

Pollinator Pathways

Garden as if Life Depends On It





PennState
College of Agricultural Sciences

Department of
Entomology

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Center for Pollinator Research

Overview

Who we are

Stakeholder Advisory Board
on Pollinator Health

Globally, pollinators are in decline

World-wide, pollinator populations are shrinking and several factors are contributing to this disturbing global trend.

75% decline of flying insect biomass in protected areas

Hallmann et al

*There are over 349 species of bees native to Connecticut, and they play a vital role in pollinating the plants we rely on in our communities.

*Bee populations, both native and honey bees, have seen sharp declines.

*Monarch butterflies have declined by 94.6% in the last 20 years, according to the **US Wildlife Federation**.

Pollinator Decline

<https://www.nps.gov/subjects/pollinators/pollinators-in-trouble.htm>

Pesticides... Pesticides are tools used to kill pest plants, insects, fungi, other pests. They include herbicides, insecticides, fungicides.

- Pesticides can adversely affect pollinators directly or some types of pesticides may remain in the environment for an extended time and affect multiple generations of pollinators.
- Insecticides applied to plant seeds may, when the plant is mature, contaminate pollen grains that are food sources for pollinators.....**neonicotinoids**

Pollinator Decline

<https://www.epa.gov/subjects/pollinators/pollinators-in-trouble.htm>

Pesticides... Pesticides are tools used to kill pest plants, insects, fungi, other pests. They include herbicides, insecticides, fungicides.

- Insecticides that don't directly kill may hamper the ability of pollinators to navigate or forage.
- Herbicides may kill important forage plants for pollinators.



Pollinator Decline

<https://www.nps.gov/subjects/pollinators/pollinators-in-trouble.htm>

Climate Change

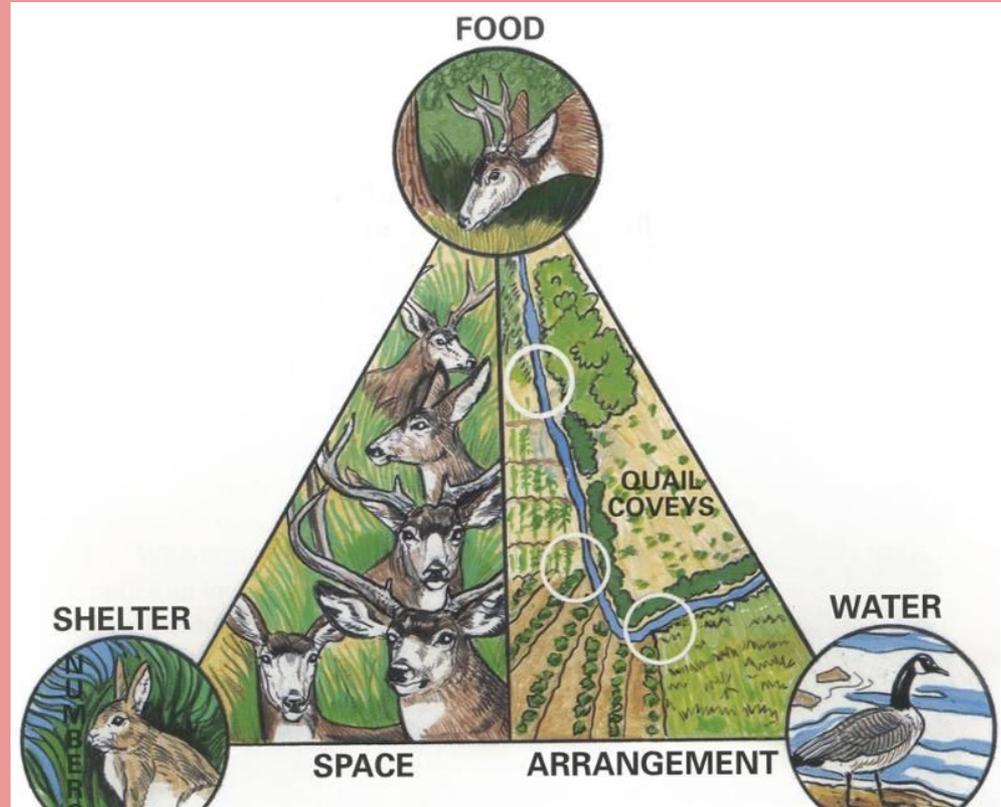
- Flowering plants may occur farther north or at higher elevations as a response to warming temperatures and may become out of sync with their pollinators.
- The types and distributions of pollinators may change; pollinators adapted to warmer temperatures may expand their northward range, displacing other pollinators.

Pollinator Decline

<https://www.nps.gov/subjects/pollinators/pollinators-in-trouble.htm>

Habitat Loss

- ❖ Simplification of landscape
- ❖ Conversion of landscape
- ❖ Fragmentation of natural landscapes





Pollinator Decline

<https://www.nps.gov/subjects/pollinators/pollinators-in-trouble.htm>

*Pollinators require spaces with flowering plants to forage for their food: pollen and nectar. Pollinators require water & suitable nesting sites.

*The chief causes for pollinator habitat loss are agriculture, mining and human development:

Habitat Loss

- ❖ Conversion of landscape
- ❖ Simplification of landscape
- ❖ Fragmentation of natural landscapes

Habitat Loss

❖ ~~Conversion of landscape~~ (urban parks, Highline Trail)

Let's focus on these two

- ❖ Simplification of landscape
- ❖ Fragmentation of natural landscapes

There are somewhere around 40 million acres of lawn in the lower 48, according to a [2005 NASA estimate derived from satellite imaging](#).

"Turf grasses, occupying 1.9% of the surface of the continental United States, would be the single largest irrigated crop in the country," that study concludes.

Doug Tallamy.....

