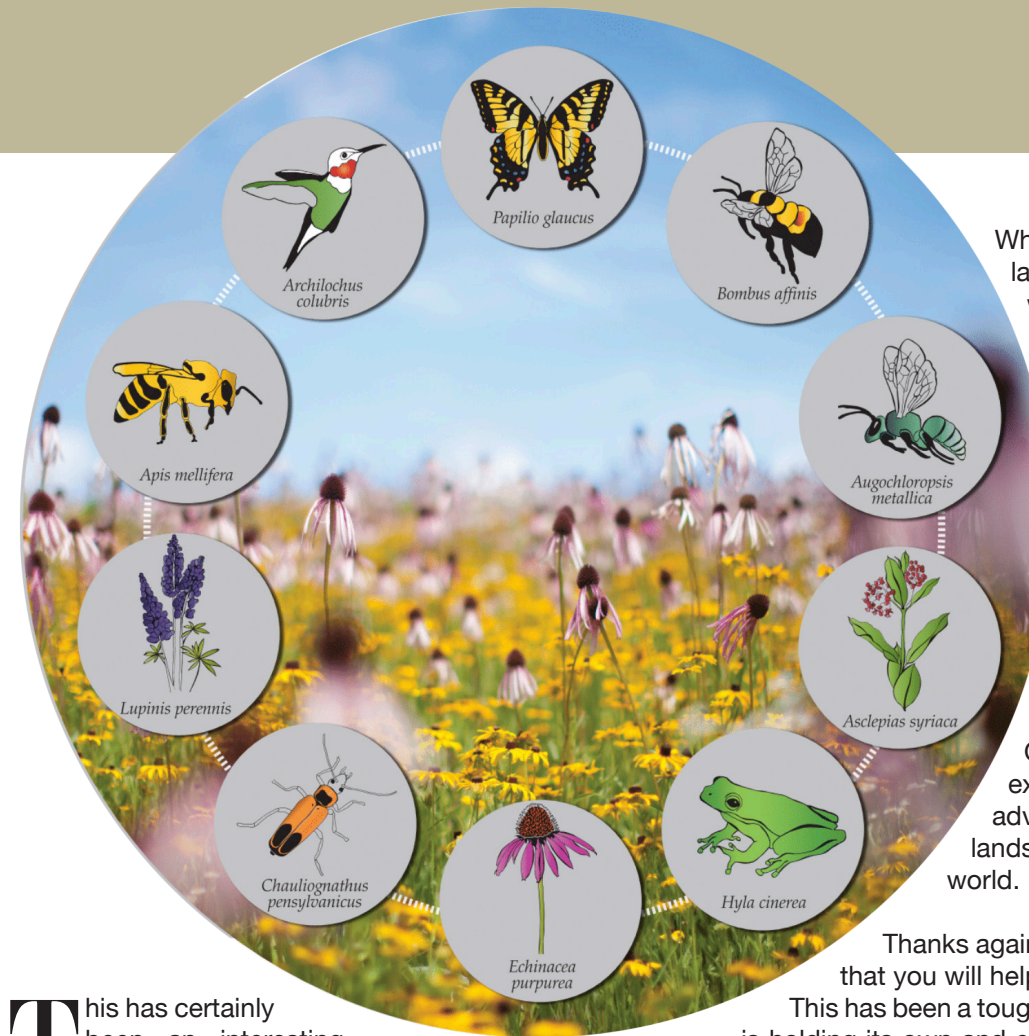
Contributing Writers

Craig Hansen
Laurie Schneider
Joanna Eckles
Stephen Thomforde
Heather Holm
Pam Arnold

Designer
Julie Bourman

Editor
Karin Winegar

LETTER FROM THE HIVE



When PFA rehabilitates parcels of land to support natural pollinators, we create sanctuaries that help guarantee the future of our environment. Over the past year, we worked on some large tracts of land and will do so in 2021. Even the smallest pollinator gardens have impact. They help preserve the nearly 460 species of bees indigenous to Minnesota, as well as the other countless beneficial insects, birds, and mammals that play a role in pollination.

Our continuing challenge is to expand our efforts, to educate, to advocate, and to restore biodiverse landscapes that comprise our natural world.

Thanks again for your support. I sincerely hope that you will help us continue our efforts into 2021. This has been a tough year for many nonprofits, but PFA is holding its own and even expanding its programming. I cannot thank our dedicated supporters enough!

Please join us in the coming year as a supporter or volunteer as we work with energy and hope to preserve pollinators and the natural world.

-Craig Hansen
Chair, PFA Board of Directors

This has certainly been an interesting year! Despite its many challenges, I can say that this has been a year of wonderful accomplishments for PFA. For this, my sincere thanks go to our scores of volunteers, our supporters who have stood by us this year with its limited fundraising opportunities, my devoted fellow board members, and, in particular, our tireless and innovative Executive Director, Laurie Schneider.

Laurie summarizes our accomplishments in an article that follows. The scale of our activity on behalf of pollinators has expanded, and we have great opportunities in 2021.

We have seen the environmental landscape change in the last few years with the relaxation of some environmental protections that we once took for granted. Yet our work continues.

Pollinators are an environmental keystone. If the population declines to critical levels, our ecology crumbles, not just the natural world but also many of the agricultural products upon which humans depend.



A CALL TO ACTION



A BIG THANKS to our volunteers and supporters. Look what we did together! We can do so much more.

Pollinator Friendly Alliance (PFA) is a regional leader in the crusade to protect pollinators. While PFA works to protect pollinators, these same actions also support other wildlife and the environment. Pollinators are a keystone species in an interconnected web of life in which all depend upon the other.

Loss of biodiversity and habitats have direct impacts on pollinators, other wildlife and the entire planet ecosystem.¹ For more than 40 years, scientists have warned that climate change and its accompanying lack of biodiversity are causing human disease.² Covid-19 is the latest tragic reminder that human health is linked to our planet's health. Biodiversity and environmental integrity are critical to mitigating climate change. Returning land to a wild state (rewilding) and restoring biodiversity while removing synthetic pesticides are the most important actions we can take.

