

Creating Pollinator-Friendly Landscapes

How Everyone Can Take Action to Protect Pollinators and Improve Habitat






XERCES SOCIETY
for Invertebrate Conservation


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Photo: Mace Vaughan

Introduction to the Xerces Society



XERCES SOCIETY
for Invertebrate Conservation



Xerces blue butterfly (*Glaucopsyche xerces*)

Protecting the Life that Sustains Us

The Xerces Society is a nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. For over forty years, the Society has been at the forefront of invertebrate protection worldwide, harnessing the knowledge of scientists and the enthusiasm of citizens to implement conservation programs.

Learn more about our work at www.xerces.org

Photo: Ed Ross

The Xerces Society: Protecting the Life that Sustains Us



Xerces Program Areas

- Butterfly conservation
- Aquatic conservation
- Endangered species
- Pollinator conservation
- Conservation biocontrol
- Pesticide protection
- Citizen science
- Advocacy and Policy
- Bee Better Certified
- Bee City USA



Photos: Adam Varenhorst, Tim Menard, Sarina Jepsen, Bruce Newhouse, Xerces Society/Kelly Gill

Resources and Guidelines

www.xerces.org



Xerces-NRCS Conservation Partnership

USDA Natural Resources Conservation Service

- Joint Staff Biologist positions with USDA NRCS
- Technical assistance for Farm Bill programs
- Developing / enhancing on-farm pollinator habitat
- Financial support for conservation
- Find out more at: www.nrcs.usda.gov



Photo: USDA-NRCS, USDA-ARS

Importance of Insects

Biodiversity

- Insects make up over 50% of the 1,750,000 described species, and most of those are beetles.
- If the weight of all land animals is summed, arthropods comprise over 85 percent of the total

Rank of Diversity

- | | |
|--------------------------|-------------------|
| 1. Insects | 10. Roundworms |
| 2. Plants | 11. Earthworms |
| 3. Non-insect Arthropods | 12. Birds |
| 4. Mollusks | 13. Coelenterates |
| 5. Fungi | 14. Reptiles |
| 6. Protozoa | 15. Echinoderms |
| 7. Algae | 16. Sponges |
| 8. Fish | 17. Bacteria |
| 9. Flatworms | 18. Amphibians |
| | 19. Mammals |

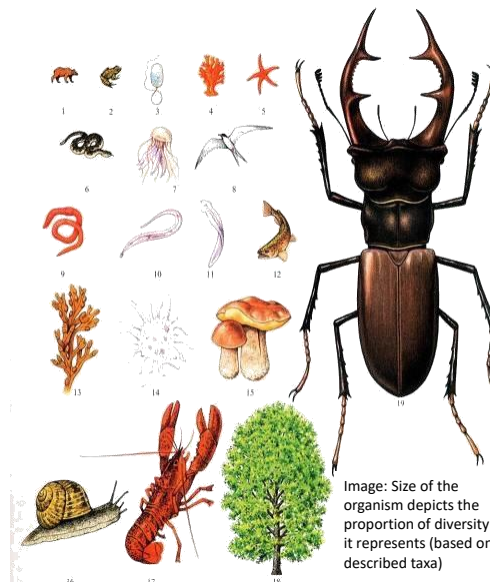


Image: Size of the organism depicts the proportion of diversity it represents (based on described taxa)

Wilson 1992, UNEP Global Biodiversity Assessment 1995

Importance of Pollinators: Ecological Keystone

Insects drive the system

- Over 85% of the world's flowering plants depend on animal – mostly insects – for pollination
- Open pollination promotes genetic diversity in plant communities
- 87 of 124 most commonly cultivated crops are animal pollinated
- Fruits and seeds are a major part of the diet of ~25% of birds, and many mammals
- Insects are a food source
- Pollinator-friendly landscapes support a variety of wildlife