["Homegrown National Park"](#)

Reclaim 1/2 of suburban turf grass to pollinator habitat

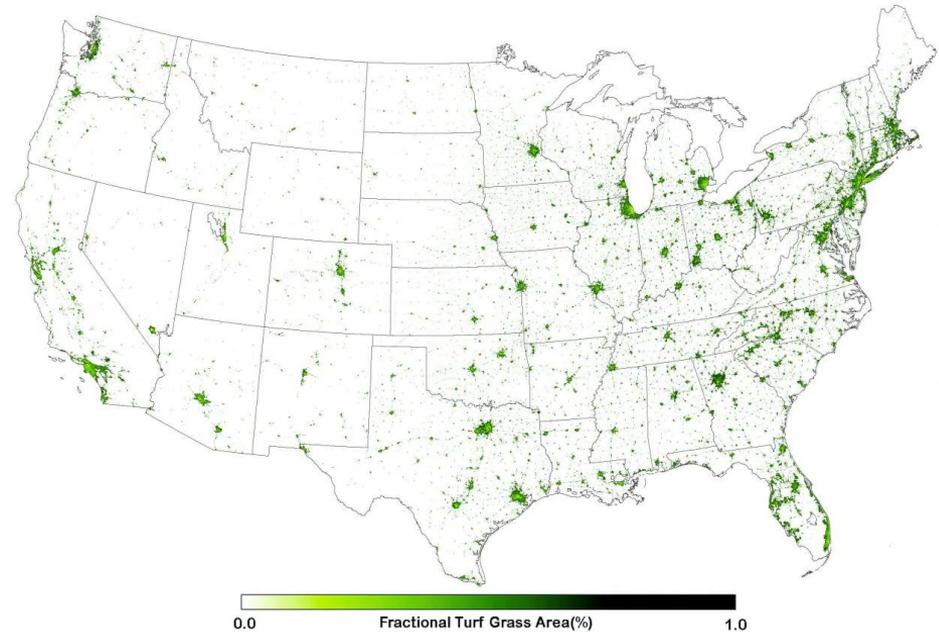


Figure 1. Distribution of the fractional turf grass area (%) in the conterminous U.S.



Take Annie White's advice

Minimize lawn; maximize flowering plants and natural areas.

Invert the relationship between your lawn and planting beds.

Hint: Think of your lawn as an area rug or as a hallway, not as wall-to-wall carpeting.



“Unless we restore native plants to our suburban ecosystems, the future of biodiversity in the U.S. is dim,” writes [Doug Tallamy](#) in his book, [“Bringing Nature Home.”](#)

“Today, 85.6% of the land east of the Mississippi is privately owned. The area of lawn in the U.S. is equal to the size of New England, and it’s increasing 500 square miles every year. The changes we are bringing to our landscapes are way too fast. We have to make the important changes. We need to reduce 50% of the lawns in New England.”



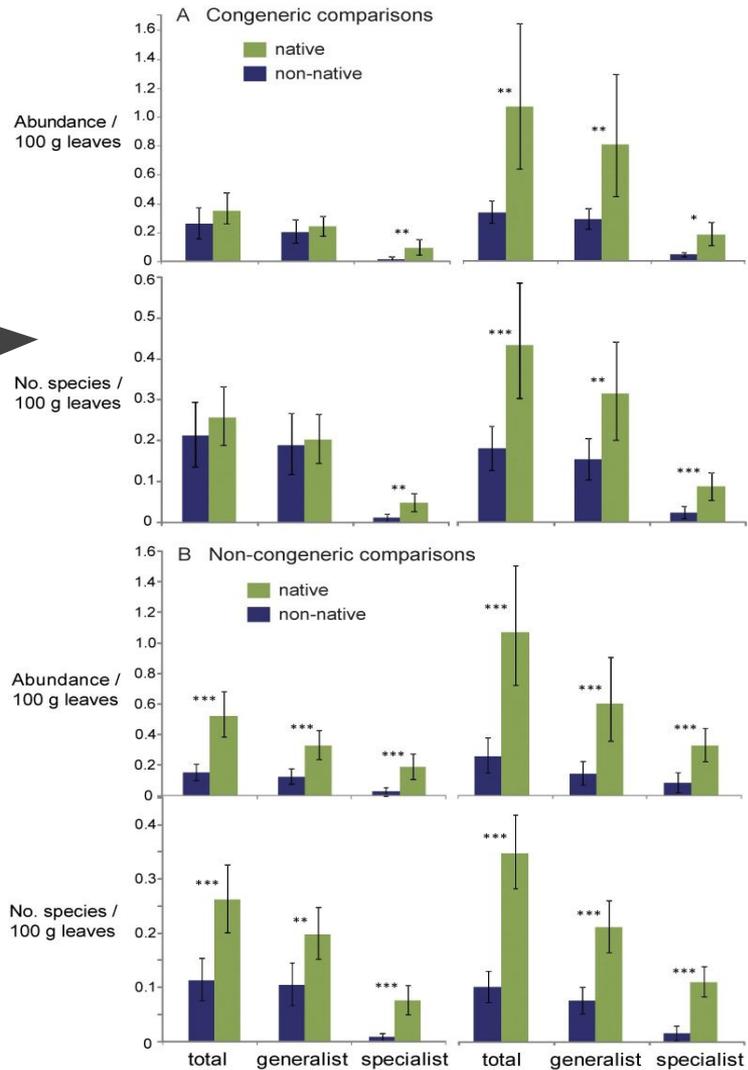
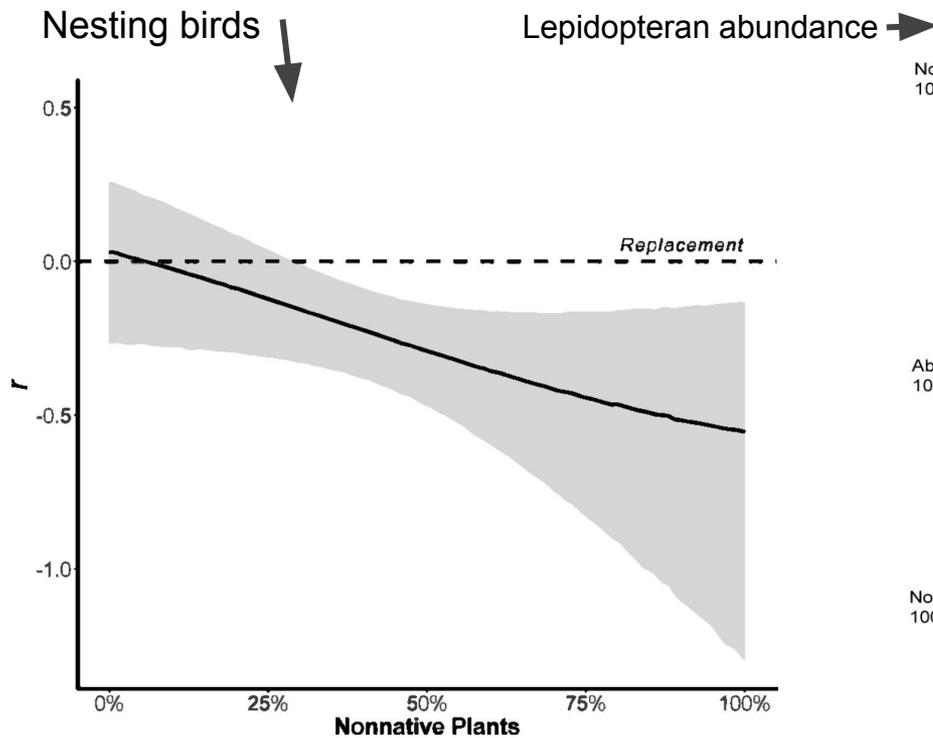
In Connecticut ~4000 400 40

The other must do for homeowners is to get rid of invasive species. “There are over 330 invasives [nationwide],” he reported. “A single invasive plant can harm the ecosystem. Invasives ought to be illegal.”

