


Common Native Bees and Habitat Management to Support Pollinators and Other Beneficial Insects



bumble bee & hedge-nettle (aka woundwort), *Stachys* sp.
Blue Ridge Parkway, NC, July 2015


Nancy Lee Adamson, PhD
Pollinator Conservation Specialist
Xerces Society for Invertebrate Conservation
& USDA-NRCS East National Technology
Support Center, Greensboro, NC

Photo: Nancy Adamson

 **THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION** **Xerces Society & NRCS partnering for conservation**

Xerces-NRCS partner biologists support pollinator habitat creation and management, which benefits other beneficial insects and wildlife.

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

 Xerces blue butterfly (*Glaucopsyche xerces*), the first U.S. butterfly to go extinct due to human activities. www.xerces.org



 Pollinator Habitat

Photo: Amy Gomes, CA NRCS

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **USDA NRCS Implements Farm Bill Programs**

Help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters



NRCS District Conservationist Carl Wright & Cypress Gardens Gardener Elizabeth Vaughn learning about and planting a pollinator meadow at Dirt Works Incubator Farm. Photo insert: Nancy Adamson

Dirt Works Incubator Farm is a project of Lowcountry Local First at Rosebank Farms on John's Island near Charleston, S.C.

Photo: Amy Overstreet, NRCS


THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **2008 & 2014 Farm Bill Pollinator Habitat Provisions**

- Pollinators a priority for all USDA land managers & conservationists
- Encouraging inclusion of pollinators in all USDA conservation programs-
-adding diversity to plant mixes & promoting IPM at NRCS

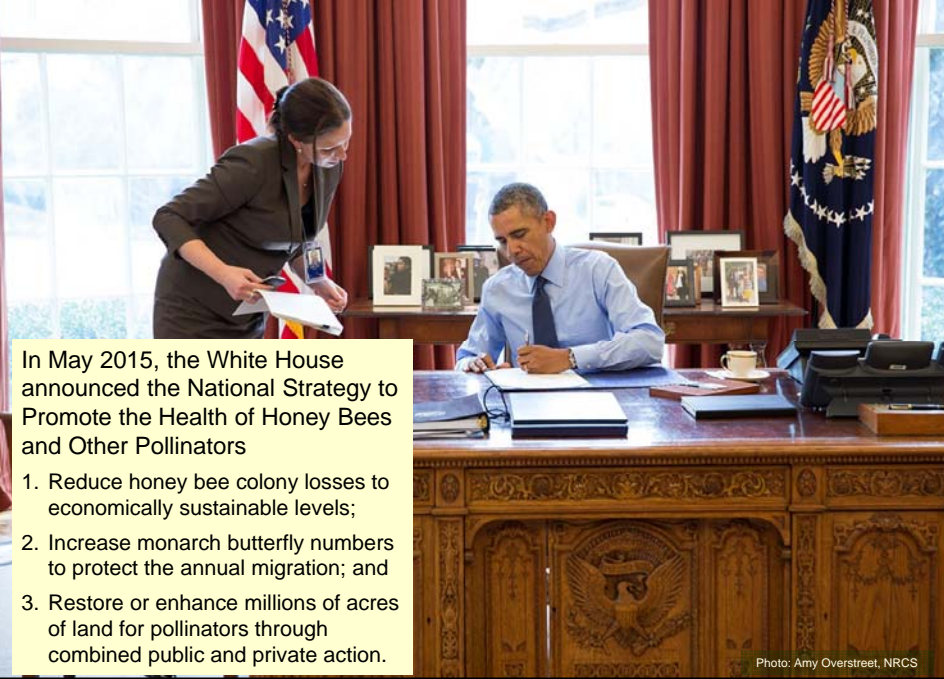


sweat bee,
Agapostemon sp.
on annual sunflower,
Helianthus annuus

Photo: Nancy Adamson

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National Strategy to Promote Pollinator Health



In May 2015, the White House announced the National Strategy to Promote the Health of Honey Bees and Other Pollinators

1. Reduce honey bee colony losses to economically sustainable levels;
2. Increase monarch butterfly numbers to protect the annual migration; and
3. Restore or enhance millions of acres of land for pollinators through combined public and private action.

Photo: Amy Overstreet, NRCS

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Federal BMPs for Pollinator-Friendly Lands

Also in May 2015, USDA & Department of Interior released ***Pollinator-Friendly Best Management Practices for Federal Lands***
<http://www.fs.fed.us/wildflowers/pollinators/BMPs/>

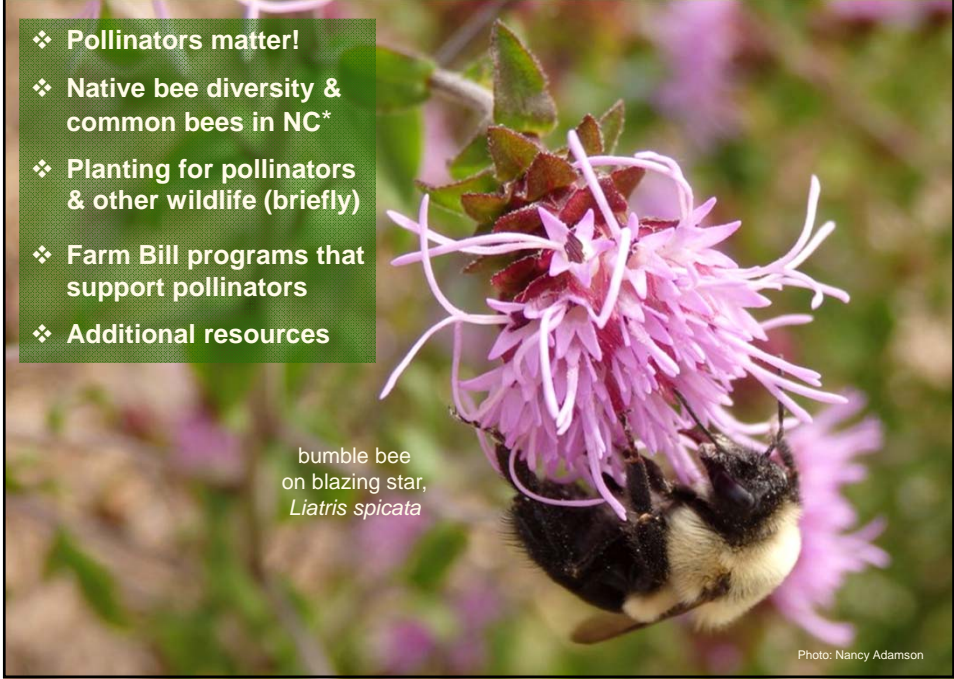


monarch
on ironweed,
Vernonia noveboracensis

Photo: Judy Stierand,
NC Native Plant Society



- ❖ Pollinators matter!
- ❖ Native bee diversity & common bees in NC*
- ❖ Planting for pollinators & other wildlife (briefly)
- ❖ Farm Bill programs that support pollinators
- ❖ Additional resources



bumble bee
on blazing star,
Liatris spicata

Photo: Nancy Adamson



**The Importance of
Pollinators**

green sweat bee
on blueberry

Photo: Nancy Adamson

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Bugs Drive the System

Benefits to Other Wildlife:

- Pollinator-produced fruits and seeds comprise 25% of the global bird and mammal diets
- Pollinators are food for other wildlife
- Pollinator habitat is directly compatible with the needs of other wildlife, such as songbirds

Photo: Nancy Adamson

Photo: Nancy Adamson

© Sierra Vision

Photo: Nancy Adamson

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Multiple Benefits of Pollinator Habitat

