

A close-up photograph of a green and yellow striped bee on a purple flower. The bee is positioned in the lower-left quadrant, facing right. The flower has many light purple petals and a yellow center. The background is dark and out of focus.

Bee Campus USA

An Initiative of The Xerces Society for Invertebrate Conservation

The Xerces Society



Photo: Endangered Fender's blue butterfly (*Icaricia icarioides fenderi*) by Dana Ross

*Protecting the life that
sustains us*

Since 1971, the Xerces Society has worked to protect wildlife through the conservation of invertebrates and their habitat.

Bee Campus USA

Bringing communities together to sustain pollinators, in particular the more than 3,600 species of native bees in this country, by increasing the abundance of native plants, providing nest sites, and reducing the use of pesticides.



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Honey Bees





Photo: Emily May

Beekeeping ≠ Bee Conservation

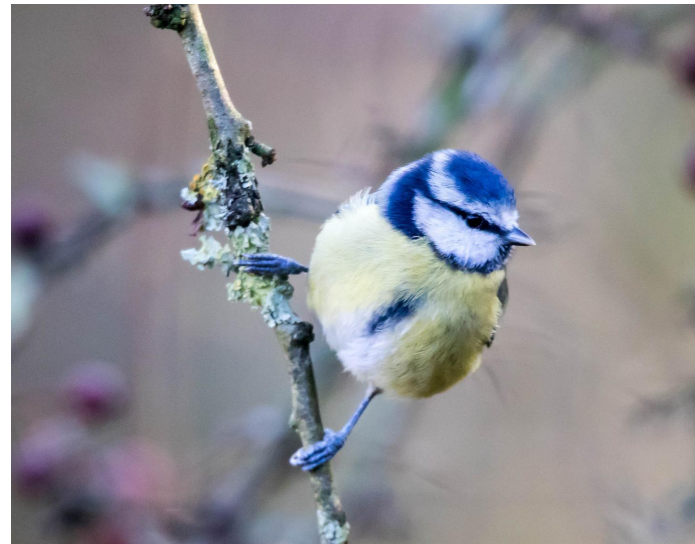




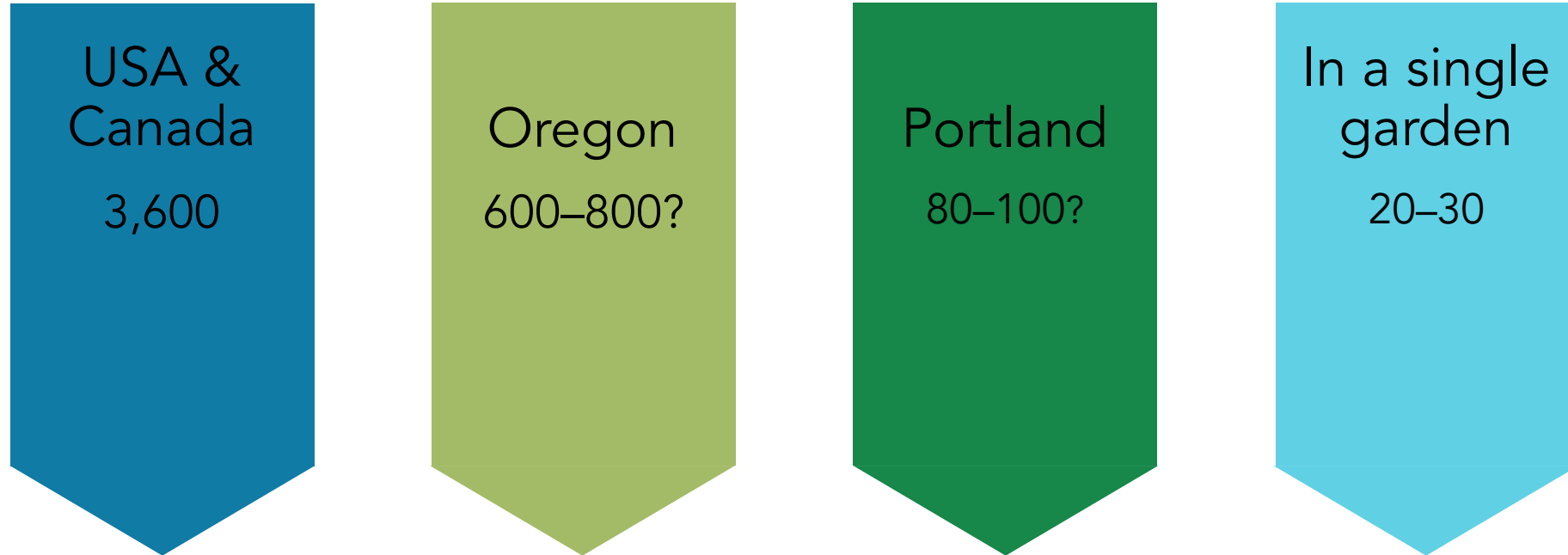


Photo: Stephanie McKnight / Xerces



Bee Diversity

Number of species



Other Pollinators

Butterflies



Moths



Beetles



Flies



Photos: Dennis Burnette, Stephanie McKnight, Whitney Cranshaw, Scott Horvath

Why Care About Pollinators?



Plant Reproduction



Food Production

Ecological Role

Pollinators are at the center of complex food webs.

They enable the fruits and seeds that make up a major part of the diet of many animals.



And sometimes they are the food themselves.



Photos: Wildreturn, Flickr; Colleen Prieto, Flickr; U.S. Forest Service; kansasphoto, Flickr.

Enrich our Lives, Define our Seasons

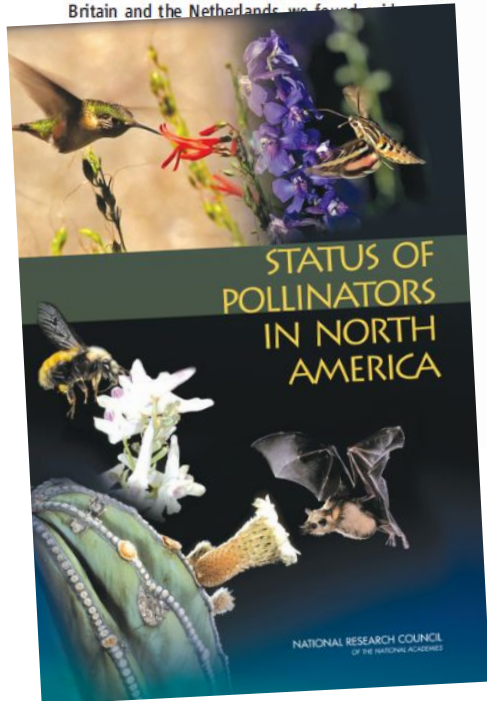


The Science is Clear: Pollinators are in Peril

Parallel Declines in Pollinators and Insect-Pollinated Plants in Britain and the Netherlands