The challenge Tallamy experienced on his own property is “un-natives will come back in 3-5 years if they are not continuously removed. You have to keep on, keep on getting rid of invasives. The challenge is to get rid of their rootstock.”



Pollinator Decline



Data from Doug Tallamy's Research on Lepidopteran Use of Native and Non-native Plants

Woody Plants

Common Name	Plant Genus	Butterfly/moth species supported
Oak	Quercus	534
Black cherry	Prunus	456
Willow	Salix	455
Birch	Betula	413
Poplar	Populus	368
Crabapple	Malus	311
Blueberry	Vaccinium	288
Maple	Acer	285
Elm	Ulmus	213
Pine	Pinus	203
Hickory	Carya	200
Hawthorn	Crataegus	159
Spruce	Picea	156
Alder	Alnus	156
Basswood	Tilia	150
Ash	Fraxinus	150
Rose	Rosa	139
Filbert	Corylus	131
Walnut	Juglans	130
Beech	Fagus	126
Chestnut	Castanea	125

Herbaceous Plants

Common Name	Plant Genus	Butterfly/moth species supported
Goldenrod	Solidago	115
Asters	Aster	112
Sunflower	Helianthus	73
Joe pye, Boneset	Eupatorium	42
Morning glory	Ipomoea	39
Sedges	Carex	36
Honeysuckle	Lonicera	36
Lupine	Lupinus	33
Violets	Viola	29
Geraniums	Geranium	23
Black-eyed susan	Rudbeckia	17
Iris	Iris	17
Evening primrose	Oenothera	16
Milkweed	Asclepias	12
Verbena	Verbena	11
Beardtongue	Penstemon	8
Phlox	Phlox	8
Bee balm	Monarda	7
Veronica	Veronica	6
Little bluestem	Schizachyrium	6
Cardinal flower	Lobelia	4



What do bees want from our flowers?

When foraging for food, most bees search for two things:

Nectar for energy, and

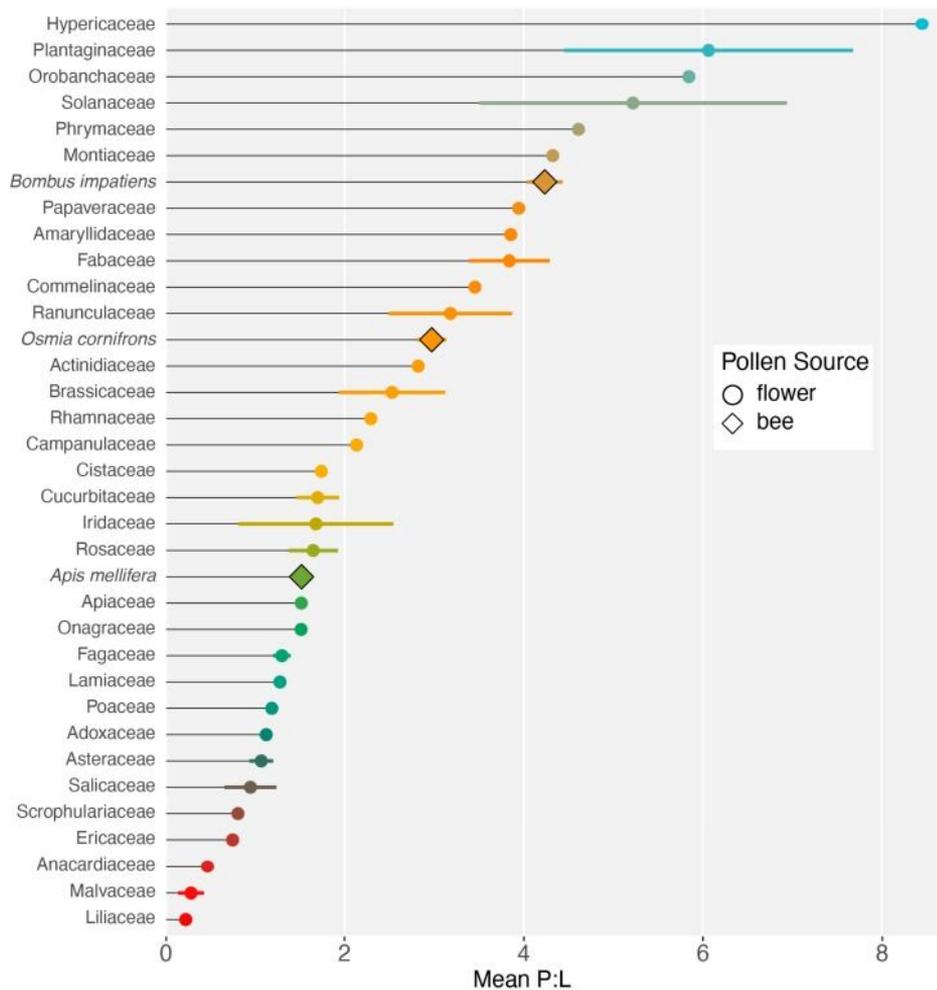
Pollen to feed their brood.

Some bees also collect special oils from flowers to use as both an adult and larval food source

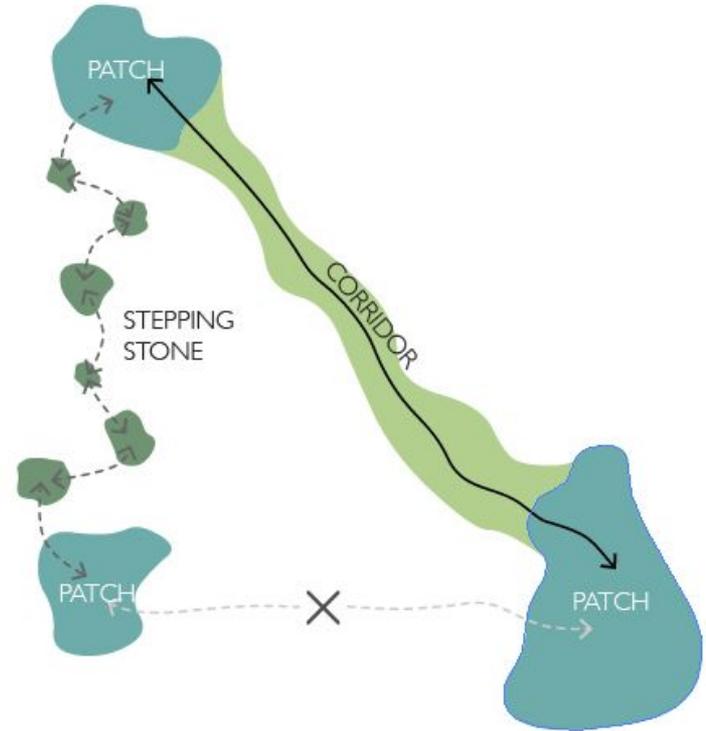
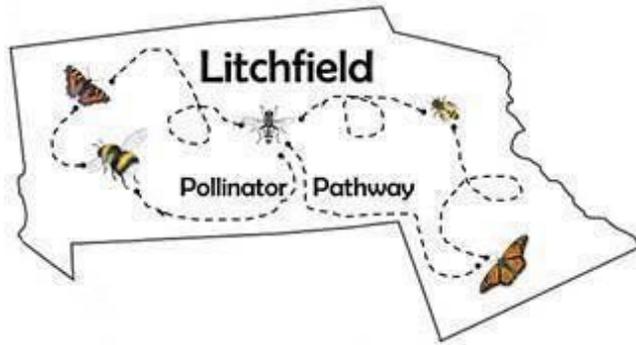
Protein-Lipid ratio for several plant families and collected by 3 bee species