Fruits and seeds are a major part of the diet of many insects, about 25% of birds, and many mammals

Photos: Marie Reed, USDA ARS

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Multiple Benefits of Pollinator Habitat**

Pollinators and other insects are food for wildlife, including 89% of birds








Photo: Terry Spivey, USFS

Photo: Jeff Vanuga, NRCS

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Multiple benefits of pollinator habitat**

Conservation Biological Control
Flowering plants that support pollinators also support predatory and parasitic insects

Soldier beetle


Syrphid fly drinking raspberry nectar

Parasitoid wasp

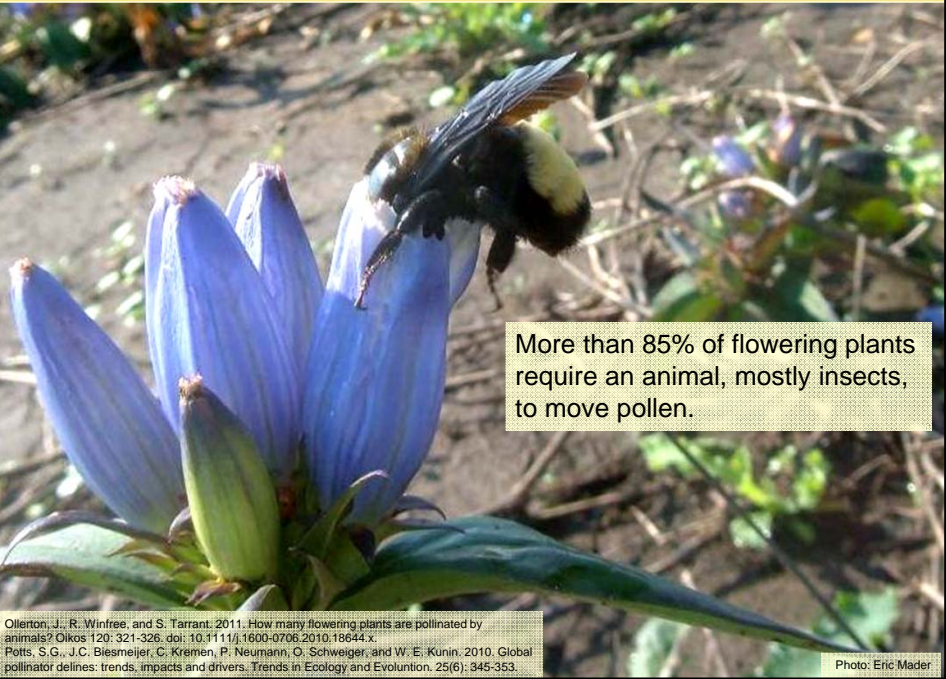
Ladybird beetle

6133-34

Photos: Mace Vaughan, Paul Jepson, Mario Ambrosino

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Insect Pollinators Are Ecological keystones



More than 85% of flowering plants require an animal, mostly insects, to move pollen.

Ollerton, J., R. Winfree, and S. Tarrant. 2011. How many flowering plants are pollinated by animals? *Oikos* 120: 321-326. doi: 10.1111/j.1600-0708.2010.18644.x.

Potts, S.G., J.C. Blesmeijer, C. Kremen, P. Neumann, O. Schweiger, and W. E. Kunin. 2010. Global pollinator declines: trends, impacts and drivers. *Trends in Ecology and Evolution*, 25(6): 345-353.

Photo: Eric Mader

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Bees: The Most Important Pollinators

Bees are the most agriculturally important pollinators

- Bees actively collect and transport pollen
- Bees exhibit flower constancy
- Bees regularly forage in area around nest



bumble bees & honey bees collecting squash nectar

New study re value of non-bee pollinators:
Rader et al. 2015. Non-bee insects are important contributors to global crop pollination. PNAS
www.pnas.org/cgi/doi/10.1073/pnas.1517092112

Photo: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Bees evolved from wasps into vegetarians!**

Bees evolved to better collect pollen & nectar

branched hair

long tongues

leafcutter (aka megachilid) bee

scopa: pollen-carrying hairs
(on abdomen of megachilid bees; on hind legs of most species; bumble bees & honey bees have pollen baskets, corbicula)

bumble bee

Photos: Ralph Hozenal, Mace Vaughan, Steve Buchmann

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Other bees in decline (along with honey bees)**

North America's Bumble Bees

- 1-in-4 at risk of extinction today
- 2014 IUCN & Xerces Society Status Review

Conservation Status	Number of Species
Critically Endangered	5
Endangered	2
Vulnerable	5
Near Threatened	1
Least Concern	28
Data Deficient	5

Yellowbanded

Rusty patched

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Current State of Bee Health**

Despite increased awareness since 2006, some of the highest losses ever in 2013 & 2014

Year	Acceptable level (%)	Total Winter Loss (%)	Total Annual Loss (%)
2006-2007	15.0	30.0	30.0
2007-2008	15.0	35.0	35.0
2008-2009	15.0	28.0	28.0
2009-2010	15.0	30.0	30.0
2010-2011	15.0	30.0	35.0
2011-2012	15.0	25.0	28.0
2012-2013	15.0	30.0	45.0
2013-2014	15.0	25.0	35.0
2014-2015	15.0	25.0	40.0

Graph: Steinhauer et al 2015. <http://beeinformed.org/>

Mass bee kills in 2013 & 2014:

- Bumble bees in Oregon--others reported subsequently
- Honey bees in Canada
- Honey bees in CA almond orchards

Photo: Dan Gunderson, MN Public Radio

Photos: Rich Hatfield (Xerces Society); The Oregonian

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Protecting & creating habitat grows more important**

North Carolina housing density in 1960 and 1990, and projected density in 2030.

Projected Housing Density

Average Acres per Housing Unit

- Less than 0.33 acres
- >0.33 to 1 acre
- >1 to 15 acres
- >15 to 30 acres
- >30 to 100 acres
- More than 100 acres
- Water

Maps courtesy of the Conservation Trust of North Carolina and Dr. Volker Radeloff, University of Wisconsin-Madison, published in the NC Wildlife Resources Commission Green Growth Toolbox <http://www.ncwildlife.org/Conserving/Programs/GreenGrowthToolbox/WhyGreenGrowth.aspx>.

Bee Diversity: Slow down and smell the flowers to see diverse bees!



green sweat bees, maybe *Augochlora pura* or *Augochlorella*, on Helen's flower, *Helenium* sp

Photo: Nancy Adamson



Native Bee Diversity

~4,500 native bee species in North America—most are **solitary**, not colonial

~700 native bee species in the eastern US, ~3,600 in contiguous US

~400-500 in NC (http://www.discoverlife.org/mp/20q?guide=Apoidea_species)



**southeastern
blueberry bee**
Habropoda laboriosa

Specialist bees eat pollen only from one genus or family,
but may collect nectar from other plants.