Photos: Nancy Adamson, USDA-NRCS, Mace Vaughan

Pollinators: Human Nutrition

Produce section with bee-pollinated crops



Photo: Whole Foods Market

Pollinators: Human Nutrition

Produce section without bee-pollinated crops

237 of 453 products removed, a total of 52% of the produce items

WHOLE FOODS MARKET SHARE THE BUZZ

Photo: Whole Foods Market

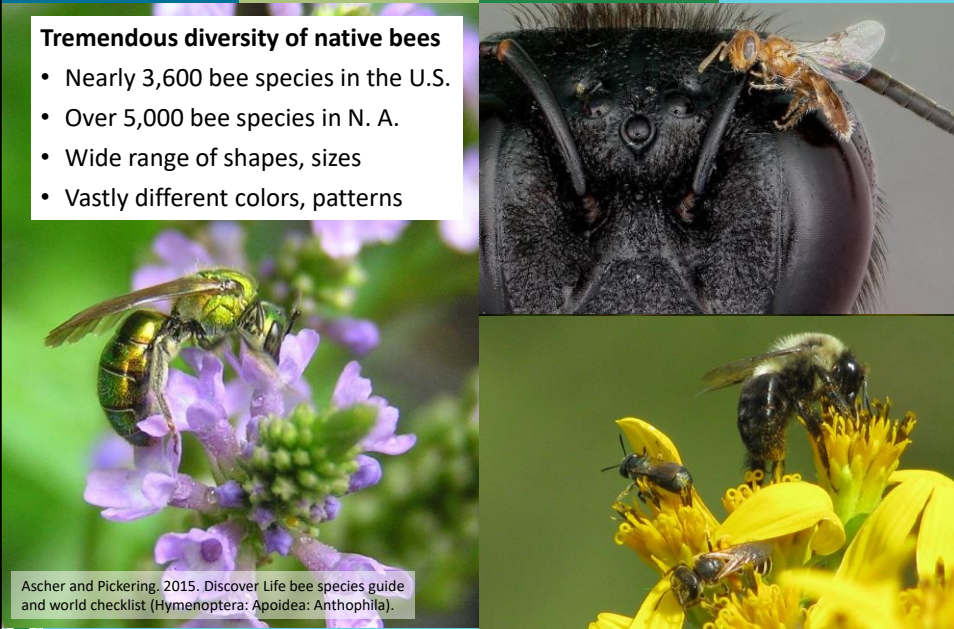
Main Groups of Pollinators

Photos: Sarah Foltz Jordan, The Xerces Society

Native Bees

Tremendous diversity of native bees

- Nearly 3,600 bee species in the U.S.
- Over 5,000 bee species in N. A.
- Wide range of shapes, sizes
- Vastly different colors, patterns



Ascher and Pickering. 2015. Discover Life bee species guide and world checklist (Hymenoptera: Apoidea: Anthophila).

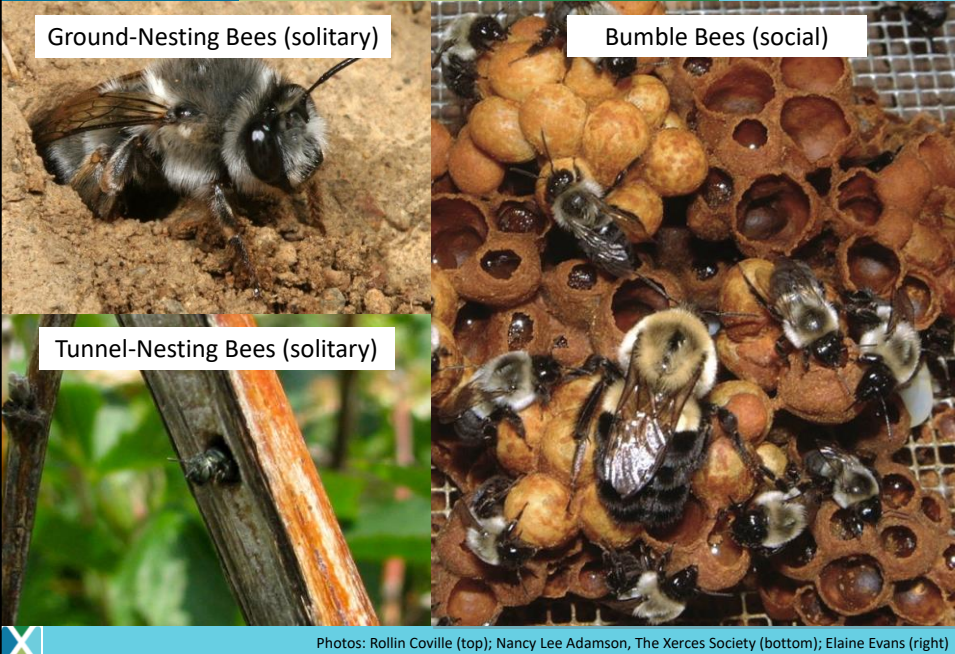
Photos: Nancy Lee Adamson, Stephen L. Buchmann