Vaudo et al [Insects](#). 2020 Feb; 11(2): 132.
Published online 2020 Feb 18

Pollen P:L ratios of plant families and bee species

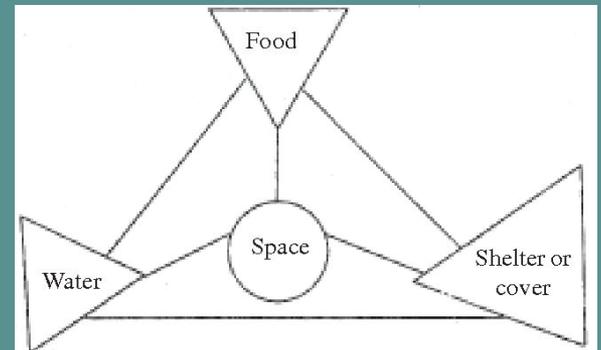


Our task is to create, reclaim and monitor patches of suitable pollinator habitat and to see how they interconnect in Litchfield.



Create a way-station for pollinators!

- plant native pollinator-friendly trees, shrubs, and perennials!
- provide a source of clean water
- leave some dead wood and dirt patches for nesting bees





Sample List of Wildflowers for Bees Through the Season

	Wildflower	May	June	July	Aug	Sept	Oct
	Golden Alexanders <i>Zizia aurea</i>	■	■				
	Ohio Spiderwort <i>Tradescantia ohioensis</i>		■	■			
	White Beardtongue <i>Penstemon digitalis</i>		■	■			
	Swamp milkweed <i>Asclepias incarnata</i>			■	■	■	
	Wild Bergamot <i>Monarda fistulosa</i>			■	■	■	
	Mountain mint <i>Pycnanthemum virginianum</i>			■	■	■	
	Marsh Blazing Star <i>Liatris spicata</i>			■	■	■	
	Spotted Joe Pye Weed <i>Eutrochium maculatum</i>				■	■	■
	Wingstem <i>Verbesina alternifolia</i>					■	■
	New York Ironweed <i>Vernonia noveboracensis</i>					■	■
	Gray goldenrod <i>Solidago nemoralis</i>					■	■
	New England Aster <i>Symphotrichum novae-angliae</i>						■

Note that wildflowers have habitat preferences for sun and shade, drainage and moisture, and soil type.

Plant native trees, shrubs, and wildflowers with at least two species blooming at any time from April through October

Northeast

(Connecticut, Pennsylvania, Massachusetts, Maine, New Hampshire, New Jersey, New York, Rhode Island, Vermont)

PLANT		BLOOM PERIOD AND COLOR								
Common name	Scientific name	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Spotted geranium	<i>Geranium maculatum</i>	Purple								
Dutchman's breeches	<i>Dicentra cucullaria</i>		Yellow							
Sundial lupine	<i>Lupinus perennis</i>			Blue						
Smooth penstemon	<i>Penstemon digitalis</i>			Yellow						
Beebalm	<i>Monarda fistulosa</i>			Purple						
Butterflyweed	<i>Asclepias tuberosa</i>			Orange						
Field thistle	<i>Cirsium discolor</i>				Pink					
Narrowleaf mountain mint	<i>Pycnanthemum tenuifolium</i>				Yellow					
Blue giant hyssop	<i>Agastache foeniculum</i>					Purple				
Showy goldenrod	<i>Solidago speciosa</i>						Yellow			
New England aster	<i>Symphotrichum novae-angliae</i>						Purple			



Rethink your lawn.

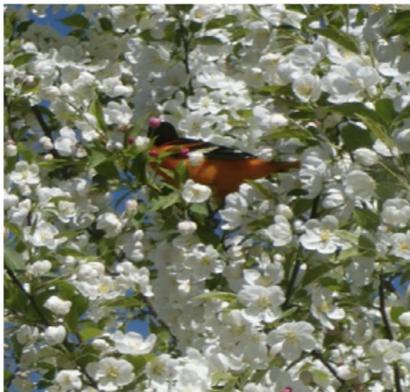
- leave the clippings on the grass as fertilizer rather than adding synthetic chemicals
- leave the leaves--many pollinators overwinter in leaf matter
- consider the use of slow-release organic fertilizers or none at all
- reduce lawn size by adding native plants
- mow less often
- no need for pesticides! this means a healthy lawn for your children and pets too!

If you plant it, they will come.



This Pollinator Pathway has spread from one town to over 35 in Connecticut and New York since 2017, all connected. Volunteers, often from land trusts, garden clubs, nature centers, watershed associations, and conservation commissions get together to create steering committees which help build the pathways.

- If you live along the Pollinator Pathway we especially hope you'll decide to join the fun and sign-up to be part of the Pathway.
- Our goal is to create a corridor of contiguous properties including open spaces and the adjacent private ones of our residents.
- *Everyone* should consider getting on the Pollinator Pathway since the bees and butterflies don't recognize the signs and only look for the nectar!



Contact us

Phone:
877-679-2463

Email:
info@pollinator-pathway.org

Visit us on the web:
Pollinator-Pathway.org

Sign Up
To sign up, email us at Info@Pollinator-Pathway.org. Also check our website Pollinator-Pathway.org for events throughout the region such as planting parties and talks by experts on native and invasive plants, birds, bees, and butterflies as well as resources for making your yard and your town more pollinator friendly.



The Pollinator Pathway



Photo by Louise Washer, Norwalk, CT

What is a Pollinator Pathway?