J. C. Biesmeijer,^{1*} S. P. M. Roberts,² M. Reemer,³ A. P. Schaffers,⁷ S. G. Potts,² R. Kleukers,³ C. D.

Despite widespread concern about declines in poll patterns of change in most pollinator assemblages Britain and the Netherlands we found that



However, the evidence for such declines remains scanty (5).

To adequately demonstrate a decline in pollinator services, one would need to document (i) overall declines in

Plant-Pollinator Interactions over 120 Years: Loss of Species, Co-Occurrence, and Function

Laura A. Burkle,^{1,2*} John C. Martin,³ Tiffany M. Knight¹

Using historic data sets, we quantified the degree to which global change over 120 years disrupted plant-pollinator interactions in a temperate forest understory community in Illinois, USA. We found degradation of interaction network structure and function and extirpation of 50% of bee species. These changes can be attributed to shifts in forb and bee phenology, resulting in temporal co-occurrences between services have declined; disturbance; however

Almost 90% of pollinators (1), rely on pollinator interactions that are particularly susceptible to their sensitivity

AS PNAS

Patterns of widespread decline in North American bumble bees

Sydney A. Cameron^{a,1}, Jeffrey D. Lozier^a, James P. Strange^b, Jonathan B. Koch^{b,c}, Nils Cordes^{a,2}, Leellen F. Solter^d, and Terry L. Griswold^b

^aDepartment of Entomology and Institute for Genomic Biology, University of Illinois, Urbana, IL 61801; ^bUnited States Department of Agriculture-Agricultural Research Service Pollinating Insects Research Unit, Utah State University, Logan, UT 84322; ^cDepartment of Biology, Utah State University, Logan, UT 84321; and ^dIllinois Natural History Survey, Institute of Natural Resource Sustainability, University of Illinois, Champaign, IL 61820

Edited* by Gene E. Robinson, University of Illinois, Urbana, IL, and approved November 24, 2010 (received for review October 3, 2010)