Honey Bees: Not Your Average Bee

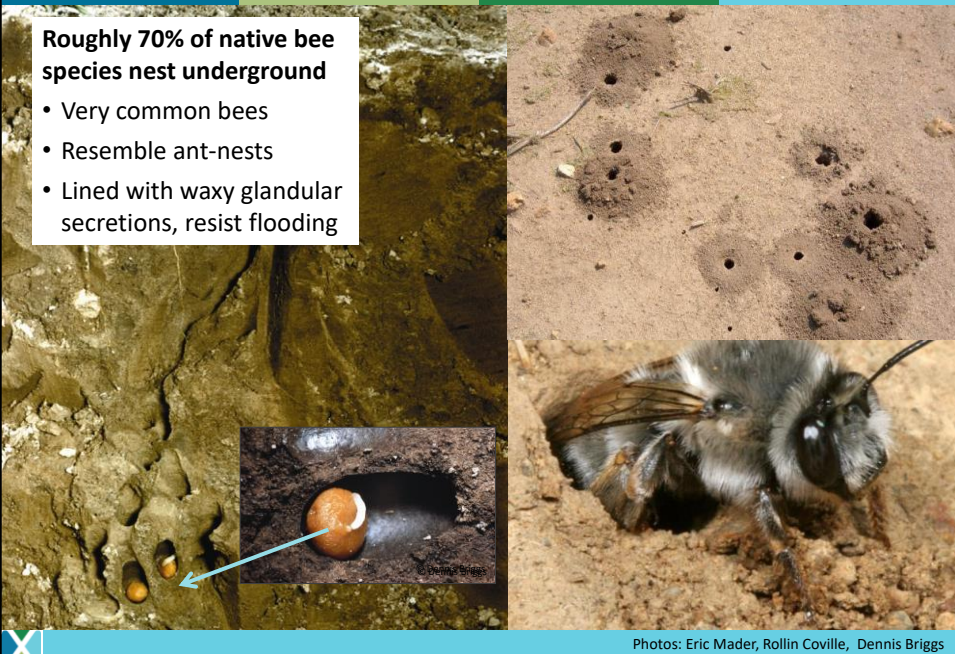


Photo: Robert W. Matthews, University of Georgia; Bugwood.org

Three Broad Groups of Native Bees



Ground-Nesting Solitary Bees



Tunnel-Nesting Solitary Bees

Roughly 30% of native bee species nest in tunnels

- Hollow stems, beetle borer holes, tunnels in snags, rotting wood
- Nest tunnel partitions constructed of mud, leaf pieces, or sawdust
- Artificially managed for some crops



Photos: Edward Ross, Darrin O' Brien, Matthew Shepherd

Bumble Bees (Social)

45 species in U.S., ~26 in East

- Social colonies founded by single queen
- Annual, last only one season
- Nest may contain 100-300 workers
- Nests in abandoned rodent burrows, brush piles, tussocks, tree cavities



Photos: Elaine Evans, Nancy Adamson, Eric Mader

Pollinator Conservation: Understanding Habitat Needs

Whether you are planting for pollinators in the backyard or the back forty, habitat must include:

- **Shelter:** nest sites, refuge, overwintering sites
- **Food:** nectar, pollen, caterpillar host plants
- **Protection:** best management practices and pesticide risk mitigation