- a wildlife corridor providing habitat and nutrition for pollinators
- includes healthy yards and public spaces for pollinators, pets & families

“To share suburbia with wildlife, we need to: Create corridors connecting natural areas; Reduce the area now in lawn; and Begin the transition from alien ornamentals to native ornamentals.”

—Doug Tallamy,
professor of entomology and wildlife ecology at
the University of Delaware

How to “Bee” Part of the Pollinator Pathway

1 Plant Native Plants

- Trees, shrubs, and wildflowers native to this area provide food and shelter for local pollinators
- Plant a container or garden with pollinator plants or integrate natives into your existing landscaping
- Remove non-native invasive plants

2 Go Pesticide-Free

- This means a healthy lawn for your children and pets too
- Landscape to minimize tick habitat
- Consider organic alternatives to poisons

3 Rethink Your Lawn

- Consider using slow-release organic fertilizers, if any
- Leave the clippings on your lawn rather than adding chemicals
- Convert some of your lawn to native trees, shrubs, flowers
- Mow less often, every 2–3 weeks is best
- Leave some leaves in beds for overwintering insects
- Mow remaining leaves in the fall and let them fertilize the lawn
- Provide a source of clean water for pollinators and birds
- Leave some dirt patches for native ground nesting bees

What are pollinators?

- birds, bees, butterflies and other insects, bats and other mammals, rodents and amphibians

What do they do?

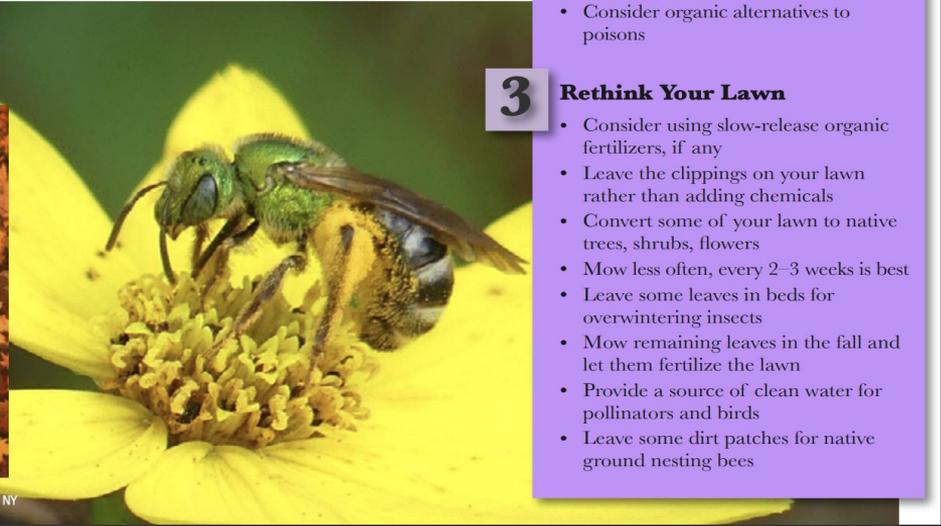
- move pollen from one plant to another, enabling cross fertilization and allowing the reproduction and the growth of new plants — 35% of our food grows as a result of the work pollinators do

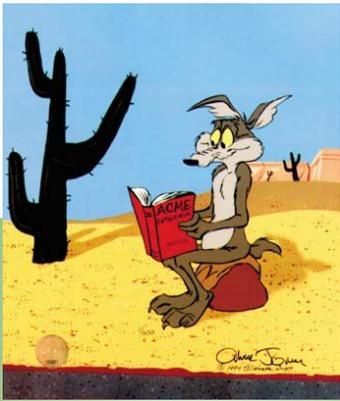
What is threatening our pollinators?

- widespread application of pesticides and other chemicals on lawns, landscaped plantings, and agricultural crops
- climate changes that lead to lack of larval host plants
- loss of habitat as more and more natural environments become urban and suburban
- the spread of invasive (non-native) plants



Photo by Karalyn Lamb, Croton, NY





Acme's Amazing Habitat Grid

Light gradient

Low light-----Bright & Sunny
 < 3 hours dappled sunlight 3 - 6 hours > 6 hours

Moisture gradient

1.Excessively Well Drained

4. Moderately Well Drained

7. Very Poorly Drained

Shady & Dry

Part Shade & Dry

Sunny & Dry

Shady & Moist

Part Shade & Moist

Sunny & Moist

Shady & Wet

Part Shade & Wet

Sunny & Wet



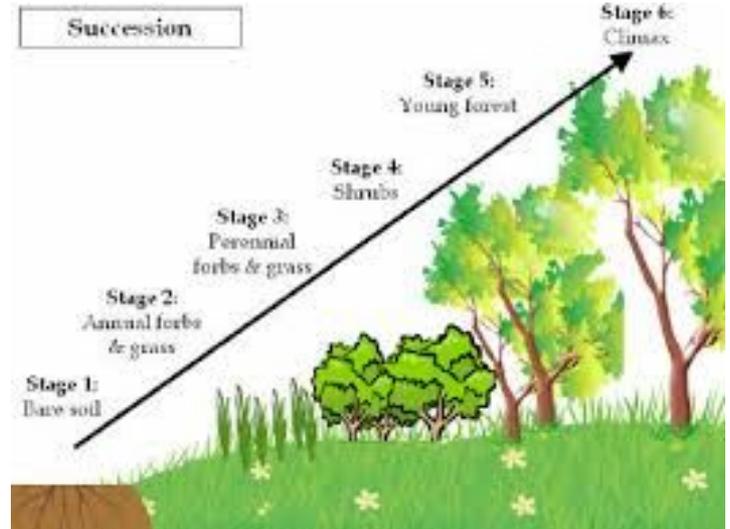
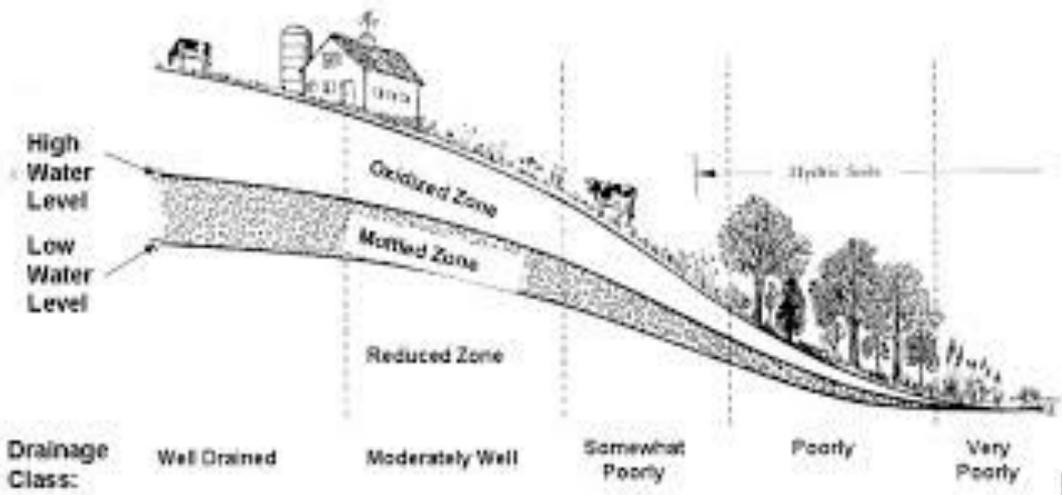
Importance of transmission line corridors for conservation of native bees and other wildlife

Researchers found that the sunny, open corridors held nearly **10 times** the number of bees and **twice the number of bee species** as compared to forested plots, where nectar becomes scarce by the end of May.