Bumble bees (*Bombus*) are vitally important pollinators of wild plants and agricultural crops worldwide. Fragmentary observations, however, have suggested population declines in several North American species. Despite rising concern over these observations in the United States, highlighted in a recent National Academy of

Long-Term Trends in Eastern North American Monarch Butterflies: A Collection of Studies Focusing on Spring, Summer, and Fall Dynamics

ANDREW K. DAVIS^{1,2} AND LEE A. DYER³

ELSEVIER

journal homepage: www.elsevier.com/locate/jjip

A historical review of managed honey bee populations in Europe and the United States and the factors that may affect them

Dennis vanEngelsdorp^{a,*}, Marina Doris Meixner^b

^aDepartment of Entomology, The Pennsylvania State University, 501 ASI Bldg., University Park, PA 16802, USA
^bLLH Bieneninstitut, Erlenstrasse 9, 35274 Kirchhain, Germany

The monarch butterfly, *Danaus plexippus*, is one of the most appreciated insects in North America.

study in the United States identified lower genetic diversity and elevated genetic differentiation (F_{ST}) among Illinois populations of the putatively declining *B. pensylvanicus* relative to those of a codistributed stable species (19). Similar patterns have been observed in comparative studies of some European species (8), but

Pollinator Declines

Globally: Up to 40% of pollinator species may be at risk of extinction in the coming years.

North America: More than a quarter of bumble bees species are in decline



Photo: Rusty-patched bumble bee (*Bombus affinis*), Rich Hatfield



Drivers of Pollinator Declines



Habitat loss and degradation

Drivers of Pollinator Declines



Habitat loss and degradation



Pesticide use

Drivers of Pollinator Declines



Habitat loss and degradation



Pesticide use



Diseases and pathogens

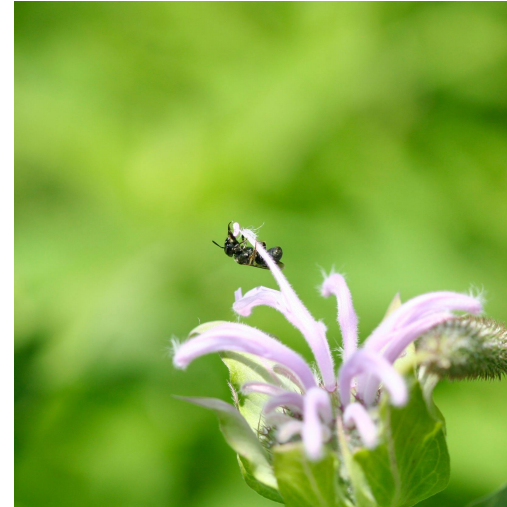
Drivers of Pollinator Declines



Habitat loss and degradation



Pesticide use



Diseases and pathogens



Climate change

Good News: There are Solutions



Pollinator Conservation Principles



Increase the
availability of
native flowering
species

Pollinator Conservation Principles



Increase the
availability of
native flowering
species



Provide
appropriate
nesting
substrates

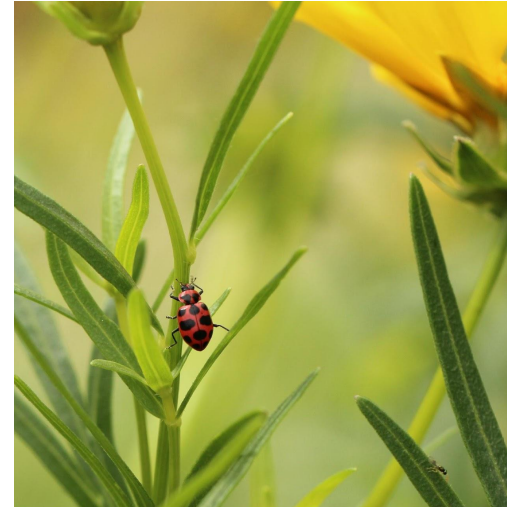
Pollinator Conservation Principles



Increase the
availability of
native flowering
species



Provide
appropriate
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substrates



