

Campus Pollinator Habitat Plan

SUNY New Paltz

June 2019

Prepared by Laura Wyeth

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Biodiversity Initiative

Introduction



Biodiversity is defined as "the variety of life found on Earth," though it is not simply the variety that is important.

Plants, insects, fungi, mammals, bacteria, and birds don't simply co-exist in an ecosystem, they interact and depend on each other in specific and irreplaceable ways-ways that are shaped by each organism's unique characteristics.

Biodiversity, then, is really a measure of the abundance of – **specific relationships between species** – relationships that have evolved over millennia.

In August of 2018, the Office of Campus Sustainability launched a Biodiversity Initiative in partnership with faculty and staff from across campus to identify, support, and protect a wide variety of interdependent living species on our campus.

We live in an era in which species of all kinds are **disappearing** at alarming rates. Destruction and degradation of habitat are the primary driver of species extinction, and human activities are the primary cause of that **habitat loss**.

Plants and animals of all kinds also face other threats, such as displacement by invasive species, hunting and overharvesting, and the pressures of the climate crisis. Habitat and species loss are not anomalies that happen in far-off rainforests- they're occurring all around us. Every paved, mowed, night-illuminated, and developed landscape contributes to the loss of species diversity.

Protecting Pollinators

With this initiative, we seek to support the native creatures that have called this place home for countless generations.

To do so, we must identify these organisms and understand the complex relationships between them.

One of nature's most important processes for expanding the diversity of species is **pollination**, which brings together the reproductive cycles of a flowering plant and an animal, usually an insect.

Pollination is vital work, not just because insect-pollinated crops account for up to 30% of the food we eat (USDA, 2013), but because all plants that are pollinated by insects **rely totally** on those pollinators for their reproduction. If there are not enough pollinators to do this work, then a huge percentage of the plants that surround us and feed us cannot reproduce in sufficient quantity and will face extinction.

**Native insects need native plants,
and native plants need an abundance of pollinators.**



Laura Wyeth

Threats to Pollinators

Loss of Habitat

Fragmentation of habitats and loss of plant hosts

Environmental Pollution

Pesticide, herbicide, and fungicide exposure

The Climate Crisis

Plant and insect life cycles moving out of synchrony, extreme weather events, extended droughts

Pollination

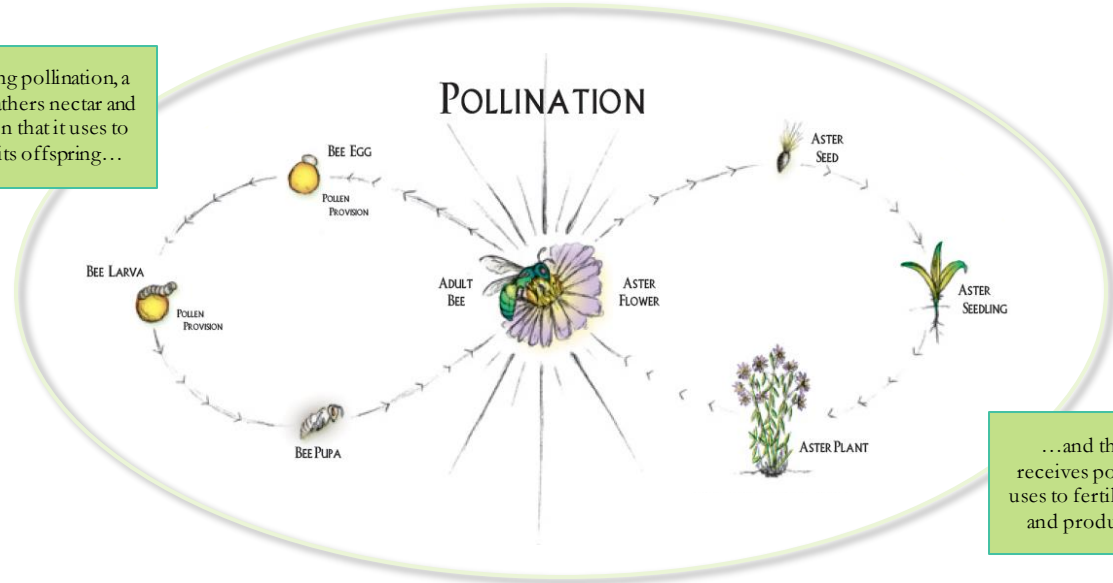
This elegant cycle ensures continuing generations for both flowering plants and bees.

Flowering plants and pollinating insects have a special relationship; they depend on each other to reproduce.

Bees visit flowers to find nutritious nectar and pollen, which they gather to feed their young. Some of that pollen will get transferred from one flower to another while the bees forage.

When a flower receives pollen from another plant of its kind, it uses that pollen to fertilize its eggs, creating new baby plants, which we know as seeds.

During pollination, a bee gathers nectar and pollen that it uses to feed its offspring...



...and the plant receives pollen that it uses to fertilize its eggs and produce seeds.

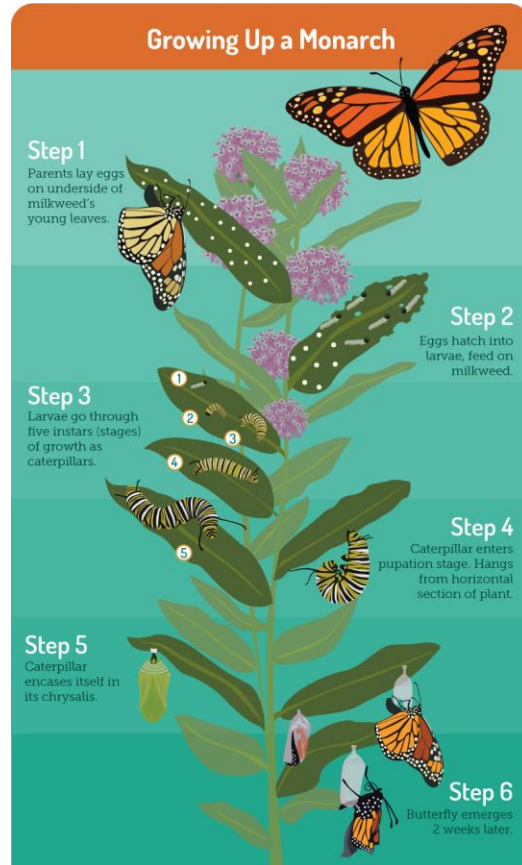
Most plants do not bloom continuously throughout the season; they have a specific period of bloom each year, some lasting only a few weeks. Most pollinators need to forage all season long, however, so it's important that they have access to a wide range of early, mid, and late season blooms.

Pollinator Life Stages

Insects experience a series of body transformations called **metamorphosis**, usually involving an egg, larval, pupal, and adult stage. They eat different things during each stage of their life cycle. **Becoming familiar with these changes is the key to supporting insect pollinators.**

Bees live through their egg, larval, and pupal stages inside a brood cell in a nest. During these stages, they are largely immobile, and feed on a mix of nectar and pollen provided by their mothers. Adult bees feed on flower nectar.