Photo: Sam Droege, USGS Bee Inventory
and Monitoring Lab, www.flickr.com/usgsbiml



Example: Blue Orchard Bee

- 250 to 750 females/acre compared to 1 to 2.5 hives of honey bees (10-20,000 per hive)
- Make contact with anther and stigma on almost every visit
- Active at low light levels and low temperatures
 - 33+ hours foraging in 5 days
 - 15+ hours by honey bees



Bosch, J. and W. Kemp. 2001. How to Manage the Blue Orchard Bee as an Orchard Pollinator. Sustainable Agriculture Network, Beltsville, MD. 88 pp.:

Photos: Eric Mader, Mace



Some bees only collect and feed their offspring pollen from one to a few related plants (oligolectic).



callirhoe bee,
Melissodes agilis,
sunflower pollen specialist

Photo: Jennifer Hopwood

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Some flowers with pollen specialist bees

- asters (various genera)
- *Cirsium*, native thistles
- *Chrysopsis*, goldenaster
- *Cucurbita*, squash
- *Helianthus*, sunflowers
- *Hibiscus*, rose mallow
- *Ipomoea*, wild potato vine
- *Oenothera*, primroses
- *Physalis*, ground cherry
- *Pityopsis*, silkgrass
- *Salix*, willows
- *Strophostyles*, fuzzy bean
- *Vaccinium*, blueberry
- *Vernonia*, ironweed
- *Viola*, violet...many more

sunflower bee, *Svastra* or *Eucera* sp.

http://www.illinoiswildflowers.info/flower_insects/
http://jarrodowler.com/specialist_bees.html

Photo: Nancy Adamson

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Native Bee Pollen Specialists

Squash Bees

- Ground-nesting directly at the base of squash plants
- Active in early morning hours (before sunrise)
- Pollinate flowers before honey bees begin foraging¹
- 67% of 87 sites studied across the U.S. had all pollination needs met by squash bees²

¹ Tepedino, V. J. 1981. The pollination efficiency of the squash bee (*Peponapis pruinosa*) and the honey bee (*Apis mellifera*) on summer squash (*Cucurbita pepo*). *Journal of the Kansas Entomological Society* 54:359-377.

² Jim Cane (USDA ARS Logan Bee Lab), 2011. Personal communication

Photo: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Wild Pollinators: Better Quality Pollination**

2013 research highlights importance of native bees: Wild bees improved fruit set **twice** as much as honey bees.

Better quality pollination relates to cross-pollination, the ability to buzz pollinate, and other ways bees interact with flowers.



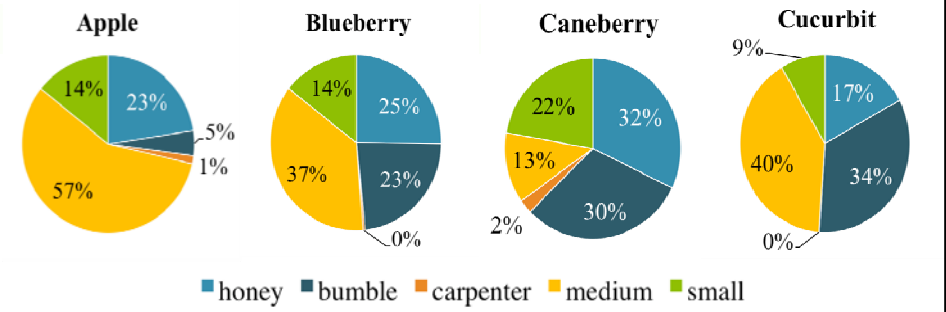
honey bee andrenid bees

We still need honey bees since we can manage them and move them to crops.


Garibaldi, L. A. et al., 2013. Wild pollinators enhance fruit set of crops regardless of honey bee abundance. *Science* 339 (6127) : 1608-1611. Photos: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Native (Wild) Bee Abundance in Crops**

SW VA Study 2008–9: Three quarters of flower visitors were native bees




Crop	honey	bumble	carpenter	medium	small
Apple	23%	5%	1%	57%	14%
Blueberry	25%	23%	0%	37%	14%
Caneberry	32%	30%	2%	13%	22%
Cucurbit	34%	0%	0%	40%	17%




■ honey ■ bumble ■ carpenter ■ medium ■ small

Adamson, N.L., T. H. Roulston, R. D. Fell, D. E. Mullins. 2012. From April to August—wild bees pollinating crops through the growing season in Virginia, USA. *Environmental Entomology* 41 (4):813–821. Photos: Nancy Adamson

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Buzz Pollination by Native Bees



Example: Cherry tomatoes
When native bees were present, Sungold cherry tomato production almost tripled.
Video online highlights buzz pollination:
https://www.youtube.com/watch?v=l_etyEdu9fQ

Greenleaf, S. S., and C. Kremen. 2006. Wild bee species increase tomato production and respond differently to surrounding land use in Northern California. *Biological Conservation* 133:81-87.

Photo: Anne Berblinger

Video:
Native plants of the mid-Atlantic support diverse
pollinators
<https://www.youtube.com/watch?v=HhC5iY0ijJM>

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **How can we better support pollinators?**

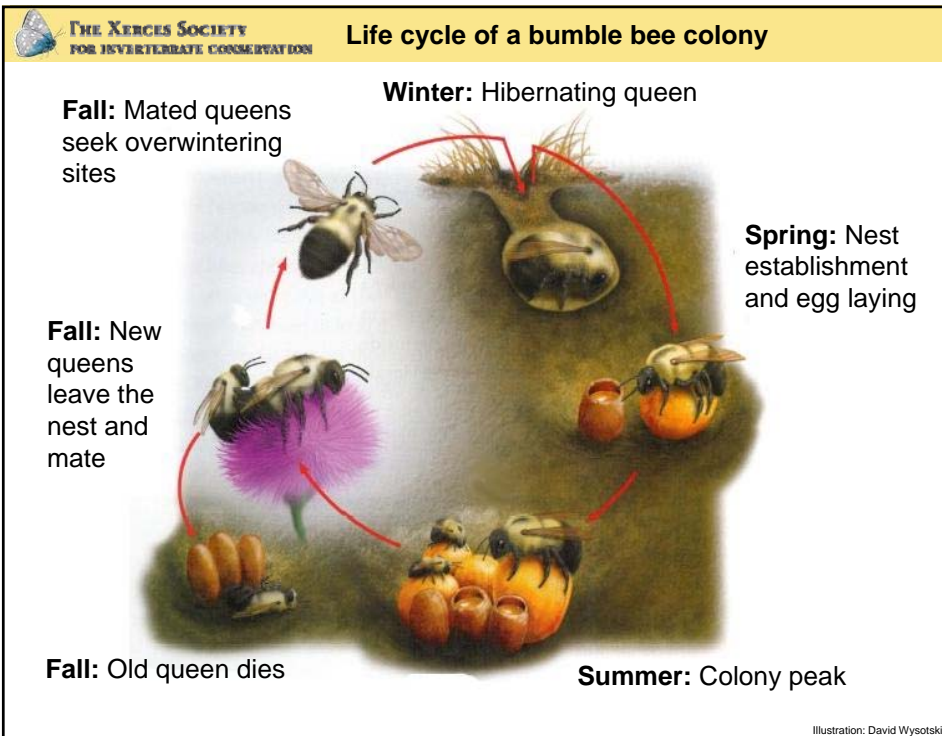
Strengthen habitat & pesticide protection to support *diverse* pollinators
Plant & conserve native plants (or cover crops)

Photos: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Native Bee Nesting—3 Broad Groups**

<p>ground-nesting bees (solitary)</p> <p>polyester bee, <i>Colletes inaequalis</i></p>	<p>bumble bees (social)</p> <p><i>Bombus impatiens</i></p>
<p>orchard mason bee, <i>Osmia lignaria</i></p> <p>cavity-nesting bees (solitary)</p>	

Photos: Elaine Evans, Steve Javorek, Eric Mader



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Bumble bees, *Bombus* spp.

- 45 species in U.S., ~26 in East, ~17 in NC
- Social colonies founded by single queen
- Annual colonies--last only one season
- Nest may contain 25-400 workers
- Nests in abandoned rodent burrows or under lodged grasses

Conserve brush piles, un-mowed areas

Photos: Elaine Evans, Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION Shelter for Bumble Bees

Conserve undisturbed or unmowed areas; protect possible overwintering sites for queens

- Cavities such as old rodent holes
- Under brush piles & overgrown areas
- Under bunch grasses

Excellent habitat for groundnesting birds, too!