¹ [United Nations Convention on Biological Diversity, March 2010.](#)

² [World Health Organization, June 2015.](#)

-Laurie Schneider
Executive Director
Pollinator Friendly Alliance



We are proud of the work we've done together with our partners. Over these long months of the pandemic, our PFA team continued to build biodiversity with 20 conservation webinars reaching more than 3,000 people, reducing pesticide use in communities and increasing biodiverse habitat. With your ongoing support, our work to protect keystone pollinator species has expanded.

LOOK WHAT WE ARE UP TO:

- Restored nearly 100 acres to biodiverse habitat (goal of 200 acres by 2022).
- Restored 14-acre *Butterfly Landing* at *Pine Point Park*.
- Converted underutilized lots into Minnesota's first pollinator park, *Pollinators Landing*.
- Restored 36-acre *Bumble Bee Sanctuary* at Lake Elmo Park Reserve.
- In 2021, we will convert 38-acre corn crop to native habitat *St. Croix Bluffs Restoration*.
- Offered 26 citizen science field programs with hundreds of community scientists to collect at-risk species data.
- Hosted 20 conservation webinars with an audience reach of more than 3000 viewers.
- Hosting our fifth annual *Best Practices for Pollinators Summit* which teaches ecologically sound best practices to more than 1400 land managers from state, county and local government and private industry who collectively manage 10,000's of acres.
- Hosted four *PollINATION Art & Music Festivals* which attracted 1,000's of visitors each year to celebrate and learn about pollinator conservation.
- The *Best Practices for Pollinators Summit* is now recognized as Minnesota's most comprehensive educational program on ecologically sound land management practices.
- Presented more than 200 education programs for groups, schools and community events on pollinator conservation to thousands of people.
- Mentored communities to implement ecological best practices and reduce pesticide use with pollinator protection resolutions. Fifty resolutions have been passed to date.
- More than 2,000 people registered to **JOIN THE HIVE** and follow PFA.

HABITAT RESTORATION SPOTLIGHT:

We can't wait to start our 2021 collaborative restoration project with Washington County Parks at St. Croix Bluffs Regional Park. In 2021, we plan to convert 18 acres of corn crops to prairie plus restore 20 acres of adjacent oak savanna. This restoration rests just 200 yards up slope from the St. Croix National Scenic Riverway that drains directly into the river. This project will reduce phosphorus loading by up to 20 lbs. The collaborative approach not only allows us to restore larger land areas, but also advocates to partners for regenerative management practices instead of pesticides. This is the third restoration project with Washington County where environmentally sound practices will be used including: conservation mowing, cover and smother cropping, controlled burns, goat grazing and soil health practices. PFA's mission to improve the viability of all pollinators has inspired unusual levels of involvement in the field with interactive and first-hand immersive experiences. This restoration will also serve as a citizen science demonstration area hosting a rare bit of science for everyone to participate.



This newly acquired agricultural land will be restored to native prairie and oak savanna. Photo: Laurie Schneider.



This restoration will help protect the river at St. Croix Bluffs Regional Park. Photo: Jimmy Ostgard.



The wood frog (*Lithobates sylvaticus*) is at-risk because of habitat loss due to farming and development. Their range includes the St. Croix River Valley. Photo: Gordon Dietzman.

"The St. Croix Bluffs Regional Park has three major species communities: northern coniferous forest, eastern deciduous forest, and pockets of prairie all overlap and intertwine along the riverway. The topography and wet and dry riverine areas, plus relatively unbroken stretches of riverside forests, make this an important wild corridor refuge for pollinators, birds and other animals. Birds follow natural river landmarks during migration. Riverside forests are good places for many species to replenish themselves on their way north or south."³ This park is home to a long list of endangered and at-risk species including rusty patched bumble bee, Karner blue butterfly, lightning bug, splendid clubtail dragonfly, wood frog, spotted salamander, Blandings turtle, blue racer snake, Pawnee skipper, red-headed woodpecker, trumpeter swan, golden eagle, red shouldered hawk, gray wolf, marten and more.

³ National Park Service, Northwest Passage "The St. Croix and Namekagon Rivers"



Lawn pathway in a residential biodiverse backyard. Photo: Joanna Eckles.

Biodiversify Your Lawn

Once had an opportunity to see the master trail plan for my city. That is the behind-the-scenes blueprint that shows both existing sidewalks and trails and also future places where trail connections can be made as opportunities arise. The minute I saw that map scrolled out on the drafting table I envisioned something different. Instead of circuitous lines of paved connections I pictured habitat. I pictured strips and patches of diversity – existing and future native connections – a master habitat plan.

Habitat destruction and fragmentation is a serious problem for all species – insects, birds, mammals, even plants. We can help on our own properties, either independently or, if possible, with our communities through making connections with neighboring or municipal properties in some cases. We need to create habitat anywhere and everywhere possible, thereby creating vital connections for wildlife to live and move.

Where do we find space? Picture the vast mowed turf lawns of summer – a great place to start. Turf lawns are unnatural habitats. Mowed and chemically treated lawns take up a huge percentage of the American landscape and is America's largest irrigated crop – for an entertaining read see this [2015 Washington Post article](#).

We can start at home by reducing mowed areas. If each of us reduced mowing by just a fraction, say ten percent, it would amount to millions of acres. Ideally, we'd convert this to native habitat, creating beautiful strips and corridors along the edges to feed and shelter insects and animals, to reduce runoff, to buffer views and to provide winter interest, seeds and cover.

If you're not ready to do a full-blown conversion, to mow less or need to do some convincing, perhaps step one to a more biodiverse property is stop chemical inputs on your lawn as a whole. Begin to train yourself (and your neighbors) to see the beauty in the diversity that will appear naturally. It will come! You can speed things up by overseeding with flowering species (see list). Consider success to be the more different plants you can cultivate versus the monotone green sameness. The clovers and mosses and small forbs will buzz with life and save water and mowing time.