Transmission line corridors often provide much **early successional habitat** in forests.

Powerline corridors can provide **critical habitat for rare bees** and other wildlife.





**This beautiful native plant meadow
must be disturbed ... every 3 - 5 years**



Web Soil Survey



You are here: Web Soil Survey Home

The simple yet powerful way to access and use soil data.



Welcome to Web Soil Survey (WSS)



Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

I Want To...

- **Start Web Soil Survey (WSS)**
- **Know Web Soil Survey Requirements**
- **Know Web Soil Survey operation hours**
- **Find what areas of the U.S. have soil data**
- **Find information by topic**
- **Know how to hyperlink from other documents to Web Soil Survey**
- **Know the SSURGO data structure**
- **Use Web Soil**

meF

Use your address to

The screenshot shows the top navigation bar with tabs for "Area of Interest (AOI)", "Soil Map", "Soil Data Explorer", "Download Soils Data", and "Shop". Below this is a search interface with a "Search" section containing a "Quick Navigation" dropdown menu. The "Address" option is selected and highlighted in yellow. To the right is the "Area of Interest Interactive Map" section, which includes a legend and a map of the western United States showing state boundaries and labels for WA, OR, CA, NV, UT, CO, ID, MT, and WY. A red arrow points from the text "Use your address to" to the "Address" option in the search menu.

Area of Interest Interactive Map

Legend

View Extent Contiguous U.S. Scale (not to scale)



est

Open All Close All

tion

View ?

Address
Brush Hill Road Litchfield, CT

Location
marker

View

- City
- Area
- Longitude or Current Location
- (Township, Range)
- Management
- Defense
- Service

Area of Interest Interactive Map

Legend



View Extent (not to scale)



Area of Interest (AOI)

Soil Map

Search

Map Unit Legend

State of Connecticut (CT600)

State of Connecticut (CT600)

Map Unit Symbol	Map Unit Name	Acres in AOI
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	4.3
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	0.4
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	0.0
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	2.2
107	Limerick and Lim soils	1.8
306	Udorthents-Urban land complex	1.3

Totals for Area of Interest **10.0 1**

Report — Map Unit Description

State of Connecticut

45B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2q1
 Elevation: 0 to 1,470 feet
 Mean annual precipitation: 36 to 71 inches
 Mean annual air temperature: 39 to 55 degrees F
 Frost-free period: 140 to 240 days
 Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent
 Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam Setting

Landform: Hills, drumlins, ground moraines
 Landform position (two-dimensional): Backslope, footslope, summit
 Landform position (three-dimensional): Side slope
 Down-slope shape: Concave
 Across-slope shape: Linear
 Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
 Bw1 - 7 to 18 inches: fine sandy loam
 Bw2 - 18 to 30 inches: fine sandy loam
 Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
 Depth to restrictive feature: 20 to 39 inches to densic material
 Natural drainage class: Moderately well drained
 Runoff class: Medium
 Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
 Depth to water table: About 18 to 30 inches
 Frequency of flooding: None
 Frequency of ponding: None
 Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
 Available water storage in profile: Low (about 3.6 inches)



So the Habitat at the Litchfield Community Garden is.....

	<p style="text-align: center;"><u>Light gradient</u></p> <p style="text-align: center;">Low light-----Bright & Sunny</p> <p style="text-align: center;">< 3 hours dappled sunlight 3 - 6 hours > 6 hours</p>		
	<p><u>Moisture gradient</u></p> <p>1.Excessively Well Drained</p>	<p>Shady & Dry</p>	<p>Part Shade & Dry</p>
<p>4. Moderately Well Drained</p>	<p>Shady & Well-drained</p>	<p>Part Shade & Well-drained</p>	<p>Sunny & Well-drained</p>
<p>7. Very Poorly Drained</p> <p>http://nenativeplants.uconn.edu/pollinators_4_648750963.pdf</p>	<p>Shady & Wet</p>	<p>Part Shade & Wet</p>	<p>Sunny & Wet</p>



Visit Earth Tones Natives to use their S Native Plant Search Wizard

Plant Type	Any... ▾
Berry Color	Any... ▾
Bloom Time	Any... ▾
Exposure/Light Requirements	Full Sun ▾
Flower Color	Any... ▾
Foliage	Any... ▾
Height	Any... ▾
Soil Conditions	Well-drained ▾
Wildlife	Any... ▾

START SEARCH

OR

Search by keyword

START KEYWORD SEARCH



Suitable perennials for this pollinator garden site are:

<i>Achillea millefolium</i>yarrow
<i>Agastache foeniculum</i>hysop
<i>Asclepias tuberosa</i> butterflyweed (milkweed)
<i>Amsonia tabernaemontana</i>bluestar
<i>Coreopsis verticillata</i>tickseed
<i>Echinacea purpurea</i>purple coneflower