Find alternatives
to harmful
pesticides

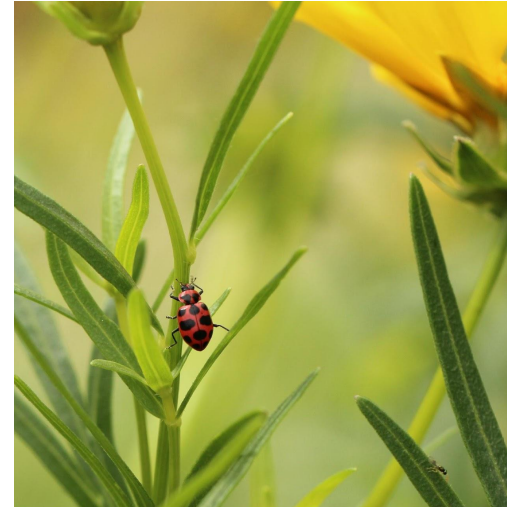
Pollinator Conservation Principles



Increase the availability of native flowering species



Provide appropriate nesting substrates

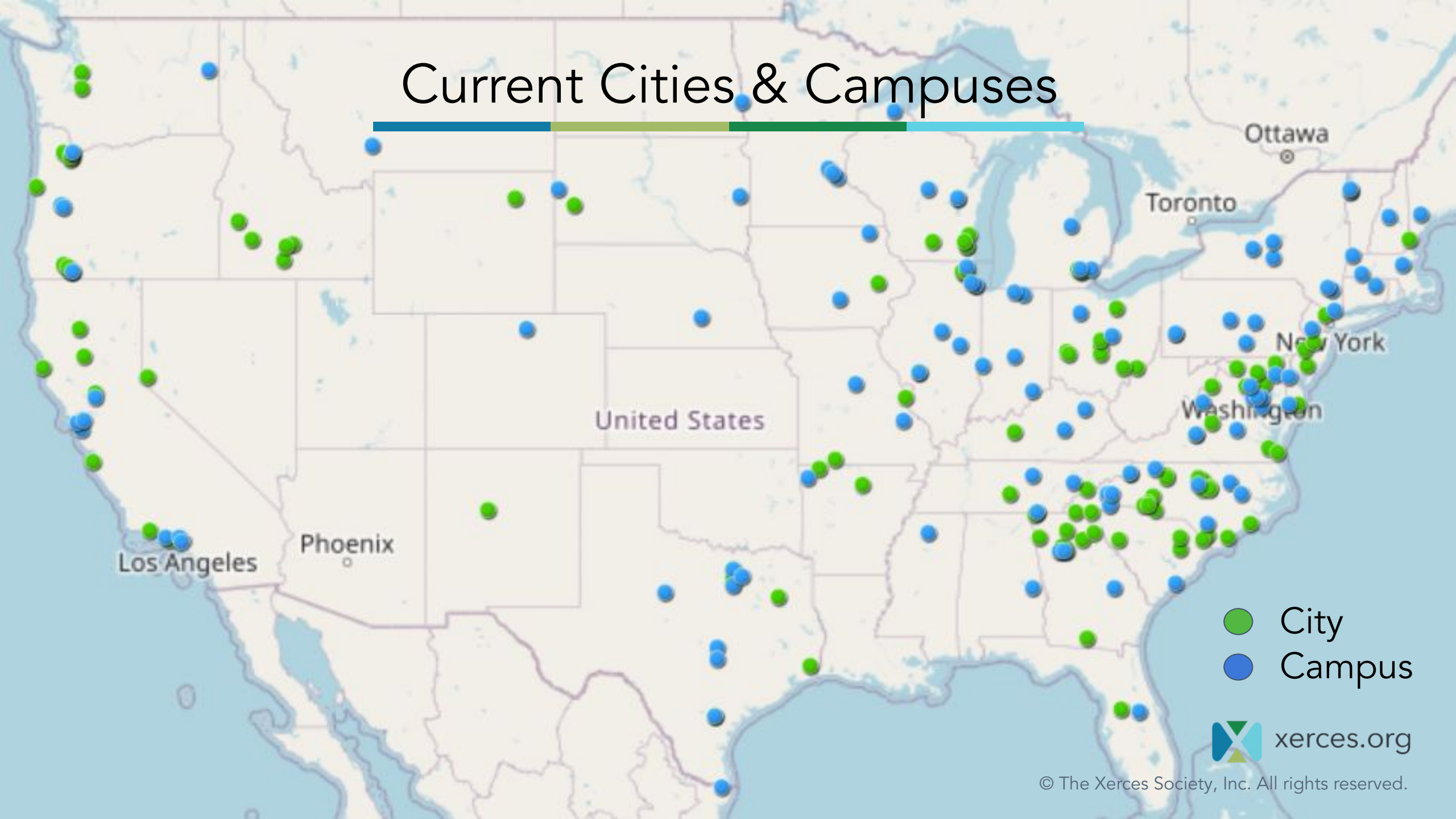


Find alternatives to harmful pesticides



Educate and spread awareness

Current Cities & Campuses



Bee Campus USA Commitments

Establish a standing Bee Campus USA committee to advocate for pollinators.