Butterflies and moths experience a metamorphosis that most of us are familiar with. After hatching from an egg, the larval stage, called a caterpillar, eats leaves voraciously until it's time to form a transformation chamber, or chrysalis. After a period of concealed development, they emerge radically changed into winged adults. Their mouth shapes change from leaf-chomping jaws to nectar-sipping straws, which indicates the change in their food source. Adults transfer pollen from flower to flower while foraging for nectar.



The Monarch's host plant is milkweed.



Most insects that eat plants can only eat specific species of plants, known as host plants. This is because plants produce their own **chemical deterrents and poisons**, in order to protect themselves from herbivores. Over thousands or millions of generations, some insect species develop an immunity to a particular plant or plant family's poisons, allowing the species to eat plants in that group. Sometimes the species loses the ability to eat any other plants, and become reliant on specific plant species.

In order to support the greatest range of pollinators, we need to provide and protect a wide range of host plants.

Insects whose larval stages eat leaves, such as butterflies, moths, flies, and beetles, typically lay their eggs on or very near to their host plants, so that the newborn larva don't need to travel far to start eating. Some insects eat host plants that are herbaceous perennials, but most trees and shrubs serve as host plants, too.

Types of Pollinators

Though bees are the most abundant and efficient pollinators, many other creatures feed on nectar and transfer pollen in the process.

Here are some other types we hope to support in our area:



Sarah Bright

Butterflies: Spicebush swallowtails, Monarchs (*Danaus plexippus*), and Cloudless sulphur (*Phoebastria sennae*) are native butterflies that are common in our area. Butterflies survive on flower nectar in their adult stage, transferring pollen as they go.

Beetles were among the first pollinators of flowering plants, beginning in the late Jurassic period, 150 million years ago. Many beetles eat pollen as adults, and most lay their eggs on or near a host plant. The Flower scarab (*Trichiotinus assimilis*) is an important pollinator of native magnolia trees.



Beatriz Moisset



roadsendnaturalist.com

Moths: Some moths live a short time as adults, as brief as two weeks, and so do not feed at all. Hummingbird hawkmoths (*Hemaris thysbe*) are beautiful, move fast, and hover while they feed; it's easy to mistake them for hummingbirds. They are common in our area, though, so keep a look out for them in summer!

Flies: Adult flower flies in the family *Syrphidae* eat nectar and pollen. Flies do not have stingers, but many species have developed body shapes and coloration that mimic bees and wasps, to avoid being eaten by predators.



Laura Wyeth



Larry Master

Hummingbirds are attracted to red, tube-shaped flowers. Ruby-throated hummingbirds (*Archilochus colubris*) are the most common species in our area, though they are migratory - every winter they fly to Mexico or Florida!

Wasps: Many wasps feed on nectar and other sugars as adults, though they feed their larva other insects. Bees descended from a wasp ancestor. The majority of wasps are small, non-aggressive creatures that rarely sting people. The yellow jackets and hornets, who attack if provoked, have given their docile cousins a bad rap.



Pixabay



Emily Puthoff

Bees

In terms of supporting biodiversity, bees do a tremendous amount of work.

Bees have specially co-evolved with many flower types, and their bodies have been shaped by evolution to carry pollen for the benefit of their offspring and for the flower. But like so many species, their numbers are in **steep decline**.

The reasons for this loss are the same for native and non-native bees, solitary and communal: disease, parasites, and pesticide exposure, and especially **habitat loss** (meaning loss of host plant, in many cases). More work needs to be done to change the public perception of these creatures from pests to **invaluable pollinators**.



Emily Puthoff

To guarantee their next generation, bees need access to flowers; they need meadows, gardens, roadside verges, forest edges, and farm margins. They need easy access to spaces full of plant life, especially native flowering annuals and perennials, at all stages of growth. They will inadvertently pollinate the flowers they visit as they collect pollen and nectar, and those efforts will help ensure that the plants will survive for another generation, too.

For a bee, a **'habitat'** isn't a place so much as it is a **community** of other species. It's an abundance of healthy, prolific flowering plants that haven't been sprayed with chemical pesticides.



Emily Puthoff



Native Solitary Bees

Emily Puthoff

Usually, when we think of bees, we think of honey bees, who live in hive communities.

In fact, **the overwhelming majority of North American bees (90%) are solitary species** that build nests in trees, dead wood, or underground. In solitary species, each female creates her own nest and feeds her own young with nectar and pollen. Many of these native bees are very small, and escape our notice until we learn to see them.

Different species of bees emerge and forage at different times of year (early spring, late summer, etc..) so it's important to have pollen producing flowers available throughout the season to meet their needs.

Leafcutter Bee Nest Building

Mom finds a suitable hole in a wood structure or tree, then cuts a circle out of a leaf. She builds a small cell in the hole using the leaf pieces, fills it with pollen and nectar, lays an egg in the chamber, then seals the cell, flying off to gather materials for the next cell..



Differences Between Native Solitary Bees and Honey Bees:



Tim Stanley

Native Solitary Bees

- North America has over 4000 native bee species
- Over 400 species of native bees are identified in New York State
- 90% of the bee species in North America are solitary
- Solitary female bees lay their eggs in small tunnels, dug into dead trees or in the ground
- Native bees have a great range of diversity in size, shape, nest construction, and flower preferences
- Females create as many nests as possible and do not defend them
- Are not aggressive and rarely sting
- Gather nectar and pollen to provision each egg they lay; solitary bees do not produce honey
- Very efficient pollinators; most spend more time per day foraging than honey bees, and are more likely to forage in inclement weather
- Precious resources in our ecosystem



Laura Wyeth

Social Honey Bees

- A single species, *Apis mellifera*, the European honey bee
- Introduced from Europe in the early 1600s
- The most well-known bee species, used world-wide to pollinate crops and produce honey
- Live in communal hives of females that work together to raise the next generation
- One queen bee lays all the eggs for the community; her sisters work together to build the nest, feed the young, defend the hive and keep it healthy
- Males leave the nest to mate with an unrelated queen and begin a new colony
- Can be aggressive in defending their nests and can sting if provoked, but rarely sting while foraging
- Employed in great numbers as pollinators for commercial crops because they are easily transportable, though they are not necessarily better pollinators than native bees.



Though we're lucky to live in a county that boasts impressive parks and preserved lands, much of the land in Ulster County is fragmented by roads, tamed into unproductive lawns, or otherwise made unsuitable for the thousands of species of all kinds that have historically lived here.