Artificial nests ineffective (but mouse pee helps!)

little bluestem

Photos: Mace Vaughan, Matthew Shepherd, Bonnie Carruthers, Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION Ground-nesting Solitary Bees

Roughly 70% of bee species build nests underground— (often aggregate nests)—
Provide forage, scout for nests, conserve sandy soil & bare ground

mining bee
Andrena barbara

Photos: Jim Cane, Dennis Briggs

Photo: Florrie Funk

Photos: JNancy Adamson

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Life cycle of a solitary bee

Mining bee (*Andrena* sp.): a year in its underground nest as egg, larva, and pupa before emerging to spend a few weeks as an adult.

Photos: Dennis Briggs, Nancy Adamson

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Ground nesting: Mining or digger bees

Andrena

- Early spring (generally)
- Nest in well-drained soils, aggregate
- Important for tree fruit and berries

Scout for & conserve nesting sites

apple

blueberry

males often smaller than females

Photos: Nancy Adamson, Eric Mader, Jim Cane, International Pollination Services.

Ground nesting: Rose mallow, hibiscus or okra bee

*Ptilothrix
bombiformis*

- Eats and provisions nests only with pollen from the hibiscus family—hardy hibiscus, okra, rose-of-Sharon, and cotton (in the mid-Atlantic).
- Nests in hard-packed soil near water, which females use to moisten and soften soil, excavating burrows with chimneys of mud surrounding the entrance.



Photo: Nancy Adamson

Videos: Nest building: <https://www.youtube.com/watch?v=JxBMRuMp35o>
Gathering pollen: <https://www.youtube.com/watch?v=xqZV8fXEz4w>



Photo: Debbie Goedde



Photo: Melissa Simpson

Melitoma taurea, mallow bee

Melitoma taurea is a morning glory specialist and the males stake out their territories.



on wild sweet potato, *Ipomoea pandurata* (aka manroot, man-of-the-earth, wild potato vine, wild rhubarb)

Photo: Nancy Adamson

Ground nesting: Squash bees



Peponapis pruinosa, *Xenoglossa strenua* & *X. kansensis*

- Specialize on cucurbit pollen: summer & winter squash, melon, cucumber
- Nest in or near crop
- Active early a.m., summer

Avoid deep tilling whenever possible



ground nesting—
but males sleep in
squash flowers

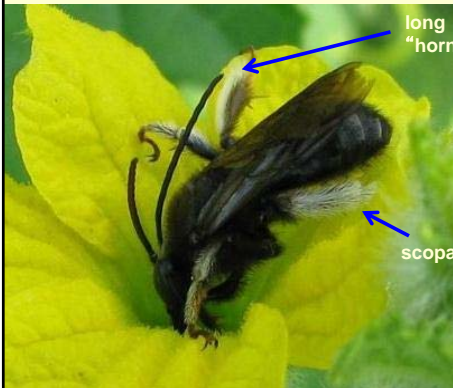
Photos: Nancy
Adamson

Ground nesting: Long-horned bees

Melissodes, *Eucera*, *Svastra*

- Long antennae (males)
- Hairy, with conspicuous hairy legs (scopa)
- Some are aster family pollen specialists, incl. sunflowers

Conserve nesting sites & avoid deep tilling



Photos: T'ai Roulston, Nancy Adamson



Ground nesting: Green sweat bees

Agapostemon, *Augochlora pura**, *Augochlorella*, *Augochloropsis*

- Generalists, short-tongued, buzz
- Some nest communally, but each female builds and provisions her brood cells

Conserve nesting sites & avoid deep tilling

**Augochlora* also nests in rotting wood



Agapostemon, green thorax, most with striped abdomen; on purple



Ground nesting: Sweat bees

Halictus & *Lasioglossum/Dialictus*

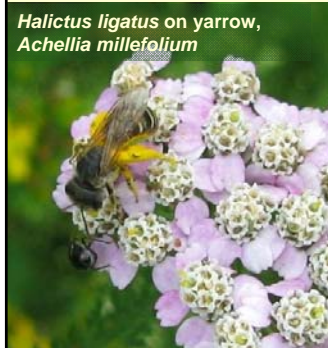
- Small, black, dark green, dark blue, with bands of white on abdomen
- Solitary, communal (aggregate nests) to semi-social (daughters help care for young)
- Many generalists, active all season

Conserve nesting sites & avoid deep tilling



swamp rose,
Rosa palustris

Halictus ligatus on yarrow,
Achillea millefolium



serviceberry,
Amelanchier sp.



melon



Photos: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION Ground nesting: Polyester, plasterer, cellophane bees

Colletes spp.

- Line brood cells with waterproof cellophane-like secretion
- Heart-shaped face, short tongue
- Small to medium, pale banded
- Many are pollen specialists

Conserve bare ground & avoid deep tilling

C. latitarsis, specialist on groundcherry, *Physalis*

C. inaequalis

Photo: Steve Javorek, Agriculture Canada

C. inaequalis

heart-shaped face

short tongue

Photos: Nancy

T'ai Roulston at UVA's Blandy Experimental Farm marks and recaptures study bees

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION Ground nesting: Southeastern blueberry bee

Habropoda laboriosa

- Apidae family
- Blueberry specialist, active early spring
- Looks like small bumble bee
- Coastal plain distribution
- Gregarious nesting

Scout for & conserve nesting sites

male

Photos: Jolie Dollar

female

pale face patch

long antennae

male on redbud, *Cercis canadensis*

Photo: Nancy Adamson

Southeastern Blueberry Bee
Habropoda laboriosa

Legend

0 300 600 1,200 kilometers

USGS

NatureServe

Map Created July 2009

Ground nesting: anthrophorid bees

Anthophora sp.



Photo: Nancy Adamson

on poke milkweed, *Asclepias exaltata*

Cavity or tunnel nesting solitary bees

Roughly 30% nest in hollow plant stems, or old beetle borer holes—
Provide forage, conserve snags, brush piles & pithy-stemmed plants. Leave dead plant material over winter.