Bee Campus Committee

Faculty

Staff

Admin

Students

Bee Campus USA Commitments


Create and enhance pollinator habitat on campus through increasing the abundance of native plants and reducing the use of pesticides.



Integrated Pest Management (IPM) Plan

SMARTER PEST MANAGEMENT

Protecting Pollinators at Home



Towns and cities are home to numerous pollinators, including the gulf fritillary (left) and the endangered rusty patched bumble bee (middle). By creating healthy, diverse, pesticide-free habitat in your yard, not only are you enriching your own life, but you are helping prevent insect declines—and potentially, extinction. (Photos: (l) Dennis Krusac; (m) Xerces Society / Sarina Jepsen; (r) Matthew Shepherd.)

Making Your Yard a Safe Place for Pollinators

Making your home pollinator-friendly is easy and rewarding. Most of North America's native bee species only forage over a distance of a few hundred yards, so with a little planning, your yard can provide a safe space for bees and other pollinators to thrive. All you need to give them are flowering plants throughout the growing season, undisturbed places to nest, and protection from pesticides. This guide will help you with the last item, managing yard pests in a pollinator-friendly way.


Urban Settings Provide Key Habitat for At-Risk Pollinators

Around the world, bee and butterfly populations are experiencing declines. Twenty-eight percent of North American bumble bees and 19 percent of butterfly species in the United States are at risk of extinction. Residential areas provide important food and shelter for many of our threatened and endangered pollinators. By establishing pollinator habitat in your yard, you will be an active part of restoring species on the brink.

Provide for All the Needs of Pollinators

To ensure you can support the entire life cycle of bees and butterflies, consider the following ideas for your yard:

1. Select a range of native and regionally adapted plants with bloom times that overlap throughout the growing season to provide food for pollinators. Be sure to include plants that bloom early and late in the season.
2. Include butterfly larval host species for caterpillars to feed on. Consult Xerces' regional plant lists (available from xerces.org) to find recommendations for your area. For more detailed information, see *Gardening for Butterflies* (Timber Press, 2016).
3. Limit planting cultivated plant varieties, especially those bred for showy blooms. While often selected for




XERCES SOCIETY
for Invertebrate Conservation

Habitat Planning for Beneficial Insects

Guidelines for Conservation Biological Control

Jennifer Hopwood, Eric Lee-Mäder, Lora Morandin, Mace Vaughan, Claire Kremen, Jessa Kay Cruz, James Eckberg, Sarah Foltz Jordan, Kelly Gill, Thelma Heidel-Baker, and Sara Morris



XERCES SOCIETY
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Integrated Pest Management Policy

Ashland Parks and Recreation Commission (APRC)

Adopted by APRC on:

May 24, 2010

Revised on:

February 28, 2011

June 27, 2011

February 27, 2012

April 22, 2013

April 28, 2014

May 22, 2017

Integrated Pest Management Policy
Ashland Parks & Recreation Commission (APRC)
Page 1 of 11

Recommended Native Plant List



The Northeast Region encompasses southern Quebec, New Brunswick, Nova Scotia, the New England states, and eastern New York. High regional variation in topography, soils, and climate translates to tremendous ecological diversity, ranging from the coastal dunes and tidal ecosystems along the Atlantic shoreline, to the spectacularly species-rich deciduous forests and riparian communities of the Appalachian Highlands.

Corresponding to this striking diversity of plant communities is an equally remarkable range of pollinators, including twenty bumble bee species and thousands of other species of native bees, butterflies, hover flies, flower-visiting beetles, wasps, and moths. As a group, these and other pollinators maintain healthy, productive plant communities, provide food that sustains wildlife, and play an essential role in crop production. In the Northeast, several important pollinators, including the yellow-banded bumble bee (*Bombus terricola*) and endangered rusty-patched bumble bee (*B. affinis*), are threatened by habitat loss, including dramatic declines in native plant communities needed to support these animals.