Photo: Jennifer Hopwood

Pollinator Conservation: Understanding Habitat Needs

Make a plan that fits your site

- Recognize and evaluate existing habitat
- Protect and manage what is already there
- Adjust management practices
- Identify opportunities for creating new habitat – focus on deficiencies

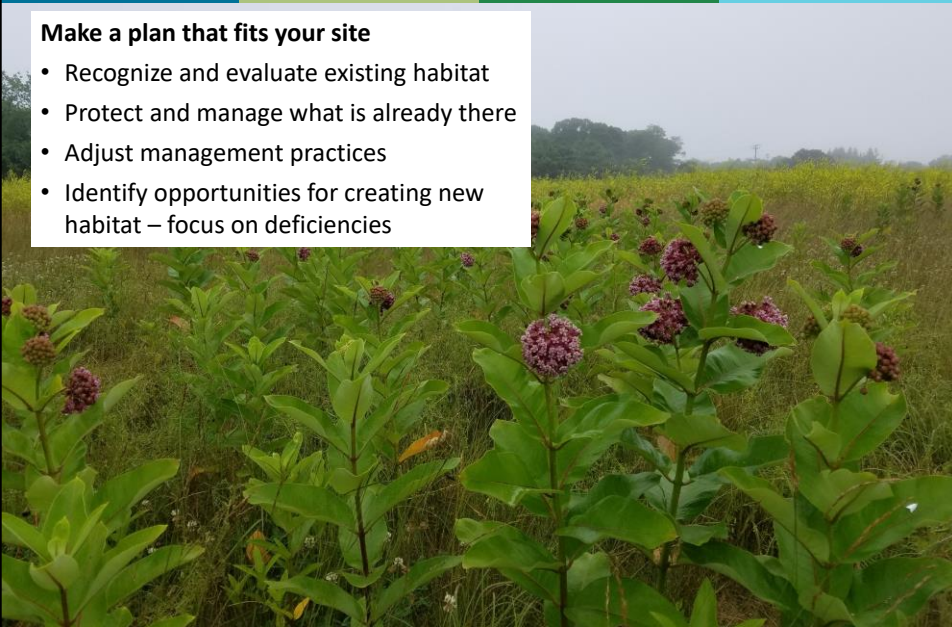


Photo: Kelly Gill

Pollinator Habitat: Plant Selection

Planting for pollinators

- Focus on native perennial plants
- Species with high pollinator value
- Succession of bloom periods
- Site appropriate characteristics
- Availability and cost
- Pesticide-free seed or plants