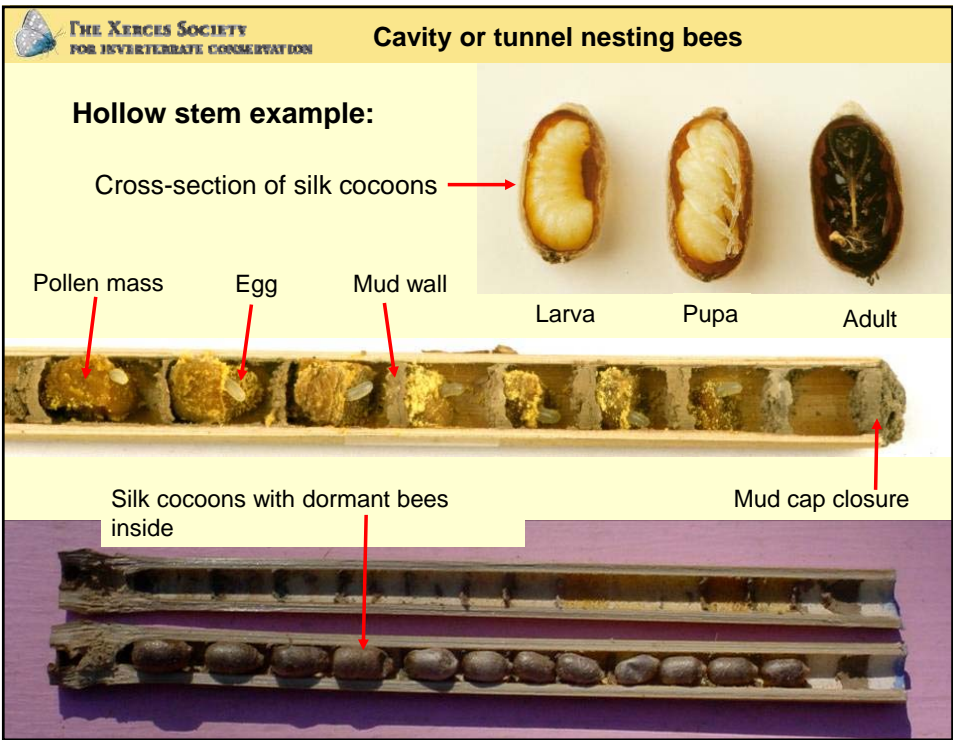
Photo: Matthew Shepherd



© Edward Ross



Photo: Nancy Adamson



Cavity or tunnel nesting: Leafcutter bees

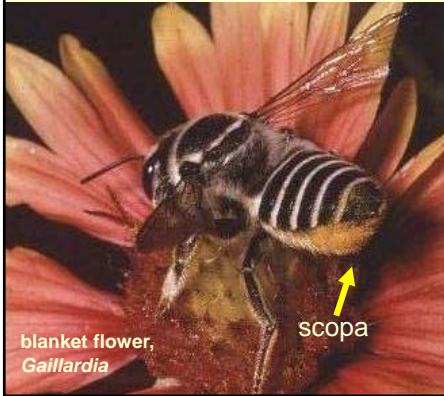
Megachile

- Small to large size
- Wide bodies and heads
- Dark, typically with pale stripes
- Scopa on underside of abdomen
- *M. rotundata* intro'd for alfalfa seed

Conserve snags, brush piles & pithy-stemmed plants



M. mendica on blackberry



blanket flower,
Gaillardia

scopa



Photos: Eric Mader, Edward S. Ross, Jennifer Hopwood, Nancy Adamson

***Megachile mucida*, megachilid or leafcutter bee**

Associated with goat's rue and other legumes



on goat's rue
Tephrosia virginica



on yellow wild indigo
Baptisia tinctoria

Photo: Nancy Adamson

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Managed tunnel nesting bees

Mason bee (aka blue orchard bee) (*Osmia lignaria*)

Alfalfa or lucerne leafcutter bee (*Megachile rotundata*), introduced from Europe

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Shelter for cavity-nesting bees

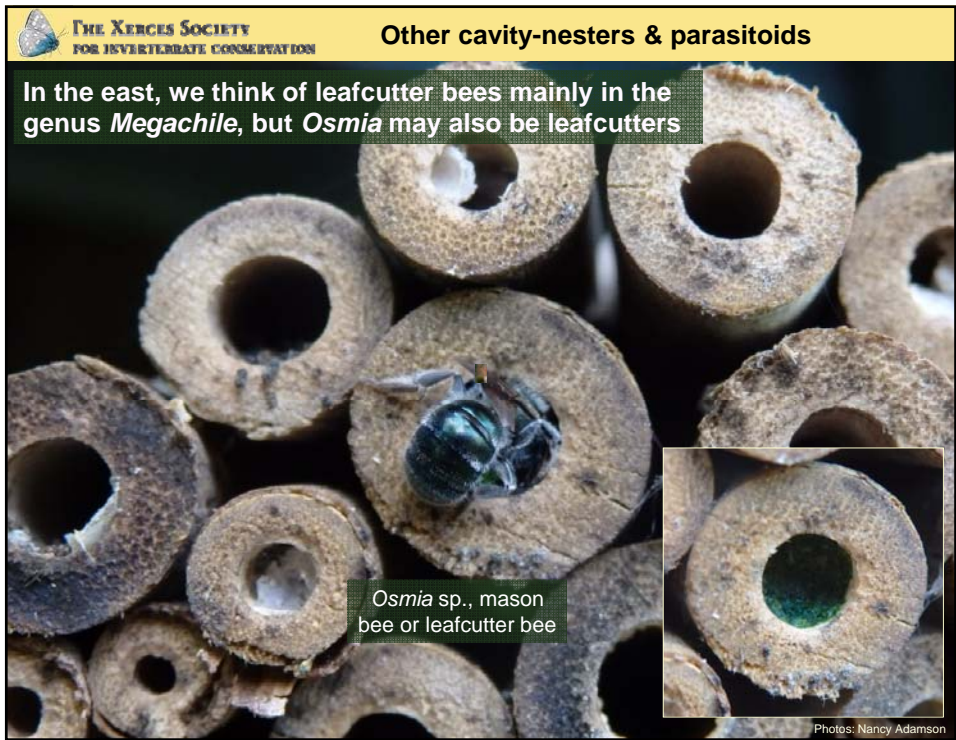
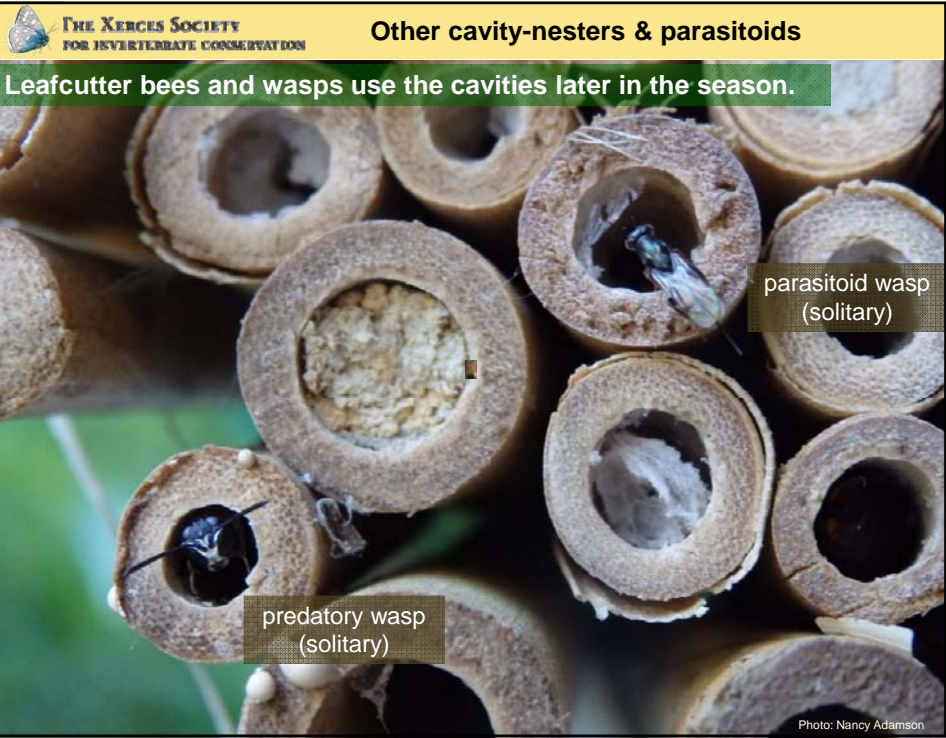
Bamboo and other plants can be cut (back end solid and front open) to provide nests for cavity-nesting solitary bees (& solitary wasps)