Providing wildflower-rich habitat is the most significant action you can take to support pollinators. Adult bees, butterflies, and other pollinators require nectar as their primary food source. Female bees also collect pollen as food for their offspring. Native plants, which are adapted to local soils and climates, are usually the best sources of nectar and pollen for native pollinators. In addition, native plants often

require less water than non-natives, do not need fertilizers, and are less likely to become weedy.

This guide features regional native plants that are highly attractive to pollinators and are well-suited for small-scale plantings in gardens, on business and school campuses, in urban greenspaces, and in farm field borders. In addition to supporting native bees and honey bees, many of these plants attract nectar-seeking butterflies, moths, and hummingbirds, and some are host plants for butterfly and moth caterpillars. With few exceptions, these species occur broadly across the region and can be purchased as seed or transplants. Please consult regional Floras, the Biota of North America's North American Plant Atlas (<http://bonap.net/napa>), or the USDA's PLANTS database (<http://plants.usda.gov>) for details on species' distributions in your area.

Our **Bring Back the Pollinators** campaign is based on four principles:

1. Grow a variety of pollinator-friendly flowers;
2. Protect and provide bee nest sites and caterpillar host plants;
3. Avoid using pesticides, especially insecticides; and
4. Spread the word!

You can participate by taking the **Pollinator Protection Pledge** and registering your habitat on our nationwide map at: www.bringbackthepollinators.org



Bloom Period	Common Name	Scientific Name	Flower Color	Max. Height*	Water Needs	Notes
Forbs						
Early	1 Golden Alexanders	<i>Zizia aurea</i>	yellow	3	H	Host plant for black swallowtail butterfly; shallow nectaries attract small beneficial wasps, bees, and flies
	2 Wild geranium	<i>Geranium maculatum</i>	pink	3	M	Shade-tolerant; provides important spring food for mining, cuckoo, mason, sweat, bumble, and small carpenter bees
Early-Mid	3 Spiderwort	<i>Tradescantia virginiana</i>	blue	3	M	The attractive flowers of this unique iris-relative are frequented by bumble bees and other pollinators; shade tolerant
	4 Blue vervain	<i>Verbena hastata</i>	blue	5	H	A preferred nectar plant for bees, butterflies, hover flies, and bee flies; choose <i>Verbena stricta</i> for drier soils
Mid	5 Narrowleaf mountain mint	<i>Pycnanthemum tenuifolium</i>	white	3	L-M	This and related species have fragrant foliage and nectar-rich flowers; very popular with butterflies, beetles, and more
	6 Swamp milkweed	<i>Asclepias incarnata</i>	pink	5	M-H	Host plant for monarchs; lovely fragrance attracts insects of all kinds; at drier sites use common or butterfly milkweed
	7 Wild bergamot	<i>Monarda fistulosa</i>	purple	4	M	Hawk moths, hummingbirds, and long-tongued bumble bees (such as <i>Bombus pensylvanicus</i>) are common visitors
	8 Boneset	<i>Eupatorium perfoliatum</i>	white	5	H	Flat-topped clusters of fluffy, nectar-rich flowers attract many kinds of insects; tolerant of partial shade and wet soils
Mid-Late	9 Cardinal flower	<i>Lobelia cardinalis</i>	red	4	H	Striking, scarlet-red tubular flowers attract hummingbirds and swallowtail butterflies
	10 Field thistle	<i>Cirsium discolor</i>	purple	6	M	Distinct from invasive, non-native thistles; an important plant for butterflies and bumble bees; grows as a perennial or biennial
	11 Wild golden glow	<i>Rudbeckia laciniata</i>	yellow	7	H	Long bloom period; shade-tolerant; visited by bumble bees and other pollinators; seeds provide food for birds
	12 Bottle gentian	<i>Gentiana clausa</i>	blue	2	M	This unique fall flower is almost exclusively pollinated by bumble bees, which pry the petals apart to climb inside
	13 Calico aster	<i>Symphotrichum lateriflorum</i>	white	3	M	The shallow nectaries attract more insect diversity than some larger-flowered aster species; tolerant of partial shade
Late	14 Gray goldenrod	<i>Solidago nemoralis</i>	yellow	2	L	Excellent for poor soils where little else will grow; one of the latest blooming goldenrods; visited by many pollinators
	15 New England aster	<i>Symphotrichum novae-angliae</i>	purple	6	M	One of the latest fall-blooming plants; frequented by honey bees and pre-hibernation bumble bee queens
	16 Wrinkleleaf goldenrod	<i>Solidago rugosa</i>	yellow	3	M-H	Goldenrods are frequented by beneficial solitary wasps, pollen-eating soldier beetles, bumble bees, and much more
Shrubs and Trees						
	17 Highbush blueberry	<i>Vaccinium corymbosum</i>	white/ pink	12	M-H	Well-loved by humans and also provides food for mining bees, mason bees, and long-tongued bumble bees
Early	18 Pussy willow	<i>Salix discolor</i>	yellow/ green	15	M-H	Silky gray catkins open into flowers that provide spring forage for bees; host plant for mourning cloak butterflies
	19 Raspberry, blackberry	<i>Rubus spp.</i>	white	4+	M	Hollow canes/ prunings make excellent nest sites for cavity-nesting bees; flowers are pollinated by many kinds of bees
Early-Mid	20 American basswood	<i>Tilia americana</i>	cream	60	M	Also called "bee tree" for its abundance of very fragrant, nectar-rich flowers which are extremely attractive to bees
	21 Ninebark	<i>Physocarpus opulifolius</i>	white	8	L	Deciduous shrub with attractive foliage, peeling bark, and white flowers; loved by birds, bees, and butterflies
Mid	22 New Jersey tea	<i>Ceanothus americanus</i>	white	4	M	A magnet for many species of flies, wasps, bees, and butterflies; slow growing and prone to deer browsing
	23 Virginia rose	<i>Rosa virginiana</i>	pink	6	L	Foliage is used by leafcutter bees; flowers provide food for many pollinators; exceptional leaf coloration in the fall
Late	24 Buttonbush	<i>Cephalanthus occidentalis</i>	white	12	H	Host plant for numerous moths and butterflies; pincushion-like flowers are very attractive to butterflies and bees