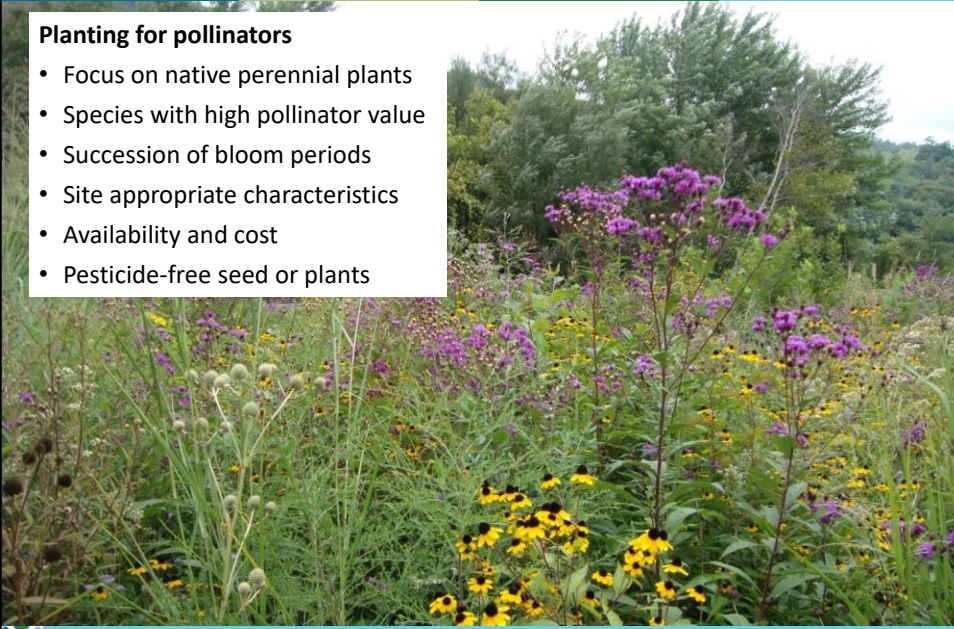


Photo: Kelly Gill

Pollinator Habitat: Plant Selection



Acer

Baptisia

Euthamia, Solidago

Pollinators need a succession of bloom: spring, summer, and fall



Salix

Pycnanthemum

Liatris

Symphyotrichum

Photos: Elaine Haug NRCS, Matthew Shepherd; Mace Vaughan, Eric Mader, Jeff McMillan NRCS, Berry Botanic Garden, Nancy Adamson

Pollinator Habitat: Special Considerations

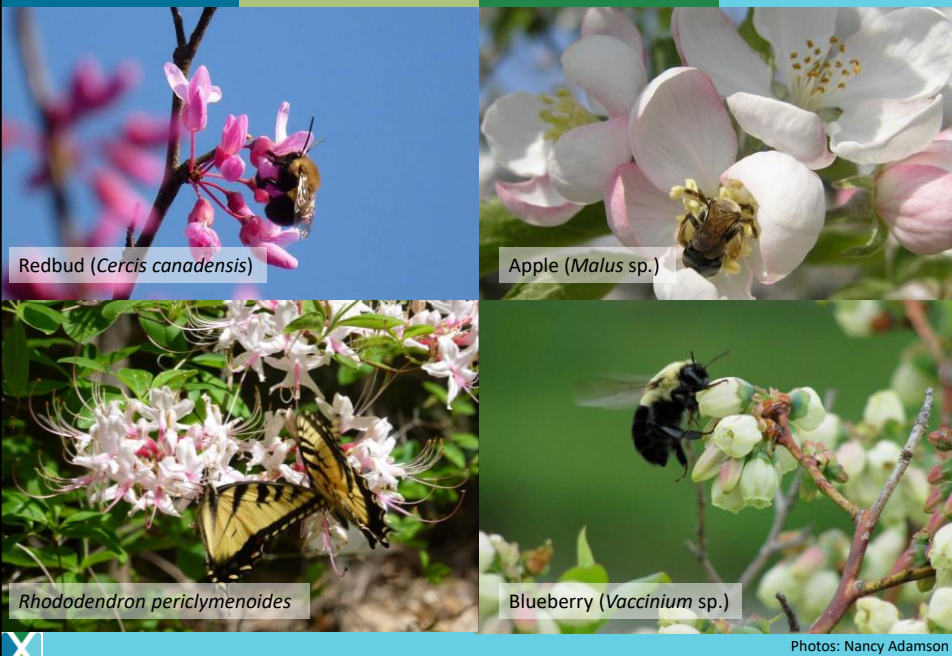
**When planting for pollinators...
choose ornamental species with care**

- Garden varieties can look pretty but may offer little or no nectar or pollen
- Showy petals in place of anthers have little or no pollen; nectar inaccessible
- Attractiveness of nativars vs. straight species is mixed, active area of research
- Make sure plants are not pretreated with insecticides!



Photo: Matthew Shepherd

Pollinator Habitat: High-Value Trees and Shrubs



Redbud (*Cercis canadensis*)

Apple (*Malus* sp.)

Rhododendron periclymenoides

Blueberry (*Vaccinium* sp.)