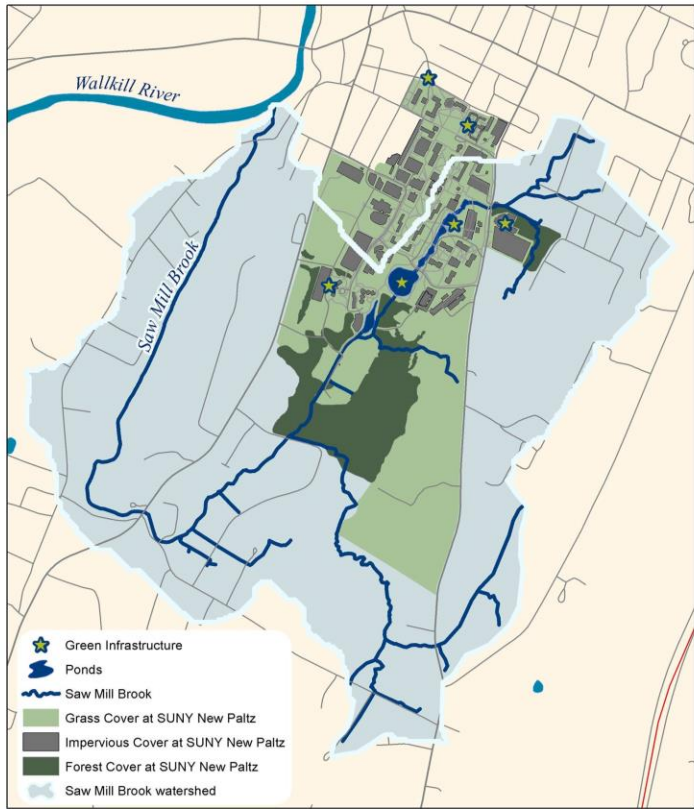
Habitat loss is the primary reason that so many species become endangered and go extinct, and not just in the rainforest or other exotic locales, but right here in our backyards. We can reverse these trends, but only if we learn how to see and understand Nature's elegant systems.

Pollinating insects and the plant allies they rely upon are in dangerous decline worldwide.

To support pollinators, we need to consider the spaces all around us as potential habitat, and to change our perception of unmanicured spaces from "messy" to "life-sustaining."

Given the incredible loss of species diversity the world has experienced in the last century, every little bit counts.





The **SUNY New Paltz campus** sits in the scenic Hudson Valley amongst the forests and fields of the Shawangunk Mountains. We are surrounded by many large parks and preserved habitats, a great variety of farms and orchards, highly connected public rail trails, and a town that places a high value on environmental conservation. Our campus encompasses over **209 acres**, including 45 buildings that cover approximately 2.27 million square feet, an abundance of mature shade trees, a wetland complex, several large fields, and a thriving deciduous forest dominant in beech, oak, and hickory.

SUNY New Paltz is situated in the **Saw Mill Brook Watershed**. Waters from nearby neighborhoods collect and flow through the heart of campus, including the central pond system. The Saw Mill Brook then flows through the south end of campus and the forest beyond before looping back north to flow into the Wallkill River.



Given the range of habitat types within our campus and our close proximity to farms, forests, and wetlands, it is important for us to consider how our activities impact our surrounding environment and to make every effort to contribute positively to its health.

Saw Mill Brook Watershed, New Paltz

Overall Campus Pollinator Habitat Goals:

- Get to know our pollinators: identify and research the pollinator species and their host plants indigenous to our area.
- Increase quality, year-round habitat for pollinators and native plants throughout campus while decreasing acreage of managed turf-grass.
- Choose native plant species for all new plantings and eliminate introduction of non-native plants.
- Focus on creating Bird, Bee, and Butterfly Corridors, connected planting zones that offer forage and shelter.
- Investigate opportunities to eliminate the use of herbicides on athletics fields.
- Engage and support pollinator research and student service-learning projects.
- Educate the campus and region about the importance of pollinators.
- Source plant material from nurseries that do not use synthetic pesticides and employs organic principles in its plant care.



As a campus community, we have a unique opportunity to not only support biodiversity through our land management practices, but to engage our human resources- students, staff, faculty, community members, and campus visitors by sharing what we've learned and by getting them involved.

By providing habitat, minimizing harm, and raising awareness about the important role of pollinators to our local ecosystem and economy, SUNY New Paltz can lead by example in the efforts to protect this important resource.

SUNY New Paltz Pollinator Protection Strategies:

We can support our pollinators by providing habitat and minimizing harm.



Goals to Provide Habitat:

- Plant native plants that have long term life histories with native pollinators.
- Provide a variety of flowering plants that allow for continuous bloom from spring through fall.
- Replace lawn with pollinator forage and host plants.
- Connect habitats where possible; avoid fragmenting plant communities with paved surfaces.
- Leave the leaves wherever possible to provide food and shelter for a variety of pollinators. Leave dead trees standing wherever possible; pollinators use these as nest sites.
- Some pollinators overwinter or lay eggs in or on the stems of perennial plants; leave these standing over winter.

Goals to Minimize Harm:

- Reduce or eliminate the introduction of non-native plants. Avoid highly cultivated varieties of flowers, especially those with double-petaled flowers; pollinators cannot access their pollen.
- Reduce and preferably eliminate the use of systemic pesticides on athletic fields. Do not use neonicotinoid pesticides on athletic fields.
- Avoid covering soil with plastic or landscape rock mulch; these create a barrier that prevent the inflow and outflow of organisms that keep soil alive and healthy.
- Avoid tilling, compacting, or otherwise disturbing soil.
- Avoid disturbing overwintering sites; leave dead stems and other vegetation in place where possible.



Existing Pollinator Habitat on the SUNY New Paltz Campus:



Vegetated
Bioswale



Green Roof
Garden

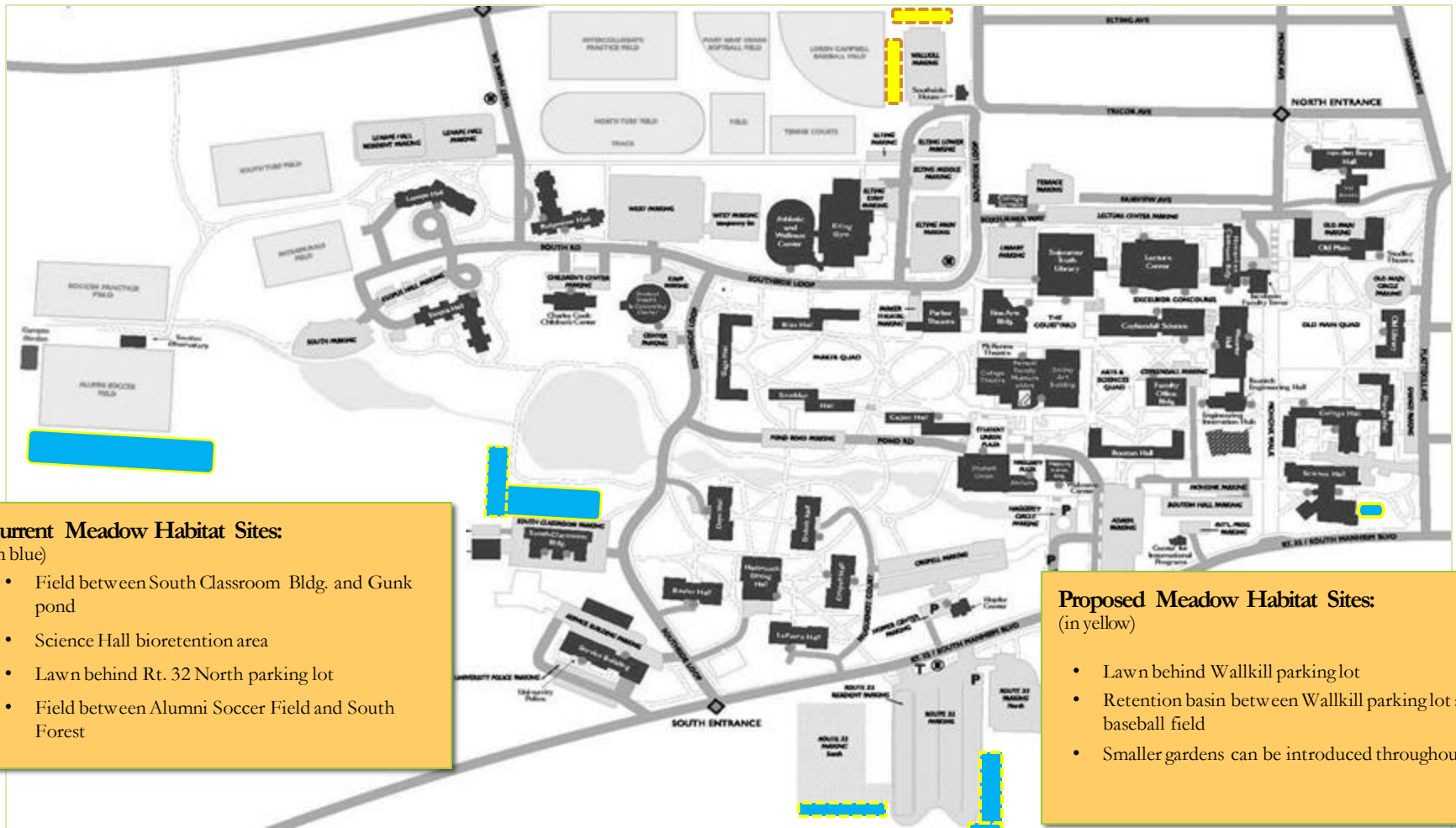
- Vegetated Bioswale between Crispell Hall and Gunk Stream (part of the larger Saw Mill Brook Watershed)
- Flowering shrubs beside Gunk stream, such as sweetspire, viburnum, and red-twig dogwood
- Retention pond, stream, and swamps at South end of campus
- Small garden of perennials between Student Union Building and Dorsky Art Museum
- Flowering and host plant trees all across campus, especially American basswood, redbud, sycamore, and red oak.
- Green Roof Garden in front of Haggerty Administration Building
- South Forest and south swamp, especially the edge zones where flowering vines, shrubs, and cane plants, such as native black raspberry, predominate.
- Science Hall bio-retention meadow



Science Hall
Bio-retention
Meadow



South Stream



Current Meadow Habitat Sites:
(in blue)

- Field between South Classroom Bldg. and Gunk pond
- Science Hall bioretention area
- Lawn behind Rt. 32 North parking lot
- Field between Alumni Soccer Field and South Forest

Proposed Meadow Habitat Sites:
(in yellow)

- Lawn behind Walkkill parking lot
- Retention basin between Walkkill parking lot and baseball field
- Smaller gardens can be introduced throughout

New Pollinator Meadow Habitat

This large lawn on the southern end of campus, between the South Classroom building and the large Gunk pond, will be allowed to grow into a meadow habitat to support flowering plants, pollinators, birds, and a variety of other life forms. The Facilities department will maintain this as a “low mow” area.



Center of new meadow, facing south.
Gunk pond to the right.



Center of new meadow, facing north.
Gunk pond to the left.

In the spring of 2019, the grounds department will ease mowing in spring and summer to allow grasses and wildflowers to return. Mowing once a year or every other year in late October/November, after the ground-nesting birds have left the nests, will prevent the area from returning to forest. The meadow will have wide mowed margins of at least ten feet and attractive interpretive signage describing the special plant/insect relationships supported there.

Pollinator Meadow Succession

Changes in a meadow over time

A **meadow** is comprised of a community of herbaceous plants and the variety of insects and other fauna that those plant species attract. The stems of herbaceous plants don't become woody, therefore these plants don't have the rigidity to grow as tall as shrubs and trees. Some meadow plants are 'annuals', meaning they die at the end of the growing season. Others are 'perennials', meaning that the stems and leaves die back in the autumn frosts and the roots remain alive over the winter.

The plants found in a meadow will change over time as some species outcompete others and as new seed types are introduced from elsewhere by animals and wind.

Two main groups of herbaceous plants inhabit a meadow: grasses (including sedges and rushes) and everything else, which we usually call "flowering plants" to distinguish them from grasses. This includes familiar local flora such as clover, asters, goldenrod, milkweed, daisies, coneflower, and many more. (It's important to note that grasses have flowers, too, they're just small and non-colorful. We call them "inconspicuous flowers". Grass flowers don't need to attract attention because they aren't pollinated by animals, they're pollinated by wind.)



A meadow plant community will change considerably over time, from year to year and over the course of the season. Many plants have relationships with specific pollinators and will create flowers at the time of year those pollinators are most active. Different flowers will be in bloom each month, each species having its special moment. Watching the changes unfold over the season and revisiting those moments of bloom every year brings deep satisfaction and connects us to the marvelous complexity of our environment.

Mowed fields are home to a community of plants that can adapt to being regularly cut short by mowing, plants such as grasses, dovers, dandelions, plantain, mosses (in shady spots), and creeping plants like ground ivy, dead nettle, and creeping veronica.

Whenever mowing stops, the plant species already present are able to grow tall and begin competing with each other for sunlight, growing even taller. The mowing-adapted plants with the ability to grow tallest- the grasses- will shade out the creeping plants and predominate in the first several years of meadow establishment. Grasses have dense fibrous root systems that remain close to the soil surface to absorb as much water as possible when it rains. These shallow root mats make it harder for seeds to germinate, which also helps to preserve the dominance of the grasses in young meadow habitats.

Over time, some seeds of flowering perennials will successfully push through the grass barrier and grow tall alongside their grass neighbors. Most flowering perennials have roots that travel deep into the soil in search of ground water; these thick tap roots can edge out the grass roots in that location, and over time the plant community shifts to fewer grasses and more flowering perennials.