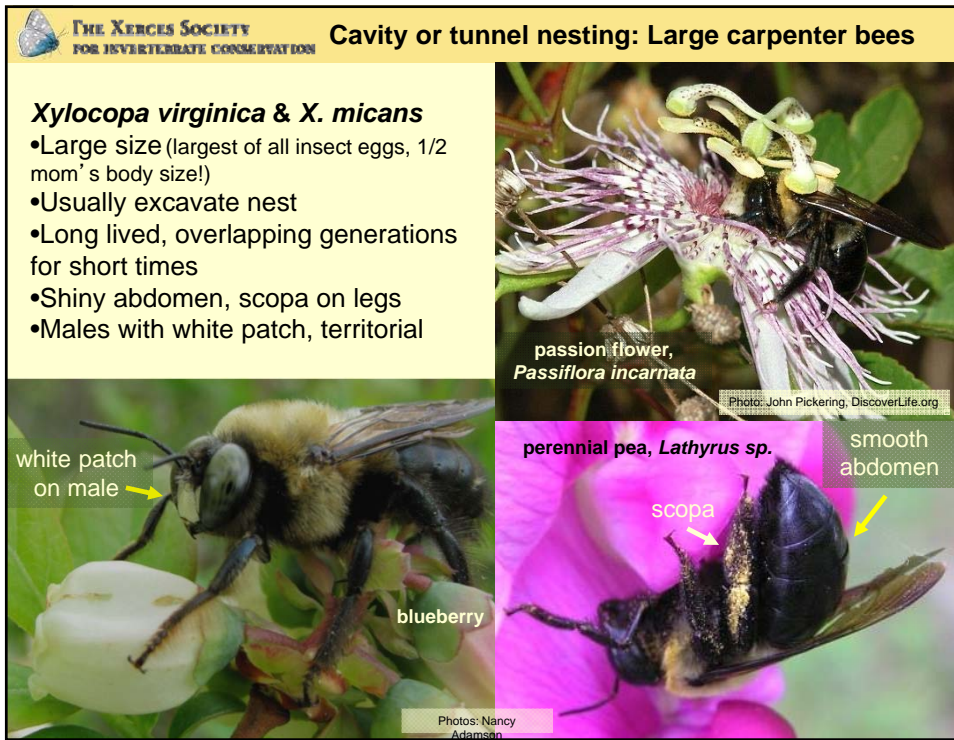
mason bees, *Osmia cornifrons* (introduced from Japan)
There's evidence that introduced species utilize these nests more than native species

pupae in bamboo (split open)
February 2015

Providing natural nesting opportunities—snags, hedgerows with pithy-stemmed plants, wood piles, woods—is best to support native species.

Photo: Nancy Adamson





Cavity or tunnel nesting: Small carpenter bees

Ceratina

- Small size, shiny body, dark metallic blue or green
- Usually excavate nest in pithy stems (box elder, elderberry, sumac, sunflower, blackberry...)
- Abdomen somewhat squared off
- Active all season



Cuckoo bees: Nest parasites (cleptoparasites)

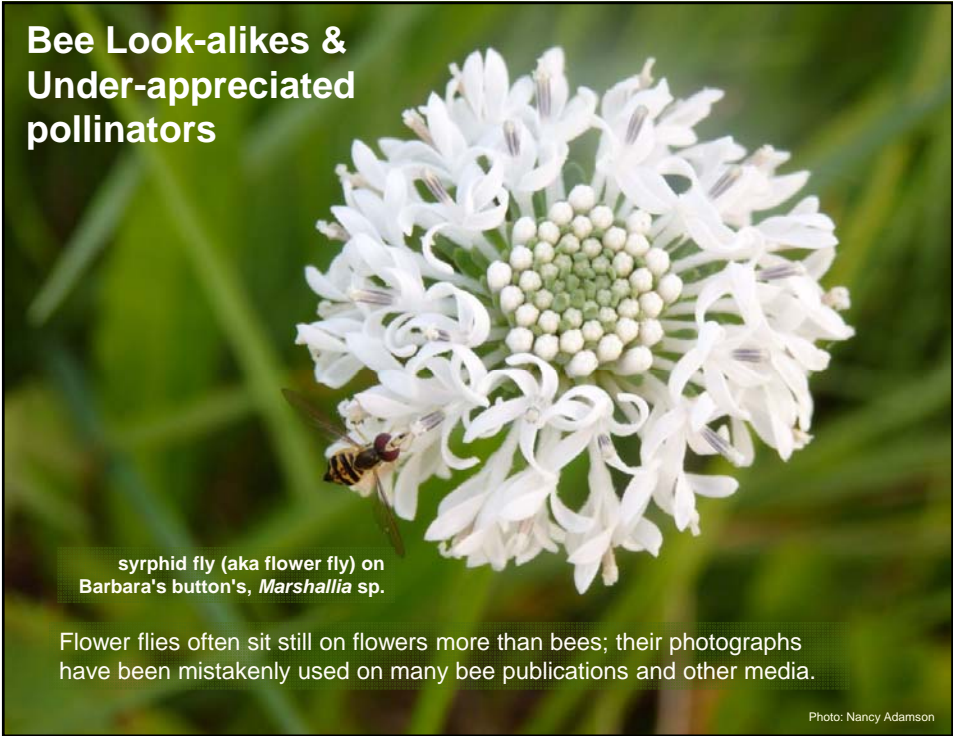


Adults feed on pollen & nectar, lay eggs in host nest

- Slender, wasp-like
- Small to medium size
- Bodies not hairy, no scopa
- Coloration highly variable
- May have spiky projections
- Use scent to locate and evade host



Bee Look-alikes & Under-appreciated pollinators

A close-up photograph of a syrphid fly (flower fly) perched on a white, multi-petaled flower. The fly is positioned at the bottom left of the flower, facing right. The background is a soft, out-of-focus green.

syrphid fly (aka flower fly) on Barbara's button's, *Marshallia* sp.

Flower flies often sit still on flowers more than bees; their photographs have been mistakenly used on many bee publications and other media.

Photo: Nancy Adamson




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bombyliid or bee flies


Some bee flies lay their eggs in mining bee (*Andrena*) nests by hovering above the ground nests & flicking their eggs in like golf balls.



Photo: Nancy Adamson

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flies: important pollinators, esp. in cool weather



on bishop's cap, *Mitella diphylla*
(April, North Carolina)

Flies deserve a lot more appreciation for their role in pollination
and as predators and parasites of crop pests

Photos: Nancy Adamson

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small wasps can be hard to tell apart from bees



mating wasps on New Jersey tea,
Ceanothus americanus

Photo: Nancy Adamson

cuckoo wasps

chrysidid wasp
Chrysis conica



Photo: Brooke Alexander in Sam Droege's lab, the USGS Bee Inventory and Monitoring Lab

What people call bees are often wasps

scoliid wasp on
dotted mint,
Monarda punctata



Photo: Nancy Adamson



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Restoring Pollinator Habitat



A Spectrum of Approaches

Easy

↑

- Protecting natural diversity (not exactly easy!)
- Planting a pot on your front porch
- Managing for early successional habitat (e.g. mowing, timber thinning, prescribed fire)
- Diverse flowering cover crops
- Establishing native hedgerows
- Establishing native wildflower meadows

↓

Less Easy

Photo: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Habitat through the growing season**

maple, *Acer*

false indigo, *Baptisia*

goldenrod, *Solidago*, *Oligoneuron*, *Euthamia*

willow, *Salix*

mountain mint, *Pycnanthemum*

blazing star, *Liatris*

aster *Symphyotrichum*, *Eurybia*

Pollinators, predators, & parasitoids need food (nectar, pollen, or prey) and refuge when crops are harvested or pesticides used.