Photos: Nancy Adamson

Pollinator Habitat: High-Value Trees and Shrubs



Pollinator Habitat: Protecting and Providing Nest Sites

Protect ground nests

- A lack of nest sites is a major constraint on bee populations
- Recognize and protect existing nesting habitat
- Reduce tillage, plastic mulch



Photos: Jennifer Hopwood, Eric Mader

Pollinator Habitat: Protecting and Providing Nest Sites

Protect tunnel nests

- Protect or establish plants with pithy stems (boxelder, elderberry, cane fruits, sumac, hollow-stem joe pye, eastern gamagrass, etc.)
- Retain snags, stems, logs, stumps, brush piles, thatch, leaf litter



Pollinator Habitat: Protecting and Providing Nest Sites

Garden guidelines: nesting habitat

- Allow 'messy areas' – stumps, snags, canes, logs, leaf litter
- Reduce tillage, plastic mulch, and landscape fabric
- Time garden activities to reduce disturbance at critical times



Photo: Kelly Gill



Pollinator Habitat: Protecting and Providing Nest Sites

Providing vegetative structure for nest sites

- Maintaining field borders, un-mown areas
- Establishing bunch grasses
- Leaving brush piles, leaf litter, thatch
- Reduce ground disturbance when queens are overwintering



Photos: Mace Vaughan, Edward Ross

Pollinator Habitat: Protecting and Providing Nest Sites

Tall grasses



Straw mulch



Raised bed, lots of organic matter



Red Pine Needles



Pollinator Habitat: Plants for Nesting

Scientific Name	Common Name	Stems for Nesting	Nest Materials
<i>Artemisia campestris</i>	Field Sagewort		X (H)
<i>Artemisia ludoviciana</i>	Prairie Sage		X (H)
<i>Cirsium spp.</i>	Native Thistles	X	
<i>Desmodium canadense</i>	Showy Ticktrefoil		X (L)
<i>Echinacea purpurea</i>	Purple Coneflower	X	
<i>Eryngium yuccifolium</i>	Rattlesnake Master	X	
<i>Eutrochium fistulosum</i>	Hollow Stem Joe Pye Weed	X	
<i>Eutrochium maculatum</i>	Spotted Joe Pye Weed	X	
<i>Helianthus spp.</i>	Sunflower	X	
<i>Monarda fistulosa</i>	Wild Bergamot, Bee Balm	X	
<i>Oenothera biennis</i>	Evening Primrose		X (P)
<i>Penstemon spp.</i>	Beardtongue	X	
<i>Silphium perfoliatum</i>	Cup Plant		X (H)
<i>Solidago spp.</i>	Goldenrod	X	
<i>Vernonia spp.</i>	Ironweed		X (H)
<i>Zizia aurea</i>	Golden Alexanders	X	
<i>Acer negundo</i>	Boxelder	X	X (L)
<i>Acer spp.</i>	Maples		X (L)
<i>Cercis canadensis</i>	Eastern Redbud		X
<i>Cornus spp.</i>	Dogwood		X
<i>Hydrangea arborescens</i>	American Hydrangea	X	
<i>Itea virginica</i>	Virginia Sweetspire		X (L)
<i>Kalmia latifolia</i>	Mountain Laurel		X (L)
<i>Morella carolinensis</i>	Small Bayberry		X (L)
<i>Rhus glabra</i>	Smooth Sumac	X	X (L)
<i>Rhus typhina</i>	Staghorn Sumac	X	X (L)
<i>Rosa carolina</i>	Pasture Rose	X	X (L, P)
<i>Rubus allegheniensis</i>	Allegheny Blackberry	X	X (L)
<i>Rubus occidentalis</i>	Black Raspberry	X	
<i>Sambucus nigra ssp. canadensis</i>	Common Elderberry	X	



Photos: Kelly Gill, The Xerces Society

Lawns Have Low to No Habitat Value

Converting Lawns to Pollinator Habitat

- Over 40 million acres of lawn in U.S.—Turf grasses are the single largest irrigated “crop” in the country
- Lawns, ornamental landscape plants support fewer pollinators, beneficial insects, songbirds, than native plants



Milesi et al. (2005) Mapping and modeling the biogeochemical cycling of turf grasses in the United States. *Environ Manag* 36: 426–438.