Eventually, the seeds of shrubs and trees will find suitable sites to sprout up. In our area, invasive shrubs such as multiflora rose, shrubby honeysuckle, autumn olive, and Japanese barberry are among the first to appear. The first trees to arrive in this “old field” habitat are often white pine and red cedar, both relatively fast-growing evergreen trees. As these trees grow and shade out the grasses and flowering perennials, the land returns to forest, the dominant habitat type in the Northeast in the absence of human activity.

Pollinator Meadow Succession



To maintain a meadow of flowering plants to support pollinators, the foliage needs to be cut back every few years to prevent the growth of woody shrubs and trees and the return to forest; pollinator meadows need to be mowed once a year or once every other year. To allow the plants time to reproduce by setting seed and to prevent the disturbance of pollinators and ground-nesting birds, this periodic mow should occur at the end of the growing season-around or after the time of the first frost, in mid-October.

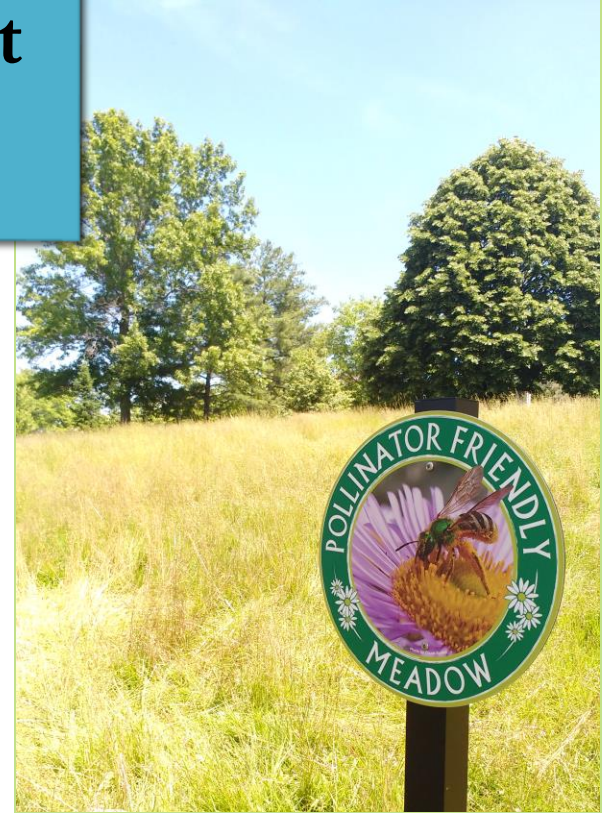
Pollinator Habitat Plant List:



Plants chosen for this list are pollinator-supporting species native to our ecoregion (northeastern United States). Size at maturity, bloom time, and ideal site conditions are listed.

Selection criteria is based on:

- Hardiness and suitability to the site conditions
- Ability to support a range of native insect pollinators
- Aesthetic qualities, such as showy flowers or bright fall color



Large Shade Trees for Sunny, Open Areas with Well-draining Soils

Common name	Botanical name	Size	Sun preference	Soil Moisture	Bloom time	Supports
American Basswood	<i>Tilia americana</i>	~60'	full sun to part shade	medium	June	bees, moths, flies, wasps
Eastern Hop Hornbeam	<i>Ostrya virginiana</i>	25'-40'	full sun to part shade	medium	wind-pollinated	moths
Sourgum	<i>Nyssa sylvatica</i>	30'-50'	full sun to part shade	medium to wet	May to June	bees, moths
American Beech	<i>Fagus grandifolia</i>	50'-60'	full sun to part shade	medium	wind-pollinated	many moth caterpillars
Chestnut Oak	<i>Quercus montana</i>	50'-70'	full sun	dry to medium	wind-pollinated	katydids, beetles, butterflies, walking stick bugs, gall wasps, moths
Red Oak	<i>Quercus rubra</i>	50'-75'	full sun	dry to medium	wind-pollinated	katydids, beetles, butterflies, walking stick bugs, gall wasps, moths
White Oak	<i>Quercus alba</i>	50'-80'	full sun	dry to medium	wind-pollinated	butterfly and moth caterpillars
White Pine	<i>Pinus strobus</i>	50'-80'	full sun	medium	wind-pollinated	butterfly and moth caterpillars, sawflies
Sweet gum	<i>Liquidambar styraciflua</i>	60'-80'	full sun	medium	wind-pollinated	luna moth caterpillar
Shagbark hickory	<i>Carya ovata</i>	70'-90'	full sun to part shade	medium to wet	wind-pollinated	moths and butterflies
Sugar Maple	<i>Acer saccharum</i>	40' – 80'	full sun to part shade	medium	wind-pollinated	moths and butterflies
Tuliptree	<i>Liriodendron tulipifera</i>	80'-140'	full sun to part shade	medium to wet	May to June	bees, beetles

Large Shade Trees for Full Sun



Oak trees (genus *Quercus*) support a huge range of different species: katydids, beetles, walkingstick bugs, gall wasps, deer, raccoons, woodpeckers, chickadees, turkeys, mice, owls, squirrels, and wrens all benefit when an oak is planted.

Over 500 species of moths and butterflies eat oak leaves while in their caterpillar form. We are lucky to have many mature and healthy oaks on campus, including a very old, majestic white oak at the back of the Route 32 parking lot.

The **sassafras** tree (*Sassafras albidum*) supports a range of native butterflies and thrives in moist, shady spots, especially on the forest edge. It has vivid fall color and unusual leaf shapes.



Sourgum (*Nyssa sylvatica*) has gorgeous red fall color and is an excellent nectar source for bees.



The **basswood** tree (*Tilia americana*) is also known as the bee tree. It offers nectar-rich flowers early in the spring, and the bees love it. We have several basswood trees on campus, but there is room for more.



Trees for Sites with Wet Soils

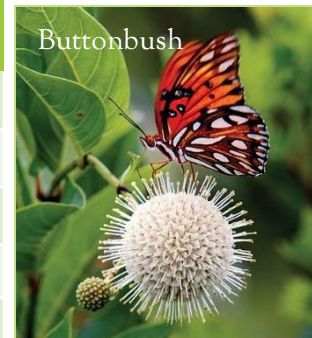
Common name	Botanical Name	Site	Size	Sun Preference	Soil Moisture	Bloom Time	Supports	Notes
Black Willow	<i>Salix nigra</i>	pond/stream side	30'-60'	full sun	medium to wet	March to April	bees, butterflies, moths	fast growing, (roots seek water; don't plant near buildings or pipes)
River birch	<i>Betula nigra</i>	pond/stream side	40'-70'	full sun to part shade	medium to wet	wind-pollinated	moths and butterflies	attractive peeling bark, fast growing, loves wet soils
Sweetbay magnolia	<i>Magnolia virginiana</i>	pond/stream side or decorative spot, near a building/pathway	10'-35'	full sun to part shade	medium to wet	May to June	beetles, bees, flies	Beautiful, fragrant spring flowers
Sourgum	<i>Nyssa sylvatica</i>	pond/stream side or open areas with well-draining soil	30'-50'	full sun to part shade	medium to wet	May to June	bees	gorgeous red fall color, excellent nectar for bees