-Joanna Eckles is a naturalist and speaker who specializes in birds – specifically in creating bird-friendly communities by creating habitat, reducing threats and engaging people.
www.joannaeckles.com



RESOURCES FOR A BIODIVERSE BACKYARD:

Seed and plants for a biodiverse lawn:

Thin grass blades give perennials a better chance to grow, are long rooted and require less maintenance.

- Fescue grasses: fine, creeping, chewings, hard, low-mow (4 lbs. seed / 1000 ft.)
- White Dutch clover (*Trifolium repens*)
- Creeping Thyme (*Thymus serpyllum*) or Common thyme (*Thymus vulgaris*)
- Common blue violet (*Viola sororia*)
- Wild strawberry (*Fragaria virginiana*)
- Calico aster (*Symphotrichum lateriflorum*)
- Lanceleaf coreopsis (*Coreopsis lanceolata*)
- Self heal (*Prunella vulgaris*)
- English daisy (*Bellis perennis*)
- Blanket flower (*Gaillardia*)
- Ground plum (*Astragalus crassicaarpus*)
- Pussytoes (*Antennaria plantaginifolia*)

Advantages to a biodiverse lawn vs chemically treated turf:

- Provides food, shelter and nesting areas for pollinators, beneficial insects, birds and wildlife
- Conserves water resources, requires less watering
- Reduces herbicide and pesticide use and contamination
- Requires very little mowing
- Promotes clean water and environment
- Improves soil health
- Promotes deeper root systems to filter groundwater
- Creates visual interest and beautifies landscapes

Plants for Great Lakes Region, Xerces Society.

Lawns to legumes backyard habitat, Minnesota Board of Water & Soil Resources BWSR.

Native plant suppliers and landscape professionals, Pollinator Friendly Alliance.

Native plant finder database for plants & butterflies, National Wildlife Federation.

Native grasses as pollinator food, Mary Meyer, University of Minnesota.

How to install bee lawn, Pollinator Friendly Alliance.

Biodiverse backyards, Krischik Lab, University of Minnesota.

Plant identification database, Missouri Botanical Garden.

Bring biodiverse habitats right up to the edges as a buffer.



Residential native design by Shoreview Natives, Duluth, MN



Photo: Prudenterra

THE BUR OAK Grandmother of all Trees

Keystone Species, Grazing Lawns, and Oaks Future

White Oaks (*Lepidobalanus*):

There are approximately 500 oak species throughout the Northern Hemisphere. Oaks belong to the Fagales family comprised of the heavy mast bearing trees, such as hickory, walnut, chestnut and beechnut. Fagale fruits have fed ecosystems since their emergence with grasslands and grazing mammals 20 million years ago. Fagales are more advanced than forest trees, such as maples and magnolias, and for practical purposes, oaks are not forest trees, but instead, oaks are grassland trees, and obligate to herbivores consuming their delicious fruits to maintain oak preferred open lawns.

Oak species can be delineated into 3 sub-categories. Almost 50% are classified as *Lepidobalanus*, the white oaks. Close to another 50% are classified as *Lobatae* or red oaks. The remaining oaks are on the fringe, such as the subtropical proto-oaks. In the Upper Midwest, we have 3 species of white oaks and 3 species of red oaks (Figure 1). This article will highlight the contributions of the white oak tribe to biodiversity and ecosystem health.

Keystone Species:

From an evolutionary perspective, white oaks represent one of earth's greatest creations, and the essence of the Gaia concept. White oaks are classic keystone species in that they promote biodiversity, enhance ecological health, and provision multiple ecosystem services. Oaks perform this service primarily by supplying edible structures such as fruit (acorns) and forage to multiple organisms. White oak fruit and forage are both highly edible and nutritious. Approximately 530 species of butterflies and moths feed

and/or nest upon oak forage (Tallamy 2009) and vertebrate herbivores, such as deer, elk, bear, bison, rabbit, and jays also gain life energy via oak fruit and browse. The bark of white oak is also consumed by the smooth patch fungus (*Aleurodiscus oakesii*). In turn, this oak energy is shuttled upward through carnivores, including insects, birds, bats, small and large mammals. Almost every heterotrophic organism in the Northern Hemisphere is directly or indirectly eating oak.



The oak is host plant for many animals including the polyphemus moth (left: cocoon on oak leaves, right: adult moth). Photo: PFA.

Oaks benefit from their edibility, hence the reason they evolved edible structures. We know squirrels plant acorns, but we should also consider how herbivores prune branches, clear brushy understories, and harvest grasses around oaks, creating open understories that prevent catastrophic cambium killing fire and excessive build-up of uneaten nuts from creating dense compost oozing nitrogen, weeds, and pestilence.

The incredible edibility of oaks allows them to shuttle copious amounts of sunlight-energy through foodwebs to the benefit of the entire ecosystem, including biodiversity and ecological integrity. Where the energy goes so too



flows nutrients, and it is this regulation of nutrients that most benefits ecological integrity. Longer foodwebs effectively regulate nutrients to the benefit of ecological integrity, creating the perfect climate, building the perfect soils, and purifying the perfect water to the benefit of all life forms. In the beginning, earth was in a Goldilocks position in space, not too hot or too cold for