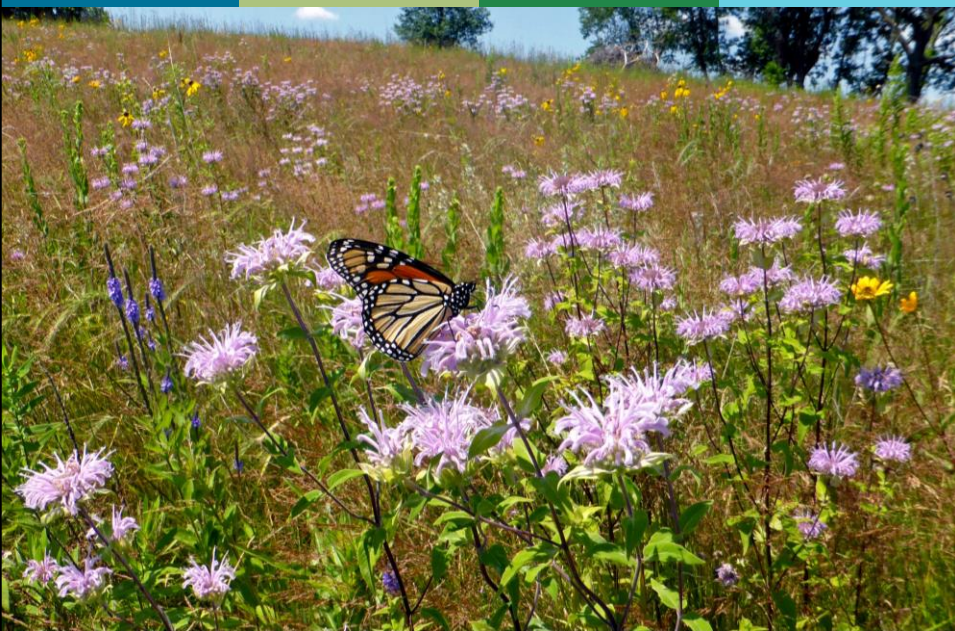
Photo: Scotts Lawn Care

Pollinator Habitat: Wildflower Meadows



X Credit: Slide and photo courtesy of Hudson Valley Farm Hub and Hawthorne Valley Farmscape Ecology Program

Pollinator Habitat: Wildflower Meadows



X Photo: Sarah Foltz Jordan

Pollinator Habitat: Flowering Hedgerows

Pollinator Hedgerows

- Native flowering shrubs, trees, bunch grasses (nectar, pollen, stem-nests, undisturbed ground nests)
- Berry producing shrubs that benefit birds and other wildlife



Photo: Jessa Kay Cruz

Pollinator Habitat: Hedgerows and Windbreaks

Multistorey Hedgerows

- May provide longer-lasting, habitat vs. meadows
- Enhance vertical layering
- Canopy, understory, shrubs, and herb layer
- Create transitional zones
- Improve connectivity
- Harvestable products