Other Pollinator-Friendly Trees

Common name	Botanical Name	Type	Site	Size	Sun Preference	Soil Moisture	Bloom Time	Supports
Eastern Redbud	<i>Cercis canadensis</i>	flowering tree	decorative spot, near a building/pathway	20'-30'	full sun to part shade	medium to wet	April	bees
Serviceberry	<i>Amelanchier spp.</i>	flowering tree	decorative spot, near a building/pathway	6'-25'	full sun to part shade	medium	April to May	bees
Sassafras	<i>Sassafras albidum</i>	understory tree	forest edge or shady spot	35'-50'	full sun to part shade	medium	April to May	butterflies
Hawthorn	<i>Crataegus sp.</i>	flowering tree	open areas with well-draining soils	~25'	full sun	medium to wet	June	moths, butterflies
Eastern hemlock	<i>Tsuga canadensis</i>	understory tree	shady spots with acidic soils	40'-70'	part shade to full shade	medium	wind-pollinated	moths

Pollinator- Friendly Shrubs for Wet Sites

Common name	Botanical name	Size	Sun preference	Soil Moisture	Bloom time	Supports
Winterberry holly	<i>Ilex verticillata</i>	6'-10'	full sun to part shade	medium to wet	June to July	bees
Buttonbush	<i>Cephalanthus occidentalis</i>	5'-12'	full sun to part shade	medium to wet	June	bees, butterflies
Elderberry	<i>Sambucus canadensis</i>	5'-12'	full sun to part shade	medium to wet	June to July	butterflies
Highbush Blueberry	<i>Vaccinium corymbosum</i>	4'-8'	full sun to part shade	medium to wet	May	bees, butterflies
Redtwig dogwood	<i>Cornus sericea</i>	4'-8'	full sun to part shade	medium to wet	May to June	bees, wasps, flies, butterflies
Sweetspire	<i>Clethra alnifolia</i>	3'-8'	full sun to part shade	medium to wet	July to August	bees, butterflies
Inkberry	<i>Ilex glabra</i>	5'-8'	full sun to part shade	medium to wet	May to June	bees
Pussy Willow	<i>Salix discolor</i>	6'-15'	full sun to part shade	medium to wet	March to April	bees, butterflies, moths



Pollinator- Friendly Shrubs for Medium-Moisture Sites

Common name	Botanical name	Size	Sun preference	Soil Moisture	Bloom time	Supports
Sweetshrub	<i>Calycanthus floridus</i>	6'-10'	full sun to part shade	medium	April to July	bees, beetles, flies
Witch hazel	<i>Hamamelis virginiana</i>	15'-20'	full sun to part shade	medium	October-December	moths, bees
Arrowwood	<i>Viburnum dentatum</i>	6'-10'	full sun to part shade	medium	May to June	butterflies
New Jersey Tea	<i>Ceanothus americanus</i>	3'-4'	full sun to part shade	medium	May to July	butterflies, bees, wasps, flies
Spicebush	<i>Lindera benzoin</i>	6'-12'	full shade to part shade	medium	March	butterflies



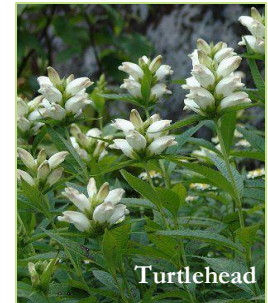
Pineland Nursery



DeGroot

Perennial Plants for a Wet Meadow or a Water's Edge, Full Sun to Part Shade

Common name	Botanical name	Type	Size	Bloom time	Supports
White Turtlehead	<i>Chelone glabra</i>	perennial forb	2'-3'	August to October	bees, butterflies, hummingbirds
Swamp Milkweed	<i>Asclepias incarnata</i>	perennial forb	4'-5'	July to August	bees, hummingbirds, Monarch butterfly larvae and adults
Wild Mint	<i>Mentha arvensis</i>	perennial forb	1'-2'	May to October	flies, wasps, small bees
Cardinal flower	<i>Lobelia cardinalis</i>	perennial forb	2'-4'	July to September	hummingbirds, butterflies
Great Blue Lobelia	<i>Lobelia syphilitica</i>	perennial forb	2'-3'	July to September	bumble bees
Joe Pye Weed	<i>Eupatorium maculatum</i> (<i>Eutrochium purpureum</i>)	perennial forb	5'-7'	July to September	bees, butterflies, hummingbirds
Marsh Marigold	<i>Caltha palustris</i>	perennial forb	1'-2'	April to June	bees, flies
Swamp Vervain	<i>Verbena hastata</i>	perennial forb	2'-6'	July to September	bees, butterflies
Sweetflag	<i>Acorus americanus</i>	perennial rush	2'-3'	wind pollinated	moth and butterfly caterpillars
Water Sedge	<i>Carex aquatilis</i>	perennial sedge	1'-4'	wind pollinated	moth and butterfly caterpillars
Common Rush	<i>Juncus effusus</i>	perennial rush	2'-4'	wind pollinated	sawfly larvae



Perennial Plants for a Sunny Meadow or Garden

Common name	Botanical name	Type	Size	Soil Moisture	Bloom time	Supports
Common Milkweed	<i>Asclepias syriaca</i>	perennial forb	2'-3'	dry to medium	June to August	bees, beetles, butterflies, flies
Butterfly weed	<i>Asclepias tuberosa</i>	perennial forb	1'-3'	dry to medium	June to August	bees, beetles, butterflies, flies
Yarrow	<i>Achillea millefolium</i>	perennial forb	2'-3'	dry to medium	June to September	bees, butterflies, wasps
Gray Goldenrod	<i>Solidago nemoralis</i>	perennial forb	0.5'-2'	dry to medium	August to September	bees, wasps, butterflies, moths, flies
Stoncrop	<i>Hylotelephium telephium</i>	perennial forb	1.5'-2'	dry to medium	August to October	bumble bees, butterflies
Ox-eye Sunflower	<i>Heliopsis helianthoides</i>	perennial forb	3'-6'	dry to medium	June to August	bees, butterflies
Sweet Clover	<i>Melilotus officinalis</i>	perennial forb	2'-7'	dry to wet	July to September	bees, butterflies, moths, flies
New York Aster	<i>Symphyotrichum novi-belgii</i>	perennial forb	3'-6'	medium	August to September	bees, beetles, butterflies
Sneezeweed	<i>Helenium autumnale</i>	perennial forb	3'-5'	medium to wet	August to October	bees, wasps, flies, butterflies, beetles
Bushy Bluestem	<i>Andropogon glomeratus</i>	perennial grass	3'-6'	medium to wet	wind pollinated	butterflies, nesting sites for bumble bees
Pennsylvania Sedge	<i>Carex pennsylvanica</i>	perennial grass	1'	dry to medium	wind pollinated	butterflies, nesting sites for bumble bees
Wild Rye	<i>Elymus canadensis</i>	perennial grass	2'-5'	dry to medium	wind pollinated	butterflies, nesting sites for bumble bees
Purple Love Grass	<i>Eragrostis spectabilis</i>	perennial grass	1'-2'	dry to medium	wind pollinated	butterflies, nesting sites for bumble bees
Switchgrass	<i>Panicum virgatum</i>	perennial grass	3'-6'	medium to wet	wind pollinated	butterflies, nesting sites for bumble bees
Little Bluestem	<i>Schizachyrium scoparium</i>	perennial grass	2'-4'	dry to medium	wind pollinated	butterflies, nesting sites for bumble bees
Indiangrass	<i>Sorghastrum nutans</i>	perennial grass	3'-5'	dry to medium	wind pollinated	butterflies, nesting sites for bumble bees