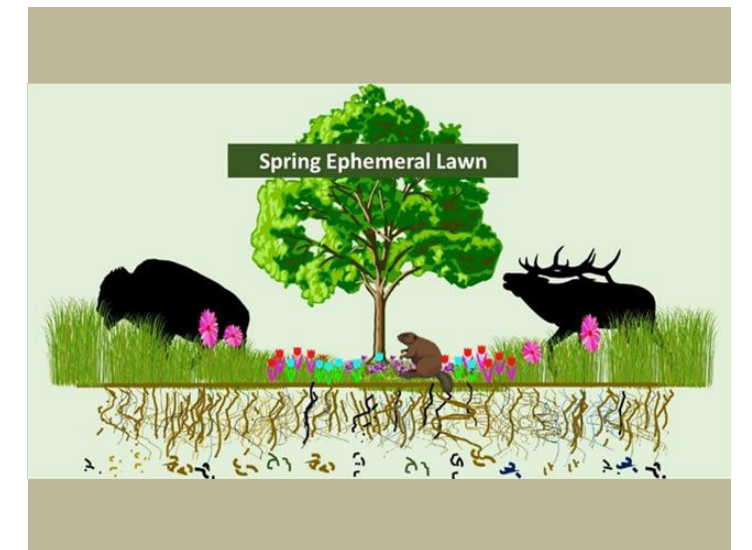
life to begin. But keystone species, such as white oaks, moved Goldilocks from finding the perfect environment to constructing the perfect environment. Hence, white oaks, in many ways represent an apex keystone species in its ability to regulate energy and nutrients to the benefit of life on earth. White oaks are the essence of Gaia.

Grazing Lawns:

Another way oaks promote biodiversity is by creating what's known as the grazing lawn (McNaughton 1984). Grazing lawns are highly evolved communities that occur on landscapes grazed in predictable rhythms, in time and space, from which emerge unique vegetations that are obligate to grazing. Grazing lawn formation occurred in late summer when large herbivores sought refuge from August heat in the oak grove cool-breeze open understories. While resting in shade, elk, bison, and deer grazed down standing crops of acorn and grass thus creating natural lawns. The reduction of standing vegetation allowed a competition free zone for low-stature, shade-tolerant native flowers and grass to flourish. Many of these graze obligate wildflowers are spring ephemerals such as anemones, pussytoes (*Antennaria*), violets (*Viola*), wild strawberry (*Fragaria*), and kittentails (*Besseyia*) to name a few. The vernal nature of grazing lawn floras provides spring foraging pollinators an

important source of food. Grazing lawn floral assemblages were once a common component of our vegetation, for millions of years, and flourished with domestic livestock surrogates, when good stewards understood the value of healthy stewardship and tended their stock and native pastures accordingly.

The demise of grazing lawns began with the extermination of native herbivores 200 years ago. The final grazing lawns disappeared when trends for raising livestock shifted from pasturing to confined animal feeding operations (CAFO) and native pastures were converted to corn fields or abandoned. While growing corn is detrimental to ecological integrity, the removal of herbivores and land abandonment also suffers horrific consequences, such as overgrowth of weedy trees (afforestation), buildup of nutrients, and subsequent dramatic declines in biodiversity. This once important and common vegetation has been exterminated from the land, and multiple floral and faunal species have also dramatically declined.





A bur oak emerges from a prescribed fire in Goodhue County, MN. Historically, almost all Midwest fire was human induced, with the primary objective to maintain high quality native pasture to encourage grazing. Oaks are fire tolerant, but tall hot fires will kill oak trees. Grazing in the shade of oaks prevented tall hot fire, thus the oaks persisted even during the most intense wildfires.

The Future:

Numerous oak species are suffering significant population declines throughout the Northern Hemisphere. Oak regeneration is failing in current afforested landscapes. Older oak specimens, individual trees that once knew bison, elk, and Native Americans, are succumbing to competition by weedy trees and associated impacts of higher heat indices, nitrogen loads and the pestilence spawned by these impacts. In many regions, keystone oaks are but one human generation from becoming extremely rare upon the landscape. Experts are searching for the cause of sudden oak decline. Their inquires focus on fungal, bacterial and insect borne disease. But perhaps our focus on the cause blinds us to seeing how the cause may be symptomatic of losing keystone herbivores that maintained park-like lawns, open, partially sunny, dry and breezy landscapes, the perfect conditions for oak regeneration and health. Likewise, social myths, such as “Oak Forest” and “Oak Woodlands” may be holding sudden oak decline in epidemic. Paleoeologic records indicate oaks are not forest trees, but instead, oaks are grassland trees, and healthy grasslands are obligate to grazing. Failing to consider declines in oak health to the removal of keystone herbivores, and the subsequent short circuiting of nutrient cycles within the land organism, illuminates our nascent understanding of the complexities associated with ecosystems. I fear the day is soon, the last oak falls into the dirt, and humanity’s fate is not far behind.

The first line in assuring oaks remain a keystone component of healthy functional ecosystems is rescuing historic oaks from their occluded nightmares. Cutting and clearing brush

from around these oaks, in ways that mimic historic grazing and low intensity fire, can save these legacy oaks. Even if it’s too late to save the individual tree, the incoming sunlight to the ground layer will once again allow for oak regeneration, and perhaps the historic tree has a few more years of acorn production to leave offspring for future generations. Occasional mowing, haying and grazing in ways that mimic historic grazing patterns will insure weed competition doesn’t eliminate sapling oaks and even promotes a floristic rich grazing lawn. Tree tubes for oak regeneration are not necessary, and perhaps counterintuitive to oak health. Oaks are highly resistant to occasional browsing and perhaps even benefit from being coppiced by herbivores. Using low intensity fire, or at least raking away leaves, twigs, and spent acorns will prevent biomass buildup and soil nitrogen pollution. Lowering soil nitrogen will encourage desirable grasses and wildflowers that act as perfect oak sapling nurseries.

Perhaps the best way to begin an oak rescue crusade is by identifying and bringing attention to your communities legacy oaks. Take a picture of the oak tree. Measure it’s circumference. Post the oak on social media. Collecting acorns and growing saplings and planting oak trees are another good way to continue oak existence. Likewise, increase your oak knowledge. There are several good oak reads in public press and numerous scientific articles in oak ecology. One of my favorite oak books is titled “The Life of an Oak” by Glenn Keator 1998. One of my favorite websites is the International Oak Society <https://www.internationaloaksociety.org>. And most of all, celebrate oaks!