This list of pollinator plants for the Northeast Region was produced by the Xerces Society. For more information about pollinator conservation, please visit www.xerces.org



Bee Campus USA Commitments

Offer service-learning projects to enhance pollinator habitat.



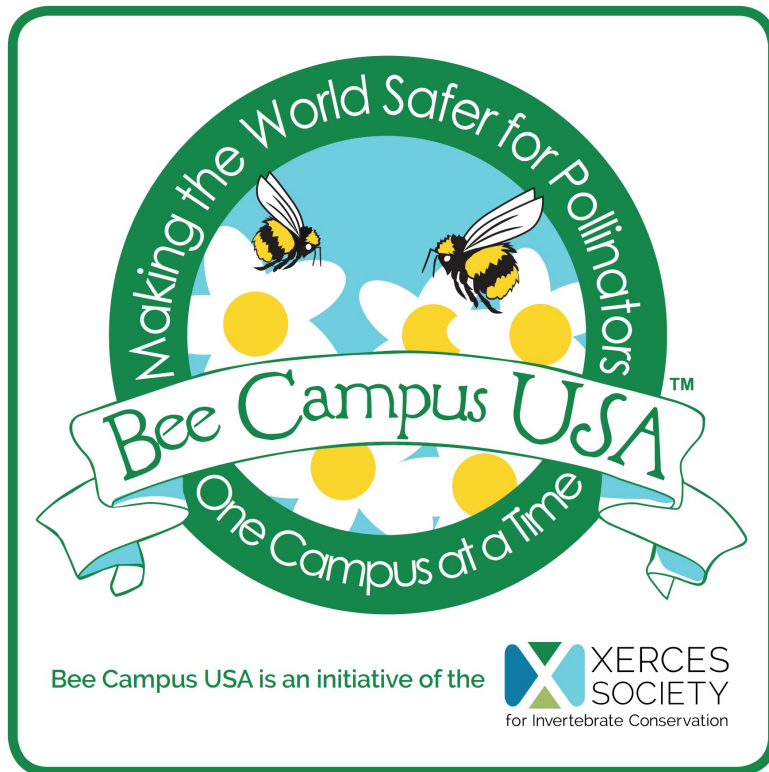
Bee Campus USA Commitments

Offer courses or continuing education opportunities that incorporate pollinator conservation.



Bee Campus USA Commitments

Publicly acknowledge Bee City USA affiliation with signs and an online presence.



Bee Campus USA Commitments

Annually apply for renewal and report on the previous year's activities.



University of Connecticut
Storrs, Connecticut

EDUCATION & OUTREACH



The UConn Farm Fresh Market offers fresh local produce from our Spring Valley Student Farm, baked goods from our "Not Just Desserts" UConn Bakery, local honey and many other local products each week from May through September.