Perennial Plants for a Sunny or Partly Shaded Meadow or Garden

Common name	Botanical name	Type	Size	Sun Preference	Soil Moisture	Bloom time	Supports
Wild Bergamot	<i>Monarda fistulosa</i>	perennial forb	2'-4'	full sun to part shade	medium	July to September	bees, butterflies, hummingbirds
New York Ironweed	<i>Vernonia novaboracensis</i>	perennial forb	4'-6'	full sun to part shade	medium to wet	August to September	bees, butterflies, hummingbirds
Black-eyed Susan	<i>Rudbeckia hirta</i>	perennial forb	2'-3'	full sun to part shade	dry to medium	June to September	bees, beetles, butterflies
Goldenrod	<i>Solidago spp.</i>	perennial forb	4'-5'	full sun to part shade	dry to wet	August to October	bees, beetles, butterflies, flies
Blue False Indigo	<i>Baptisia australis</i>	perennial forb	3'-4'	full sun to part shade	dry to medium	May to June	bees
Beardtongue	<i>Penstemon digitalis</i>	perennial forb	3'-5'	full sun to part shade	dry to wet	April to June	bees, moth caterpillars
Eastern Bluestar	<i>Amsonia tabernaemontana</i>	perennial forb	2'-3'	full sun to part shade	medium	May	moths, bees, hummingbirds
Mountain Mint	<i>Pycnanthemum muticum</i>	perennial forb	1'-3'	full sun to part shade	medium	July to Septmeber	bees, flies, wasps, butterflies
Purple Coneflower	<i>Echinacea purpurea</i>	perennial forb	2'-5'	full sun to part shade	dry to medium	June to August	bees, butterflies, flies
White Clover	<i>Trifolium repens</i>	perennial forb	6"	full sun to part shade	medium	May to June	bees, butterflies, moths
Blue Scilla	<i>Scilla siberica</i>	perennial bulb	3"-6"	full sun to part shade	medium	April	spring mason bees
Cranesbill	<i>Geranium maculatum</i>	perennial forb	1.5'-2'	shade	medium	April to May	flies, bees, beetles

Plant Information Sources

- Missouri Botanical Garden Plant Finder online tool
www.missouribotanicalgarden.org/plantfinder/plantfindersearch.aspx

- Morton Arboretum Plant Finder online tool
<https://www.mortonarb.org/trees-plants/tree-plant-descriptions>

The screenshot displays the Missouri Botanical Garden website's plant profile for *Clethra alnifolia*. The page features a navigation bar with links for Visit, Things To Do, Learn & Discover, Gardens & Gardening (highlighted), Sustainability, Plant Conservation, Plant Science, and About. A search bar is located in the top right corner. Below the navigation bar, the page title is "Gardening Help" and the plant name is "Clethra alnifolia". A sidebar on the left lists various gardening resources: Plant Finder, Lawn, Landscape & Garden Design, Edible Gardening, Advice, Tips & Resources, Plants of Merit, Sustainable Gardening, Gardening Education & Classes, Visit the Center for Home Gardening, and Gardening Help Site Map. The main content area includes a photograph of the plant, a "Gardening Help Search" box, and a "Join our Horticulture Staff" button. The plant's details are listed on the right, including its common name (sweet pepperbush), type (deciduous shrub), family (Clethraceae), native range (Eastern North America), zone (3 to 9), height (3.00 to 8.00 feet), spread (4.00 to 6.00 feet), bloom time (July to August), bloom description (white), sun requirements (full sun to part shade), water requirements (medium to wet), and maintenance (low). A "Suggested Use" section lists Hedge, Naturalize, and Rain Garden. The "Culture" section provides growing instructions: "Easily grown in average, medium to wet soils in full sun to part shade. Prefers part shade and consistently moist, acidic, sandy soils. Soils should not be allowed to dry out. Tolerates clay soils. Tolerates full shade. Promptly remove root suckers unless naturalized look is desired. Propagate by cuttings. Prune if needed in late winter." A "Donate Now!" button is visible in the top right corner.

MISSOURI BOTANICAL GARDEN

Visit Things To Do Learn & Discover **Gardens & Gardening** Sustainability Plant Conservation Plant Science About

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Gardening Help *Clethra alnifolia*

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Common Name: sweet pepperbush

Type: Deciduous shrub

Family: Clethraceae

Native Range: Eastern North America

Zone: 3 to 9

Height: 3.00 to 8.00 feet

Spread: 4.00 to 6.00 feet

Bloom Time: July to August

Bloom Description: White

Sun: Full sun to part shade

Water: Medium to wet

Maintenance: Low

Suggested Use: Hedge, Naturalize, Rain Garden

Flower: Showy, Fragrant

Leaf: Good Fall

Attracts: Birds, Butterflies

Fruit: Showy

Tolerate: Heavy Shade, Erosion, Clay Soil, Wet Soil

[Garden locations](#)

[More Images](#)

Culture

Easily grown in average, medium to wet soils in full sun to part shade. Prefers part shade and consistently moist, acidic, sandy soils. Soils should not be allowed to dry out. Tolerates clay soils. Tolerates full shade. Promptly remove root suckers unless naturalized look is desired. Propagate by cuttings. Prune if needed in late winter.

Local Plant Sources

As a state agency, we are encouraged through the **NY State Pollinator Protection Plan** (Executive Order 4) to source plants from nurseries that **do not use neonicotinoid pesticides**. Catskill Native Nursery does not use synthetic pesticides and employs organic principles in its plant care, making them a preferred vendor. Wallkill View, Kalleco Nurseries, and Devitt's Nursery use an Integrated Pest Management (IPM) approach that allows the use of neonicotinoids as a last resort.