White Oaks (<i>Lepidobalanus</i>)	Red Oaks (<i>Lobatae</i>)
Bur Oak (<i>Quercus macrocarpa</i>)	Red Oak (<i>Quercus rubra</i>)
White Oak (<i>Q. alba</i>)	North Pin Oak (<i>Q. ellipsoidalis</i>)
Marsh Oak (<i>Q. bicolor</i>)	Black Oak (<i>Q. velutina</i>)

By **Stephen Thomforde**



Author standing next to a 67” diameter oak in Cambridge, MN. This tree was the second largest bur oak in MN. Think of how many bison, elk, passenger pigeons, and Native Americans wandered in the shade of this tree.

A KEYSTONE SPECIES The Beloved Strawberry



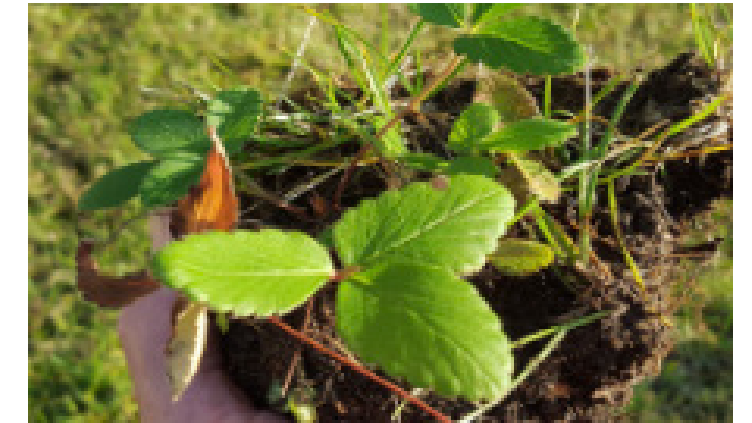
Wild and woodland strawberry plants are members of the Rose family Rosaceae. Other members associated with the Rose family include apples, pears, plums, hawthorn, prairie smoke, potentilla, service berry and cherry. Many rose family members produce edible fruits, nectar, pollen, and forage. Edible plants are keystone biodiversity promoters. They do so by transforming sunlight into sweet carbohydrate and protein, which then flows and sustains diverse foodwebs, including pollinators. Native and domestic bees, as well as bumble bees, syrphid flies, beetles and ants feast on strawberry nectar, pollen, and flower parts. In return, pollination produces an aggregate-accessory fruit, whereby the receptacle lovingly swells to embrace each embryo in fleshy fruit. These luscious red fruits, the color of love, feed many birds and mammals. Humans throughout the Northern Hemisphere have celebrated wild strawberries in lore and dance, as a sign of renewal, love, and as a powerful medicine for thousands of years.

Theme and variation of both wild and woodland strawberry plants are found throughout the Northern Hemisphere. Wild strawberry prefers full sun while the woodland strawberry prefers savanna shade. Both species prefer low nutrient soils, such as gravelly moraines and southwest aspect knolls. In historic time, both species benefited from grazing herbivores, and likewise, fall burning by humans to remove leaf litter and thatch to the benefit of herbivores and strawberries.

Curtis, in his classic *Vegetation of Wisconsin* (1959), described native strawberries as “Ubiquitous” growing across the Midwest in a variety of plant communities. Some readers may remember when wild strawberries were common, everywhere, but in recent times, soil nitrogen increases, from the lack of grazing and the over use of fertilizer and fossil fuel burning, has shifted vegetation dominance to taller growing non-edible plants. The trend towards non-edible vegetation represents a significant threat to foodwebs, biodiversity and pollinators.

Conservation and restoration of keystone strawberries, and many other native plants, requires management for low nutrient environments.

Wild Strawberry *Fragaria virginiana* L.
Woodland Strawberry *Fragaria vesca* Duchesne



Wild strawberry plant transplanted in a lawn. Note the stolon (runner).



Wild strawberry flowers with an ant feeding. Five petals associated with the Rose family. Male anthers with pollen paddles surround female stigmas. Each stigma has the potential to become a seed in the berry.

Luckily, our lawns are one such place we can all manage for reducing fertilization and organic inputs by trees, clippings, and pets. Managing for low nutrient environments require us to mimic grazing and fire. As soil nitrogen obtains healthy levels (e.g. C:N ratios), plants grow shorter while native plant diversity increases. Wild strawberries are perfect lawn plants. They are best by added to lawns from plant stock, as seeds are difficult to obtain and germinate. Be sure to purchase native plants, including wild strawberry from reputable native plant suppliers. Within a few seasons, wild strawberry plants will begin to spread across the lawn, via stolons.

I have released wild strawberry plants in many plantings, as a signature species, hoping to restore what was once common again. One landowner told me the best part of wild strawberries in her lawn was when the neighborhood children came to feast upon the strawberry bounty.

Stephen Thomforde is a Senior Ecologist with Stantec, Farmer and Educator. His experience encompasses 25 years of innovative ecological restoration, using cutting edge principles, e.g. ecosystem phenomenology, keystone processes (grazing), and disturbance theory coupled to a strong natural history, in grassland, savanna, and wetland projects.





A HARMLESS WASP WITH A SCARY NAME

Meet Our Friend, The Eastern Cicada Killer Wasp

The Eastern cicada killer wasp on Rattlesnake master flower. This native wasp is similar in appearance to the much larger Asian giant hornet. Learn to identify differences. The cicada killer wasp is beneficial and native to Minnesota. The introduced Asian giant hornet has not been spotted in Minnesota.

In a rush to stop the invasion of the Asian giant hornet (*Vespa mandarinia*) or ‘murder hornet’, entomologists recently destroyed a nest in the Pacific Northwest containing hundreds of Asian giant hornets. Time will tell if there are additional populations already established. This introduced giant hornet is extremely large, and like many social wasps (family Vespidae), it will hunt a variety of insects including caterpillars, beetle larvae, flies, other wasps, and bees.