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

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Assessing Land for Pollinator Value**

Great learning/educational tools for reading the landscape from a bee or butterfly's perspective (<http://www.xerces.org/pollinator-conservation>)

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION

USDA **NRCS**
National Resources Conservation Service

Native Bee Conservation

Pollinator Habitat
Assessment Form and Guide
NATURAL AREAS AND RANGELANDS

December 2014

The Xerces Society for Invertebrate Conservation
www.xerces.org

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION

Native Bee Conservation

Pollinator Habitat
Assessment Form and Guide

June 2011

The Xerces Society for Invertebrate Conservation
www.xerces.org

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **USDA Farm Bill Pollinator Habitat Provisions**

(2008 & 2014 Farm Bill <http://plants.usda.gov/pollinators/NRCSdocuments.html>)

- Pollinators are a priority for every USDA land manager and conservationist
- Encourages inclusion of pollinators in all conservation programs
- Identifies pollinator habitat as a priority for EQIP
- Requires that pollinators are considered in the review of Practice Standards

USDA United States Department of Agriculture
May 2015
Biology Technical Note No. 78, 2nd Ed.
Using 2014 Farm Bill Programs for Pollinator Conservation

bumble bee on blueberry

Photo: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **For pollinators & other wildlife**

Diversity & blooms through the season are vital
Choose seed to fill gaps in bloom periods & provide specific nutrients or shelter

Sunflowers, *Helianthus* spp., provide excellent pollen, nectar, and oil-rich seeds that benefit diverse wildlife, including fall migrants.

Legumes like partridge pea, (*Chamaecrista*), bush clover (*Lespedeza*), tick trefoil (*Desmodium*) are rich in protein.

sweat bee on sunchoke *Helianthus tuberosus*

Photo: Nancy Adamson

For conservation biological control (IPM*)

Refuge that includes nectar for predators & parasitoids when annual crops are harvested is vital. Plus, they need small flowers (for shorter tongues).

sand wasp on common milkweed, *Asclepias syriaca*—sand wasps collect stinkbugs to feed their young

*IPM stands for Integrated Pest Management



Photo: Nancy Adamson

Reducing harm from neonicotinoids

- Avoid applying before or during bloom
- Avoid repeat annual use, esp. in perennial crops (carry over)
- Label rates on household products as much 100X ag rates (lethal at higher rates)
- Stop “cosmetic” (vs. agricultural) use (<http://www.beecityusa.org/>)



Photo: Nancy Adamson

 **THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION**

Weed control: Protect ground-nesting insects

- Avoid deep tillage (>6")
- Reduce tillage
- Consider pros & cons of plastic mulch



Photo: USDA-ARS

 **THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION**

Is seeding or planting the best restoration approach?*

What is the history of the site? Was it previously cultivated?
 If not, the **existing seed bank** may be the most appropriate seed source.



Donahue pine flatwood in South Carolina

*For help determining if planting is appropriate, see Norman Melvin's "decision sequence keys" in *Wetlands Restoration, Enhancement, and Management*
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_010838.pdf

Photo: Sudie Daves Thomas, SC NRCS

 **THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION**

“Daylight” the seed bank

Bringing in sunlight by thinning & burning may be the best restoration strategy.

Associated NRCS practices:

- 409 Prescribed Forestry
- 338 Prescribed Burning
- 528 Prescribed Grazing
- 643 Restoration and Management of Rare and Declining Habitats
- 647 Early Successional Habitat Development or Management
- 659 Wetland Enhancement
- 657 Wetland Restoration
- 644 Wetland Wildlife Habitat Management
- 381 Silvopasture Establishment



Carolina Bay in NC restored with thinning & burning

Photo: Nancy Adamson

 **THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION**

Conservation Practices for Pollinators

Watershed Protection (various NRCS & FSA conservation practices)

- **Protect watersheds**
- **Provide habitat**--*especially species needing open, early-successional habitat*



Plantings around sinkholes, with technical support provided by Robin Mayberry, NRCS Area Biologist in Cookville, TN

Photo: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Natural Regeneration & Watershed Protection**

Leaving vegetation around creeks helps clean and shade waterways; mid to late summer flowers are abundant in riparian areas when other areas are dry

NC Mountain Research Station, Waynesville. Visit all 18 NC Research Stations to see conservation techniques and plantings to support pollinators.

<http://www.ncagr.gov/research>


Photo: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Savvy Business Management & Watershed Protection**

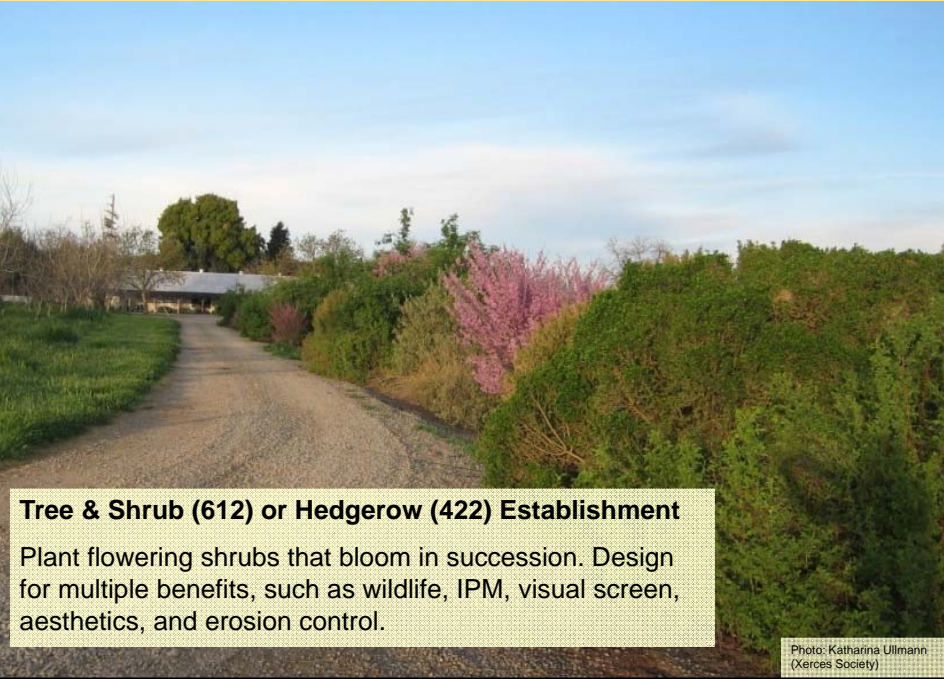
\$200/month mowing transformed into protected diverse riparian corridor; former barren now utilized regularly by staff and visitors