Etc, etc, etc

SITE REQUIREMENTS OF SOME BUTTERFLY NECTAR PLANTS NATIVE TO CONNECTICUT

						DRAFT VERSION C.Pyle, USDA Nat. Res. Conservation Serv.			
Common Name	Scientific Name	Light	Moisture	Soils	Color	Month	Height	Misc.	
Highbush Blueberry	<i>Vaccinium corymbosum</i>	Su-PSu	D-W	acid soil; mineral or peat	White	5-6	6'-12'	slow grower; occurs in abandoned pastures; birds eat fruits	
Lowbush Blueberry	<i>Vaccinium angustifolium</i>	Su	D-W	well drained; acid, mineral	White	4-6	6"-24"	birds eat fruits	
Buttonbush	<i>Cephalanthus occidentalis</i>	Su	(M-) W	in mineral or organic soils	White	6-8	3'-10'		
Meadowsweet	<i>Spiraea alba</i> var. <i>latifolia</i>	Su	D-W	tolerates occasional standing water	White	6-9	2'-5'	often in damp meadows	
New Jersey Tea	<i>Ceanothus americanus</i>	Su-PSu	D-M	well drained, poor-average	White	6-8	2'-4'	often found in disturbed soil	
Steeplebush	<i>Spiraea tomentosa</i> var. <i>tomentosa</i>	S	M-W		Pink	7-9	2'-4'		
Smooth Sumac	<i>Rhus glabra</i>	Su-PSu	D	well-drained; coarse sand to heavy clay	yellow-green	6-7	2'-20'	fast grower; persistent red fruits; fruits attract birds	
Staghorn Sumac	<i>Rhus typhina</i>	Su-PSu	D-M	well-drained; coarse sand to heavy clay	yellow-green	6-7	max. 40'	fast grower; weedy; hairy, persistent red fruits; birds eat	
Sweet Pepperbush	<i>Clethra alnifolia</i>	PSh-Su	M-W	sand to muck, clays	White	7-8	6'-12'	slow to medium growth	
Pinxter-flower	<i>Rhododendron periclymenoides</i>	Su-PSu	D-W	acidic mineral soils; and sandy peat	Pinkish	4-5	2'-7'	best on peat soils	
Swamp Azalea	<i>Rhododendron viscosum</i>	Su-PSh	W	acid soil; mineral, peat, or muck	White	6-7	6'-12'	tolerates sand to stiff clay soils	
Wild Plum	<i>Prunus americana</i>	Su	M-D		White	5-6	max. 35'	birds eat fruits	
Black Cherry	<i>Prunus serotina</i> var. <i>serotina</i>	Su	D		White	5	max. 90'	birds eat fruits	
Heath Aster	<i>Symphotrichum ericoides</i> var. <i>ericoides</i>	Su	D	dry, open sites	White	7-10	1'-3'		
New England Aster	<i>Symphotrichum novae-angliae</i>	Su-PSu	M(-W)	well drained; tolerates periodic saturation	Purp+Orng	8-10	4'-6'	fast grower but needs average or better soil	
New York Aster	<i>Symphotrichum novi-belgii</i>	Su-PSu	M		Pu to W	8-10	3'-7'		
Smooth Aster	<i>Symphotrichum laeve</i>	Su-PSu	D-Average		Bl or Pu	8-10	1'-3'		
Stiff Aster	<i>Ionactis linariifolius</i>	Su	D		Bl-Pur	9-10	6"-18"	flower center goes f/ yellow to orange	
Wild Bergamot	<i>Monarda fistulosa</i> var. <i>fistulosa</i>	Su-PSh	M	usually on limey soil	Pi-Lav	7-8	2'-3'	aromatic leaves	
Boneset	<i>Eupatorium perfoliatum</i>	Su	D-W	tolerates saturation	White	7-9	4'-6'	in wetlands & uplands	
Sweet Goldenrod	<i>Solidago odora</i> var. <i>odora</i>	Su	D-M		Yellow	7-10	2'-4'		
Purple Joe-Pye Weed	<i>Eupatorium purpureum</i> var. <i>purpureum</i>		M-W		Pur/PK	7-9	3'-10'		
Spotted Joe-Pye Weed	<i>Eupatorium maculatum</i> var. <i>maculatum</i>	Su-PSu	M-W		Pink	7-9	2'-6'	meadows and wet thickets	
Butterfly-weed	<i>Asclepias tuberosa</i> ssp. <i>tuberosa</i> or <i>A. tuberosa</i> ssp. <i>interior</i>	Su	very Dry-D		Orange	6-9	1'-2'		
Common Milkweed	<i>Asclepias syriaca</i>	Su-PSu	D-M		Pink	6-8	2'-5'	spreads readily	
Swamp Milkweed	<i>Asclepias incarnata</i>	Su-PSu	M-W	poorly drained; tolerates seasonal saturation	Pink	6-8	2'-4'		

Light: Su=Sun (at least 6 hrs of direct, unfiltered light in midsummer [some references settle for 5 hrs]); PSu=Part Sun (2-5 hours direct sun);

Light (continued): PSh=Part Shade (2-5 hrs direct sun or all-day dappled sun); Sh=Shade (< 2 hrs direct sun)

Moisture: D=dry; M=Moist; W=Wet; **Month:** Months of bloom shown numerically

June 2007

Priority plantings are native species that support specialists

<https://umaine.edu/mafes/wp-content/uploads/sites/98/2018/07/Bees-and-Their-Habitats-in-Four-New-England-States.pdf>

Estimated 15% of pollinators visit only one or a few plant taxa.

In NNE bee gardens, plant selection that favors the specialists will likely meet needs of generalist bees also (Fowler 2016).

Plants that BOTH host bee specialists and are in the Bumble Bee forage guide (Stoner page 22)

Plant Family	Plant Genus	Plant Common name	# New England Specialist bee species	Listed in Bumble Bee Forage Guide	# Moth BF Species
Asteraceae	Helianthus	Sunflowers	3	y	73
	Solidago	Goldenrod	11	y	115*
	Symphyotrichum	American aster	7	y	112
Ericaceae	Vaccinium	blueberry	5	y	288
Lamiaceae	Monarda	Bee balm	1	y	7
Salicaceae	Salix	Willow	8	y	455
Verbenaceae	Verbena	Vervain	1	y	11



Not all cultivars offer equivalent services

Many native species of trees and shrubs of NNE have particular importance to bees because they offer an abundant floral resource, perhaps at a time when flowers otherwise are scarce. Willows (*Salix* spp.) and maples (*Acer* spp.) flower earlier than most plants

[20 Bees and Their Habitats in Four New England States NNE, coinciding with the active period for the earliest wild bees \(Andrenids, *Bombus*\) \(Stubbs et al. 1992\).](#)



Plants selected for traits that people prefer, even among plant species considered ‘native’, can attract fewer pollinators than their wildtype counterparts ([White 2016](#)).

Both honey bees and wild bees were more abundant on native species over cultivated varieties of the native species, but not always, and not exclusively (White 2016)

Several studies from other regions of the U.S. suggest that wild bees tend to favor native plants (Corbet et al. 2001, Morales and Traveset 2009, Morandin and Kremin 2013, Harmon-Threatt and Kremen 2015, Salisbury et al. 2015) though numerous non-native species are also frequently visited by bees (Hanley et al. 2014, Salisbury et al. 2015).

In ME, wild bees (not including bumble bees) were more abundant on a diverse mix of mostly native wildflowers, while honey bees and bumble bees were more abundant on non-native clovers, especially yellow sweet clover (*Melilotus officinalis*) (Venturini et al. 2017b). Heinrich (1979) concluded that selection by bees is probably based on abundance, floral display, sugar content of nectar, etc. rather than on status as native versus introduced in North America.