- | | | | | |
|---|--------------------------------|--------------|---|--|
| ○ | Catskill Native Nursery | 845-626-2758 | 607 Samsonville Road, Kerhonkson NY 12446 | www.catskillnativenursery.com |
| ○ | Wallkill View Farms | 845-255-8050 | 15 Route 299 West, New Paltz, NY 12561 | www.wallkillviewfarmmarket.com |
| ○ | Kalleco Nursery | 845 658-3553 | 801 Route 32, Tillson, NY 12486 | www.kallecoplantnursery.com |
| ○ | Devitt's Nursey | 845-561-1968 | 56 Devitt Circle, New Windsor, NY 12553 | www.devittsnysy.com |

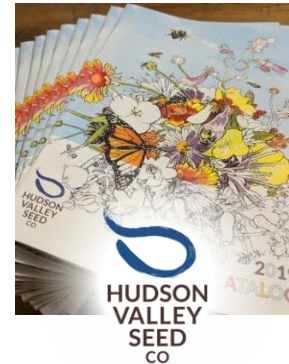


Ernst Seed Company

Ernst Seed offers a great variety of high-quality native seeds, specially mixed for different site conditions and selected habitats. Ernst was recommended to us by Nate Nardi-Cyrus at the DEC, and is highly rated by the Xerces Society. ernstseed.com

Seed mixes ideal for SUNY New Paltz sites:

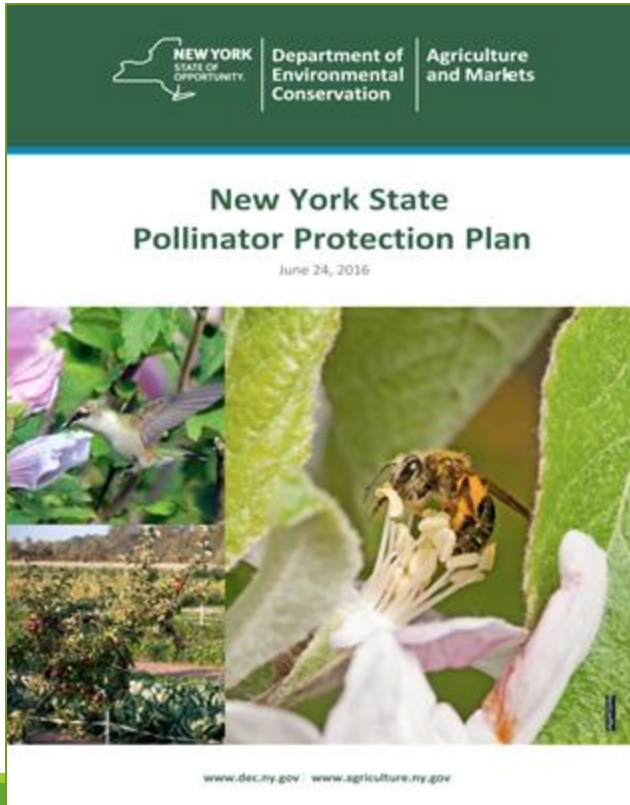
- Dry/medium moisture site: Showy Northeast Wildflower Mix
- Wet site: FACW Wet Meadow Mix



Hudson Valley Seed Company

Grows and harvests open-pollinated, heirloom seeds organically in Accord, NY. They offer many varieties of native, pollinator-supporting annual and perennial seeds. hudsonvalleyseed.com

NYS Pollinator Protection Plan



The **NY State Pollinator Protection Plan** was created to help protect New York State's priceless environment and its strong agricultural economy.

These are some of the **Best Management Practices** that apply most directly to **SUNY New Paltz**:

Increase quality bee forage areas.

Improve pollinator habitat on state lands, roadsides and rights-of-way.

Identify specific pollinator habitat goals for restoration plans.

Understand and adopt Integrated Pest Management.

Include the public at large in the effort to improve pollinator health, including native pollinators.

Four Principles To Help Pollinators

from Xerces Society Pollinator Conservation Fact Sheet

Protecting, enhancing, or providing habitat is the best way to conserve pollinators. Whether you tend a small flower box in the city or maintain a large rural garden, there are steps you can take to improve the health, abundance, and diversity of your local pollinators.



1. Create a Diversity of Bloom

Bees, butterflies, and other beneficial insects need abundant nectar and pollen sources throughout the growing season. Select native plants wherever possible. Cultivate a landscape with a diversity of flowering plants that are known to provide abundant pollen and nectar for pollinators. Try to provide blooming plants from early spring to fall, with at least three species of flower in bloom each season.

Note that some ornamental plants have been selected for traits that are attractive to people, rather than pollinators. Avoid pollenless cultivars and double-petaled varieties of ornamental flowers.

2. Protect Nests and Egg-Laying Sites

Native bees use untidy areas of the garden to nest such as open sandy ground, brush piles, and old tree stumps and snags. Consider leaving some of these for wildlife habitat. Supplement nesting opportunities with mason bee houses or bundles of hollow plant stems.

Butterflies often need specific host plants to feed on during their caterpillar stage. For example the caterpillars of monarch butterflies feed exclusively on the leaves of various milkweeds. Protect or plant the host plants of butterflies native to your area.

3. Don't Use Pesticides

Pesticides can be important tools for protecting crops and controlling invasive species, however most lawn and garden pest problems can be solved without such chemicals. Keep in mind that even “organic-approved” insecticides can harm pollinators and other wildlife.

Herbicides, while usually not directly lethal to insects, can reduce plant diversity, including the diversity of weedy, noninvasive wildflowers that provide essential pollen and nectar for bees, butterflies, and hummingbirds.

4. Spread the Word

Let your friends and neighbors know you're providing habitat with a pollinator habitat sign. Talking to your community will encourage more people to join this important effort, helping even more pollinators! You can also sign the Pollinator Protection Pledge at www.bringbackthepollinators.org



References

Books:

- Bringing Nature Home by Doug Tallamy, 2007
- Attracting Native Pollinators by The Xerces Society, 2011
- Bee Basics: An Introduction to Our Native Bees by Beatriz Moisset, U.S. Forest Service, and The Pollinator Partnership, 2011
- Pollinators of Native Plants by Heather Holm, 2014

Organizations:

- Tree Campus USA, The Arbor Day Foundation
www.arborday.org/programs/treecampususa/
- Bee Campus USA, The Xerces Society
www.beecityusa.org

Online Guides:

- Selecting Plants for Pollinators: Eastern Broadleaf Forest, The Pollinator Partnership, www.pollinator.org
- Pollinator-Friendly Plants for the Northeast United States, USDA Natural Resources Conservation Service, www.nrcs.usda.gov
- Pollinator Plants: Northeast Region, The Xerces Society, www.xerces.org
- New York State Pollinator Protection Plan
www.dec.ny.gov/docs/administration_pdf/nyspollinatorplan.pdf



Lloyd Spitalnik

Websites:

- www.illinoiswildflowers.info (has excellent information about plant/ fauna associations)
- <http://www.missouribotanicalgarden.org/plantfinder> (the best online source for information about ornamental plants)
- www.ernstseed.com