In North America, there are established populations of European hornets (*Vespa crabro*). Like the Asian giant hornet, this species can also be a pest of honey bee apiaries. While neither of these hornets occur in Minnesota, we do have a native beneficial wasp, the eastern cicada killer wasp (*Sphecius speciosus*), which unfortunately superficially resembles both of them.

People are just starting to learn about the amazing diversity of bees that occur in North America (and in Minnesota).

Wasps, their closely related cousins are even more diverse and arguably equally as fascinating as bees. Don’t forget, our beloved bees are really just hairy, vegetarian wasps! Predatory wasps differ partly because they are carnivorous, hunting insects or spiders to feed their larvae (instead of collecting pollen and nectar like bees). Many wasps are efficient predators that help control pest insects in the garden. As many as 25% of the native bee species that occur in the Upper Midwest are specialists, collecting pollen from native host plants belonging to one plant family or more narrowly, one plant genus.

Similarly, many solitary wasps have very narrow prey preferences, and some are specialists that hunt only insects belonging to a single genus. The eastern cicada killer wasp is one of those specialists; females hunt only cicadas including annual cicadas (*Neotibicen*) and scrub cicadas (*Diceroprocta and Neocicada*). What’s even more interesting is, in regions where this wasp’s range overlaps with periodical cicadas (*Magicicada*)—cicadas that emerge



Female eastern cicada killer wasp entering her ground nest.

every thirteen or seventeen years—it is rare for this wasp to hunt this type of cicada! If you’ve ever experienced the emergence of a periodical cicada population, you are probably wondering why on earth would this wasp pass up the opportunity to take advantage of this abundant supply of prey?

The female wasp hunts cicadas in trees; after capturing one, she curves her abdomen forward, then stings it at the base of one of its forelegs. The venom injected into the prey causes paralysis. But before the venom takes effect, the cicada often makes an audible screeching noise when being attacked by this wasp. After her prey is subdued, she needs to perform an amazing feat of strength—the cicada

can weigh two times more than the wasp. Clutching the cicada beneath her, she launches from the tree to fly back to her nest.

The eastern cicada killer wasp nests in the ground and the female preferentially excavates her nest in sandy or gravelly soil. Her nest has multiple cells an average of sixteen, and she stocks each cell with one or two cicadas.

As it consumes the cicada, the larva develops, going through several molts (instars). In the final (fifth) instar, it spins a silken cocoon to prepare for pupation. Pupation doesn’t happen for many more months, however, because the larva suspends its development during winter, remaining immobile in its cocoon in a prepupal state. The following spring pupation begins, then adults emerge in mid-summer, the timing overlapping with when their prey, cicadas, are active.

Males emerge from the ground before females. After mating, the females begin excavating new nests in the ground and hunting cicadas. The circle of life for these amazing wasps begins for another season.

-By Heather Holm

Author of *Pollinators of Native Plants, and Bees*
If you would like to learn more about the amazing diversity of wasps and their associations with native plants, find Heather’s book *Wasps: Their Biology, Diversity, and Role as Beneficial Insects and Pollinators of Native Plants* online at pollinatorsnativeplants.com
January 2021.



The cicada killer wasps are large, but these wasps are not interested in stinging people – they are interested in stinging cicadas. This cicada is perched on Elias’s finger carrying her prey – a cicada.
Photo: cicadamania.com

FOR THE LOVE OF SOIL

Falling for Regenerative Farming



Soil samples show 150 year old top soil (pre-European arrival). Nic Jelinski and Tiffany LaRuse, Univ of Minnesota Soil Scientists.

My little farm's mission declares that the sequence of growing fantastic food starts with growing Soil. "Growing Soil?" you ask, "Don't we have enough of that?"

I am sitting in my beautiful workspace, formerly an 1850s barn. I hold the abstract title—a record of modern time that collapses 140 years into a brown vellum binder. Without reference to the indigenous Ojibwe and Dakota people who lived here for millennia, it is a story of property transfers and ownership. There is no mention of trees, flowering plants, springs, migrating birds, or the topography of this rolling land descending from forested top to river bottom, nor is there a mention of the “free” top soil we inherited, nor the indigenous people who ensured its future through managed foraging, planting, and grazing wild animals.

Twelve or so years ago I turned my love of gardening to farming. We leased 26 acres of our logged-off land to a good albeit traditional farmer. He planted field corn one year, soybeans the next, spraying aerosols of undisclosed nature, broadcasting various dusts and odors.

It was late fall as I stood on the field's recently shorn and disked ground. Looking out on an undulation of trenched, powdered dirt, I wondered why I'd never noticed that this

field wasn't at all flat. My mother appeared in my mind's eye, providing a metaphor in the gorgeous swells and curves of this land. She was ill, I had begun caring for her as if she were my own child. I wanted to run, fly if I could, across the field's corporeal being, holding her curves and plains as I gathered her up in my arms, wanting deeply to heal her wounds.

Sandy clouds rose from the chopped soil catching luffs of wind spinning into little tornados, whistling and disappearing. The soil seemed to be disappearing before my eyes.

I saw “my” land as if for the first time. Intuitively, I realized that by leasing the land we had abrogated a responsibility of ownership. We had given away our right to farm in a manner that honors the soil.



Regeneration of the field at Salt-n-Pepper Farm, Scandia.

Starting to See Soil

Thirteen years later, the regeneration of the dry scape of field is well underway. She is emerging after 12 years of intensive rest. Her soil has not been disked nor tilled, but planted continuously with cover crops: grasses, clovers, native plants, and volunteer trees—oak, white and Norway pine—have taken root. Soil samples offer a striped geological history. There is no topsoil left except for a tiny layer at the root base of growing grasses and forbs, showing the modest outcome of continuous plant cover. Each soil layer seems to reflect the previous samples, mostly sandy loams and clay. But down further, a core of rich, dark soil—4” of “chocolate”—emerged from the bore sample, a remnant of native soil that hadn't drifted away. This dark soil layer is the picture of what we have lost. A thousand years amounting to 4” of topsoil which here in this valley survived 100 years of massive tree cutting, and yield-focused agriculture.