The UConn Spring Valley Student Farm hosted farmers markets on Thursdays from May through September in 2019.



UConn Bug Week 2019 Activities & Event



This was the flyer used to promote the screening of "The Pollinators" film, which was hosted by Eco House on February 25, 2020.

Our education and outreach activities included:

- "The Pollinators" Film Screening - February 25
- UConn Bug Week - July 21-28
- Farm Fresh Market on Fairfield Way on Thursdays, from May through to September
- UConn Native Plants and Pollinators Conference - October 3, 2019
- Free Pollinator Puppet Building Workshops hosted by The Ballard Institute and Museum of Puppetry at UConn - September 15, 2019
- Earth Day Spring Fling - April 16, 2019
- Homemade Honey Sale by the Beekeeping Club - November 8, 2019.

POLLINATOR HEALTH & HABITAT



Different varieties of flowers blooming at the UConn Eco Garden.



A view of the UConn Eco Garden.



The UConn Spring Valley Student Farm



UConn students work to remove invasive species during a trail cleanup in the Hillside Environmental Education Park (HEEP) on October 19, 2019.

UConn students completed invasive species removal and trail maintenance in the Hillside Environmental Education Park (HEEP) on campus on October 19, 2019. This event had 23 volunteers.

Julia Cartabiano, the Spring Valley Student Farm Manager, planted milkweed at the farm to create more pollinator habitat.

The Spring Valley Student Farm plants a variety of flowers, food crops, and forest plants, with the help of the 11 farm residents and volunteers that assist on Farm Fridays throughout the year.

The EcoGarden Club, comprised of about 15 students, also planted new pollinator plants at the Mansfield Community Eco Garden, which they work on throughout the year from May to October.

The EcoGarden Club planted herbs, flowers, and vegetables in 2019.

Also, UConn planted hundreds of native tree species throughout 2019, including different species of oaks, dogwoods, and pine trees.

SERVICE LEARNING

The course SPSS 1125 Insects, Food and Culture in Fall 2019 was a service learning course. Student group projects were developed on various insect related topics including pollinators. The first group project was to develop an educational 36x42 poster to be exhibited at the Willimantic Public Library. Two student groups developed their posters on the topics of:

- 1) What are pollinators and how do we interact with them;
- 2) Problems that pollinators face (this poster also gave tips on what we can do to help pollinators).

These projects had 4 students per group.

The second service learning group activity was a hands-on demonstration for an after-school program. One of the activities was centered around pollinators. Undergraduate students taught kids about bumblebees and honey bees, played a game that taught bee morphology, and kids had a chance to handle bumblebee specimens.

CURRICULUM & CONTINUING EDUCATION

The for-credit courses containing information on pollinators included BIOL 1102 Foundations of Biology, BIOL 1110 Introduction to Botany, EEB 2208E Introduction to Conservation Biology, EEB 2222 Plants in a Changing World, EEB 2244E General Ecology, EEB 2245W Evolutionary Biology, SPSS 1110 Fundamentals of Horticulture, SPSS 1115 Turfgrass Management Lab, SPSS 2110W Sustainable Plant Pest Management Communication, SPSS 3440 Small Fruit Production, SPSS 3830 Horticultural Entomology, and SPSS 3840 Integrated Pest Management.

These courses focused on or included lessons on plant ecology, pollinator biology, integrated pest management practices, pollinators in agriculture, and landscaping for pollinators.

Bee Campus USA Commitments

Pay initial application and annual renewal fees.

Fee Based on Enrollment

- <3000 (\$100)
- 3,000 - 5,000 (\$200)
- 5,001 - 10,000 (\$300)
- 10,001 - 20,000 (\$400)
- >20,000 (\$500)



Photo: Jim Cairns / USDA-NRCS

Benefits of Affiliation

- Ensure survival of vital animal species including bees and other pollinators.
- Build community locally and nationally.
- Improve local food production and raise community awareness of how our food grows.
- Support small local businesses.
- Address pest problems with fewer pesticides using integrated pest management.
- Heighten awareness of biological diversity.

Apply

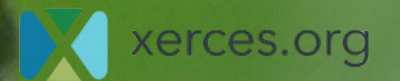
www.beecityusa.org/application-campus

Application Process

- Form Committee
- Complete online application
- Receive approval of president or chancellor
- Pay application fee (scaled to student enrollment)

Learn More

www.beecityusa.org



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Thank You

Questions?