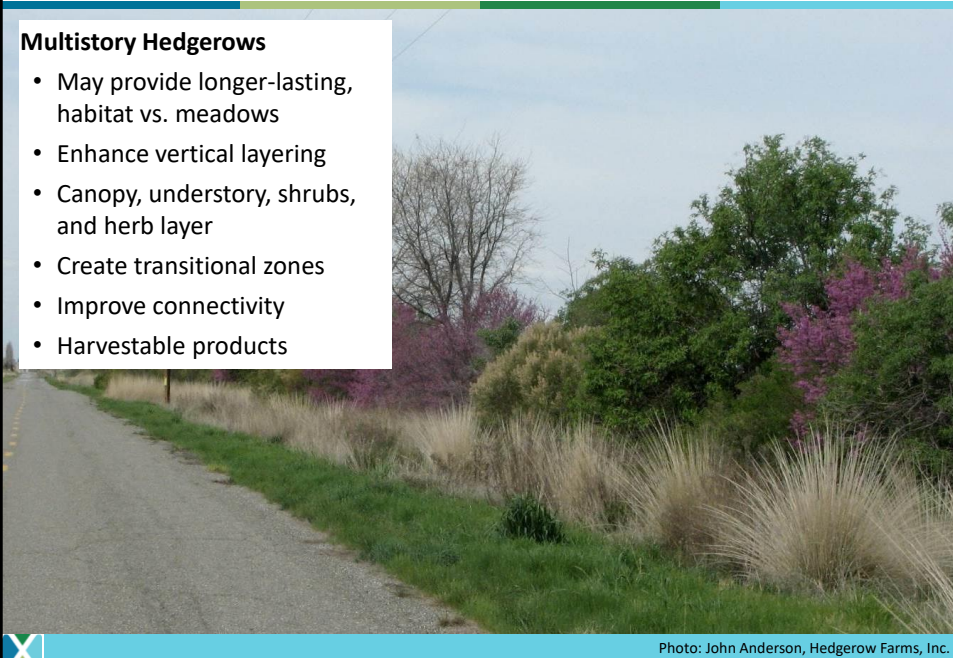


Photo: John Anderson, Hedgerow Farms, Inc.

Pollinator Habitat: Conservation Starts At Home!

Small spaces, no problem!
Make your yard a place for pollinators
Let everyone know your yard is pollinator-friendly with a **Pollinator Habitat Sign**



Photo: Matthew Shepherd

Pollinator Habitat: Pocket Meadows



Pollinator Habitat: Gardens and Yards

Business in the front, party in the back

- Convert grass lawns to eco-lawns or replace with low maintenance wildflowers
- Flowering plants in pots, planters, window boxes, raised beds, etc.



Photo: Eric Mader

Planning Habitat: There Is No Off Season!

Leave the seeds,
leaves, and stems



Photo: Kelly Gill, The Xerces Society

Planning Pollinator-Friendly Landscapes

Pollinators need more than just a flower-weather friend

- Need your help to survive winter and sustain future generations
- Design your garden or backyard habitat with all-season interest for people and pollinators

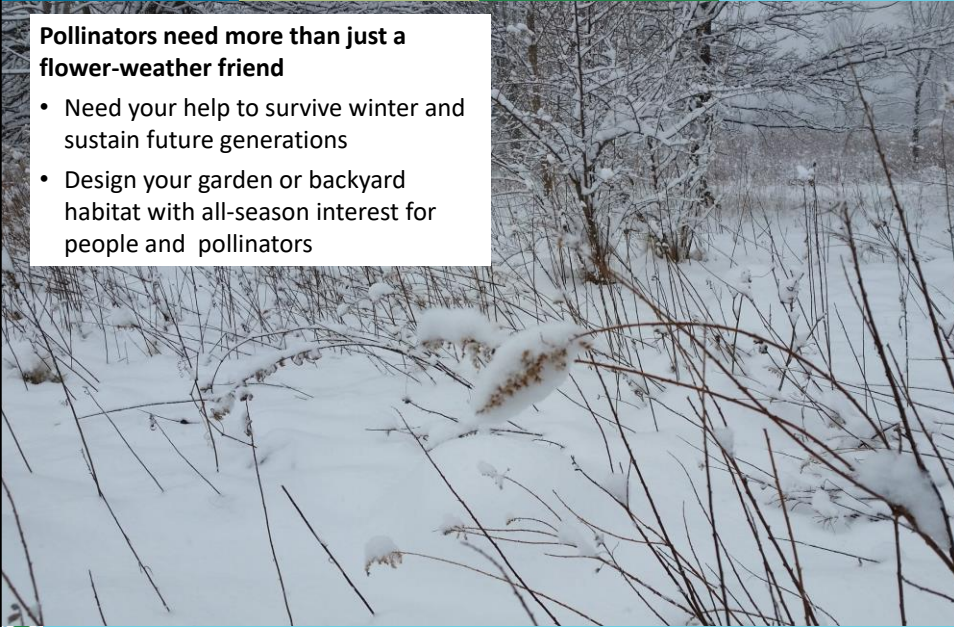


Photo: Kelly Gill, The Xerces Society

Thank You!! Questions??

Contact information:

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Every
species
needs a
voice



Your support directly funds invertebrate conservation, advocacy, applied research, outreach, and education.

**BRING BACK
THE
POLLINATORS**
A Xerces Society Conservation Campaign

Photo: Matthew Shepherd