Falling in love with soil opens doors, apparently. Twelve years ago, a series of events directed me down a path that has become my life's work. There was drama: GMO corn treated with Clothianidin, a pesticide, killed most of the bees in our apiary. There followed public recognition through the Minnesota Dept of Agriculture that the bee kill was caused by a pesticide camouflaged by euphemisms, protecting the chemical company from blame.

Then a grant from the Washington Co Conservation District offered the means to plant cover crops on the field giving me the opportunity to watch the impacts of cover cropping and green manuring for three lovely years, and to learn to read soil tests whose outcomes would NOT include the application of chemical nitrogen, nor any amendments to push the soil into hyper drive. The consequence is the field today, a slowly regenerating ecosystem that has become a biodiverse grassland and sylvan habitat supporting diverse life.

Investing in Soil (There is No Heaven without Earth)

¹ Dr. Kris Nichols adopted the metaphor of environmental investment strategy—the idea that carbon is currency—to describe the urgency and necessity of Regenerative Farming and the potential for atmospheric carbon to “fuel” long-term investment in soil. Industrial Agriculture measures success by volume: production yields. Regenerative Farming aims to grow life-sustaining soil. 90% of our agricultural land grows low-quality food and industrial products quantifying its success in production yields not the quality of food or soil. By current measure 365 billion metric tons of topsoil is annually blown into rivers, estuaries, lakes and streams. Nichols cautions that without the regeneration of healthy soil Earth cannot sustain life. Regenerative Agriculture does not guarantee yields, but rather promises the potential for sustaining life.

In order to save our planet, we need to convert the 900 million acres of desertified dirt left by industrial ag to 450 million acres of biodiverse soil. ² E.O. Wilson calls this **Half-Earth**: half the Earth must be converted from dirt to soil and left to build her portfolio of life-giving microorganisms, fungus, plants and their permanent roots. This is a long-term investment, and among the dividends are biodiversity, carbon sequestration, healthy plants, animals, air, water, and sustainable LIFE.

Dirt is Not Soil

We measure the value of agriculture by volume/yields/commodity quantification NOT by healthy soils, healthy food, clean water, breathable air, viable insect and birds, not to mention healthy animals whom we love and sometimes eat. Our current measure of success (yield) prevents us from growing our investment in soil—environmental resiliency from which to recover our losses.



Rich soil means delicious vitamin-rich produce in these shared boxes of organic produce and pollinator-friendly flowers at Salt-n-Pepper Farm.

The Dotted Line to Save Life on Earth

Dr Nichols prescribes...

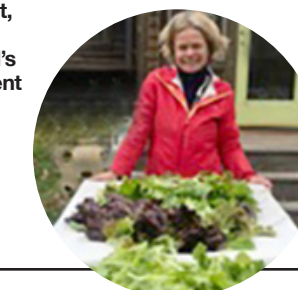
1. Agree that soil is not dirt and that we need half the Earth to be covered by soil. Soil is the Earth's armor—the entire soil investment must be protected CONTINUOUSLY by plants, 365 days a year. Plants are our allies.
2. Drugs: agree that chemical inputs are not needed nor are they a good investment. Since we're not going to measure our legacy wealth by yield, but by ENVIRONMENTAL COST. Chemicals/drugs are too environmentally expensive.
3. Animals are essential to Regenerative Agriculture. Grazing animals were given the misnomer “livestock”. In fact, grazing animals is the source of soil biological activity. The disruption introduced by animal life is a principle of soil regeneration (pooping, peeing, scuffing up the garden). Note that among the gases causing global heating, methane represents about 10%. Methane doesn't hang out long, unlike carbon and other gases. Remember too that managed grazing is NOT a CAFO feed lot (Concentrated Animal Feed Operation). These are two entirely different environments.
4. Diversity: Plant and biological diversity ensure that soil will be productive.
5. Photosynthesis: To use carbon's free capital we must support a diversity of plants that flower, seed, senesce, and establish roots at different times and rates all year round. Deeper roots create more stable soil armor, and richer more biodiverse topsoil, like the 1000s-year-old rich “chocolate”, life-giving topsoil waiting for our discovery at the base of a depression in my recovering, regenerating field.

¹ Dr Kris Nichols, soil scientist and speaker on regenerative farming.

² Half-Earth Project on saving global biodiversity, EO Wilson Foundation.

Regenerative Farming Resources:

- Gabe Brown, regenerative farmer, consultant, speaker
- Atina Diffley, farmer, organic consultant, speaker and author
- Allen Savory, regeneration of the world's grasslands through holistic management
- The Land Stewardship Project
- MOSES Organic Farm Conference
- FEDCO seed catalog



By Pam Arnold, Farmer, Salt-n-Pepper-Farm LLC

LEARN - PROTECT - TAKE ACTION

Online Learning and Resources

Check out PFA's webinars:

Our speakers include Chris Helzer, Nature Conservancy's Nebraska Director of Science, and Don Shelby, award-winning journalist, tv anchor and Twin Cities Public Television voice dedicated to investigating conservation and mitigating climate change.

Check out PFA's new resources online including updated list of [pollinator-friendly plant](#), shrub and tree sources, and the latest on [neonicotinoid pesticides](#).

March 2-4, 2021 Summit

Learn ecologically sound land management practices that promote pollinators, climate resilience, clean water and lands. **Annual Best Practices for Pollinators** provides practical knowledge and innovation on pesticide reduction, habitat installation, fostering soil health, pollinator conservation and more.



Endangered Karner blue butterfly.
Photo: Jill Utrup, USFWS

WE STAND FOR POLLINATORS

Pollinators form the foundation of the ecosystem on which all life depends.