Because the Pollinator Pathway “de-fragments” the **environment**, it benefits our ecosystem as a whole. Our landscape has been chopped up, or fragmented, through urban- and suburban-ization.

Your detective work, your data collection will enable us to see where ‘pathways’ already exist and where we can fill in the gaps and reconnect with suitable plant species.



How Far do Bees Travel ?

Size matters....

A large bee can forage farther than a small one.. The range of flowers from which bees can gather nectar depends upon the length of the bees' tongues. Short-tongued bees can drink only from open flowers such as asters and daisies; long-tongued bees can reach nectar offered by deep or complex flowers such as lobelia and lupines. Some bees will also forage for nest-building materials. For example, Mason bees search for areas of damp clay soil from which they gather balls of mud to bring back to their tunnel nests. Leafcutter bees search for leaves (and sometimes flower petals) from which to cut pieces to wallpaper their brood cells.

Bumble bees range from 275m to 750m https://xerces.org/sites/default/files/2018-05/12-028_01_XercesSoc_Conserving-Bumble-Bees-Guidelines_web.pdf

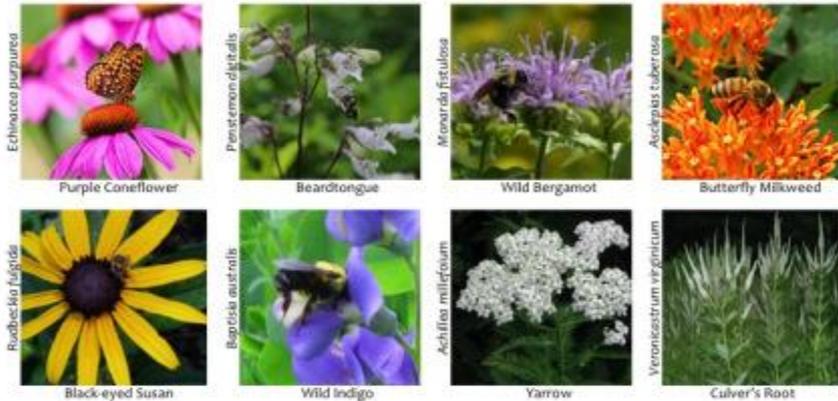
How Far Bees Travel

How far a bee can fly depends on its size. A large bee can forage farther than a small one.

Size	Example	Average Distance	Max. Distance
Small	Sweat bee	300 ft.	600-900 ft.
Medium	Mason bee	1500 ft.	0.5 miles
Medium	Honey bee	4 miles	Up to 7 miles
Large	Bumble bee	900-1800 ft.	0.5-1.7 miles

Annie White

Plant a variety of flower shapes & sizes



Color counts!



Ruby-throated hummingbird on cardinal flower (*Lobelia cardinalis*)

- Bees tend to be attracted to purples, yellows and whites
- Bees have difficulty distinguishing red from green
- Red flowers attract more hummingbirds and butterflies

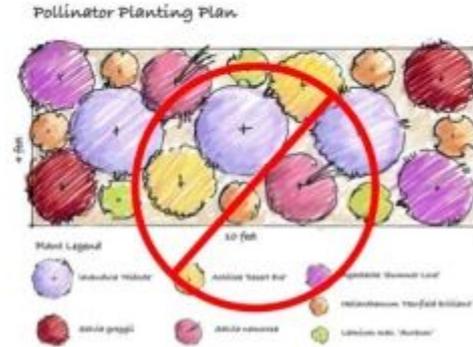
Be cautious of native cultivars



Echinacea purpurea 'Raspberry Truffle'

- Not all cultivars of native plants are as attractive to pollinators as the species
- Avoid hybrid varieties
- Avoid double-flowered varieties
- Choose cultivars that are most similar to the species in flower color, size, shape, and bloom period

Plant in masses



- Bee pollinators prefer to collect nectar/pollen from a single species of flower during each foraging outing
- Planting in masses ensures pollinators can practice “flower constancy”
- Group a minimum of 5-7 plants of the same species together

Enhance nesting opportunities

- Preserve areas of bare or sparsely vegetated, well-drained soil
- Preserve dead or dying trees and shrubs
- Minimize mulch
- Consider nesting boxes
- Maintain a nearby water source, such as a water garden or bird bath



Create microclimates for pollinators



- Areas with good south-eastern exposure are best
- Create garden spaces that are protected from prevailing winds

Minimize lawn....but if you must....

Make your lawn bee-friendly

Consider over-seeding white clover into under-utilized lawn areas



Cut back perennials in the spring



Leaving perennials intact through the winter provides nesting sites for wild pollinators and seed sources for birds

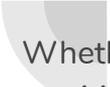




As a homeowner, participate in ecosystem function...

“Garden as if Life Depended On It” --- Doug Tallamy

...because it does



Whether invasive plants improve or degrade bee habitat is not known in NNE. One aspect, the comparative nutrition of native vs. invasive plant resources, especially nectar and pollen, remains unquantified. Relative attractiveness of native vs. invasive plants was studied by Stubbs et al. (2008) in ME among three pairs of invasive and native plants that co-flower. Lowbush blueberry had lower fruit set if located near Japanese barberry, compared to lowbush blueberry distant from the invasive plant.

Beekeepers are reluctant to control Japanese knotweed because of its abundant late-season flowers and abundant nectar secretion, but this plant spreads into and dominates riparian habitats and can take over areas at field edges (for a history of its introduction and spread in North America, see Townsend 1997).

Some beekeepers also resist controlling purple loosestrife with its abundant flowers in August, and want to retain June-flowering black locust (*Robinia pseudoacacia*), a tree native in Pennsylvania and farther south. In the case of black locust, habitat loss is due partly because the tree lacks flammability, and can change the fire regime in fire-adapted forest types such as those dominated by pitch pine (*Pinus rigida*; Dibble and Rees 2005). The consequence for wild bees is forest conversion from fire-adapted woodland vegetation that supports diverse herbs and shrubs on which they forage, to a shady mesic stand with little understory vegetation suitable as bee forage. Examples of pitch pine forest can be found in sandy outwash plains in all four states, less so in VT where the type is rare (Siccama 1971).



Bumble bees

page 32

Bumble bees queen overwinter 2-3cm down, large hold heat emerge in early spring forage for pollen(early flowers are important) and nest in old rodent nest or tufts of grass. On wax pots she lays some eggs, 4-5 weeks later larvae develop into adults

Long tongue species...*Penstemon*, bee balm, long corolla species

Short tongue species...*Helianthus* and *Echinacea*; some are nectar robbers

Buzz pollination