Join our community of pollinator champions to help save the Earth's keystone species. Your generous support sustains Pollinator Friendly Alliance.

Pollinator Friendly Alliance (PFA) is a grassroots nonprofit that protects the natural world through the conservation of pollinators and their habitats.

Choose the gift that fits your goals, either monthly or single donation. PFA is powered by volunteers, which means your tax-deductible gift goes directly and entirely to conservation efforts.

TAKE ACTION

Please mail your donation to:
Pollinator Friendly Alliance
PO Box 934, Stillwater, MN 55082
or online at:

www.pollinatorfriendly.org

JOIN THE HIVE



5★ CONSERVATION FILMS

Cozy up and eco-travel around the globe with the best for 2021!



Call of the Forest: The Forgotten Wisdom of Trees (Prime, Vimeo) A blend of science and spiritual wisdom on how our health and the health of the Earth depend on the state of our forests. Beautifully shot.

I am Greta (Hulu) Greta Thunberg at age 15 leads a global movement on climate change.

The Dark Divide (Prime, Apple) Real-life tale of a naturalist exploring imperiled wilderness, bears, bigfoot, butterflies and amazing scenery.

My Octopus Teacher (Netflix) Profound story about animal-human mysteries with a diver/filmmaker among the African kelp forest.

Public Trust (Youtube) Unforgettable photography on the fight for America's public lands with narrator Robert Redford.

A Life on Our Planet (Netflix) David Attenborough recounts life as an environmental filmmaker, grieving the loss of wild places and offering a vision for the future. Beautiful landscapes, animals and personal accounts.

The Biggest Little Farm (Hulu, Vudu) Breathtaking cinematography, captivating animals and an urgent message for Mother Earth. An 8-year chronicle from barren farmland to a dream harvest in harmony with nature.

Fantastic Fungi (Prime, Apple, Vudu) Planetary survival, gorgeous photography, mind-blowing and immensely entertaining.

Three Seconds (Vimeo, Youtube) An epic short film of where humanity stands today and how we must all work together.

Kiss The Ground (Netflix) Featuring Woody Harrelson, this climate documentary with heart demonstrated a common-sense plan that centers on revigorating our depleted soil.

Winged Migration (Prime, Vudu) Long aerial tracking shots of birds in their poignant long-distance flights, remarkable and innovative photography.

Honeyland (Hulu, Vudu) Stunningly beautiful and quietly powerful, this is a portrait of a Macedonian beekeeper's vanishing way of life.

Artifishal (Prime, Vudu, Apple) Amazing cinematography reveal the practice of spraying salmon and use of fish hatcheries intended to supplement wild fish populations actually do the opposite.

The River and The Wall (Prime, Vudu) Part adventure and part ode to this beautiful wild territory weaves in stories of undocumented immigrants and the wildlife that live in this rugged terrain.

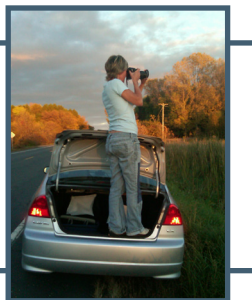
Cowspiracy (Netflix, Prime, Apple) One of the leading causes of deforestation, water consumption and greenhouse gas output is cattle. Will have you questioning everything you know about factory farming and mass-producing animals.

Sea of Shadows (Hulu, Prime) When Mexican drug cartels and Chinese traffickers join forces to poach, they threaten to destroy virtually all marine life. Filmmakers follow a team of dedicated scientists, conservationists and undercover agents to save the last remaining vaquitas.

Into the Okavango (Prime, Vudu, Disney) Botswana's Okavango is one of the greatest rivers on Earth. A dazzling closeup of the exotic flora and fauna from lions to bush babies whose lives depend on the flow inland.

Rewilding Patagonia (Youtube by Earthrise) A worldwide movement to rewild the countryside. Chile's 304,000 hectare national park is brought back to life by restoring the land to nature.

Curated by
Laurie Schneider,
Film Geek,
Professional Photographer,
BFA in Fine Arts and Film Studies



WILD BEES
Brown belted bumble bee

MEET THE POLLINATORS

Bees, Wasps, Beetles, Birds, Bats, Butterflies, Flies, Moths



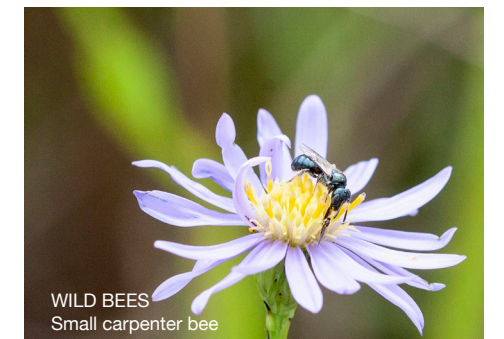
BATS
Fruit bat



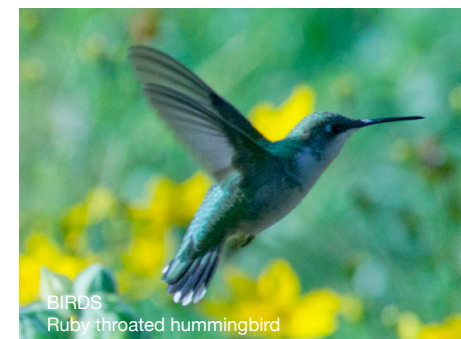
MOTHS
Luna moth



BEETLES
Goldenrod soldier beetle



WILD BEES
Small carpenter bee



BIRDS
Ruby-throated hummingbird



HONEY BEES
Western honey bee



BUTTERFLIES
Eastern tailed-blue



FLIES
Syrphid fly



WASPS
Giant black wasp



BUTTERFLIES
Fiery skipper

Photos by Laurie Schneider except bat, wikimedia.



Miner bee (*Andrena*) on black currant.
Photo: Heather Holm