Carolina Mountain Land Conservancy
<http://www.carolinamountain.org>

Photo: Nancy Adamson


 **THE XERCES SOCIETY**
FOR INVERTEBRATE CONSERVATION

Conservation Practices for Pollinators

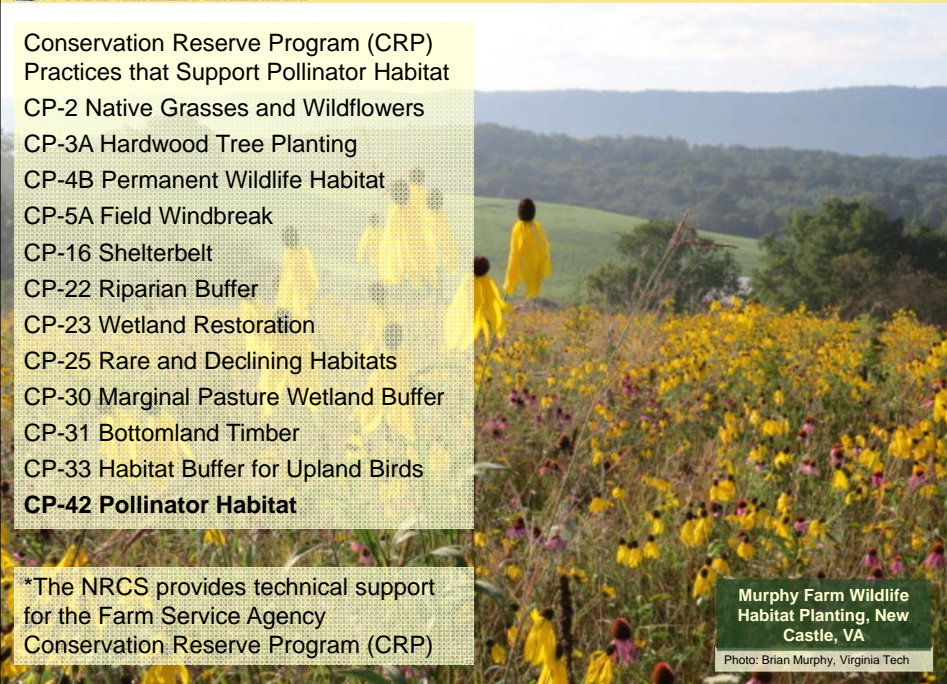


Tree & Shrub (612) or Hedgerow (422) Establishment
Plant flowering shrubs that bloom in succession. Design for multiple benefits, such as wildlife, IPM, visual screen, aesthetics, and erosion control.

Photo: Katharina Ullmann (Xerces Society)

 **THE XERCES SOCIETY**
FOR INVERTEBRATE CONSERVATION

FSA* Conservation Practices for Pollinators




Conservation Reserve Program (CRP)
Practices that Support Pollinator Habitat

- CP-2 Native Grasses and Wildflowers
- CP-3A Hardwood Tree Planting
- CP-4B Permanent Wildlife Habitat
- CP-5A Field Windbreak
- CP-16 Shelterbelt
- CP-22 Riparian Buffer
- CP-23 Wetland Restoration
- CP-25 Rare and Declining Habitats
- CP-30 Marginal Pasture Wetland Buffer
- CP-31 Bottomland Timber
- CP-33 Habitat Buffer for Upland Birds
- CP-42 Pollinator Habitat**

*The NRCS provides technical support for the Farm Service Agency Conservation Reserve Program (CRP)


Murphy Farm Wildlife Habitat Planting, New Castle, VA

Photo: Brian Murphy, Virginia Tech

 **THE XERCES SOCIETY**
FOR INVERTEBRATE CONSERVATION

For long term maintenance

Many plant communities require periodic disturbance—fire, grazing, or mowing—to thrive. Some seed needs fire (smoke) to germinate.



NCTREX team burning a longleaf pine savanna, February 2015

Photo: Nancy Adamson

 **THE XERCES SOCIETY**
FOR INVERTEBRATE CONSERVATION

Grasses have many roles in natural communities

Grasses are vital in fire adapted communities as fine fuel.
They shelter groundnesting birds, bumblebees, and other wildlife.
They are host plants for larvae of grass skippers and some true butterflies.



gemmed satyr
Enodia anthedon

Gemmed satyr larvae (caterpillars) eat river oats, *Chasmanthium* spp.

Photo: Dennis Burnette, Carolina Butterfly Society

 **THE XERCES SOCIETY**
FOR INVERTEBRATE CONSERVATION

Bringing restoration seed into the trade

With growing interest in ecological restoration, particularly using local ecotypes, more regionally local seed is becoming available every day.



gulf fritillary butterflies nectaring on chaffhead, *Carphophorus bellidi*, in SC as they migrate

The Plant Conservation Alliance, consortium of public and private organizations and individuals working to conserve native plants <http://www.nps.gov/plants>. Photo: Nancy Adamson



Additional Resources

green sweat bee, *Augochlora pura*, on butterfly milkweed, *Asclepias tuberosa*

Photo: Nancy Adamson

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION

Additional Resources: The USDA-NRCS

Natural Resources Conservation Service
 Technical and financial assistance for conservation

Photo: Buz Koot

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Contact your local NRCS District Conservationist: www.nrcs.usda.gov

SC NRCS restoration planting

BRING BACK THE POLLINATORS
 A XercES SOCIETY CONSERVATION CAMPAIGN

Three Steps You Can Take to Bring Back the Pollinators

1. Sign the Pollinator Protection Pledge.
2. Install a Pollinator Habitat sign.
3. Spread the word!

www.xsncs.org

Photo: Matthew Shepherd

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **The Xerces Society: Education and Training**

The collage features several educational materials:

- Attracting NATIVE POLLINATORS**: A booklet titled "Protecting North America's Bees and Butterflies".
- POLLINATOR-FRIENDLY PARKS**: A booklet titled "How to Enhance Parks and Greenspaces for Native Pollinator Insects".
- Butterfly Gardening**: A booklet with a butterfly illustration.
- Ecologically Sound Mosquito Management in Wetlands**: A booklet with a mosquito illustration.
- Pollinator Conservation Strategy**: A booklet with a bee illustration.
- Native Milkweeds**: A booklet with a milkweed illustration.
- Collecting Bumble Bees**: A booklet with a bumble bee illustration.
- THE XERCES SOCIETY GUIDE**: A booklet with a bee illustration.

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **The Xerces Society: Citizen Science**

Bumble Bees **Aquatic Invertebrates** **Migratory Dragonflies**


The collage features several citizen science resources:

- Bumble Bee Watch**: A screenshot of the app interface showing "Welcome to Bumble Bee Watch!" and "How to Submit a Sighting" instructions.
- Aquatic Invertebrates**: Two photographs of people in a field collecting aquatic insects from a stream.
- Migratory Dragonflies**: A poster titled "MIGRATORY DRAGONFLY PARTNERSHIP" and a "Field Guide to Migratory Dragonflies" with a dragonfly illustration.
- Overwintering Monarchs**: A photograph of monarch butterflies on a tree branch and a person holding a monarch butterfly.

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Chesapeake Bay Trust model**

CBT: Matching grants for community native plantings

[Restoration and Retrofits](#) | [Environmental Education](#) | [Outreach](#) | [County Specific](#) | [Capacity Building](#) | [Pioneer](#) | [Forms and Policies](#)




Home > Grants

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Grants

The Trust's grant-making strategies are shaped by three core objectives: environmental education, demonstration-based restoration, and community engagement. We look to these objectives as basic touchstones for developing our grant programs, engaging new partners, and communicating about our work.


To support these objectives, the Trust currently makes awards through 15 grant programs and one rebate program. To learn more about the criteria for each grant program and the partners the Trust works with, select one of the following:



Restoration and Retrofits



Environmental Education



Outreach

<http://www.cbtrust.org/site/c.miPKXPCInH/b.8600079/k.E0A8/Outreach.htm>

THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION **Thank you NCWRC for all you do to support wildlife!**

...and many excellent scientists, conservationists, and farmers!

Financial support from

- Xerces Society Members
- NRCS East National Tech Center
- Turner Foundation
- Disney Worldwide Conservation Fund
- C.S. Fund
- Whole Foods Market & their vendors
- Organic Valley FAFO
- Organic Farming Research Foundation
- Nat'l Institute of Food & Agric., USDA
- Cinco
- Clif Bar Family Foundation
- Alice C. Tyler Perpetual Trust
- Sarah K. de Coizart Article TENTH Perpetual Charitable Trust
- The Edward Gorey Charitable Trust
- EarthShare (CFC #18360)
- Endangered Species Chocolate
- The Metabolic Studio
- The Ceres Foundation
- & many others...



anthophorid bee, *Anthophora* sp., on clasping milkweed, *Asclepias exaltata*

Photo: Nancy Adamson

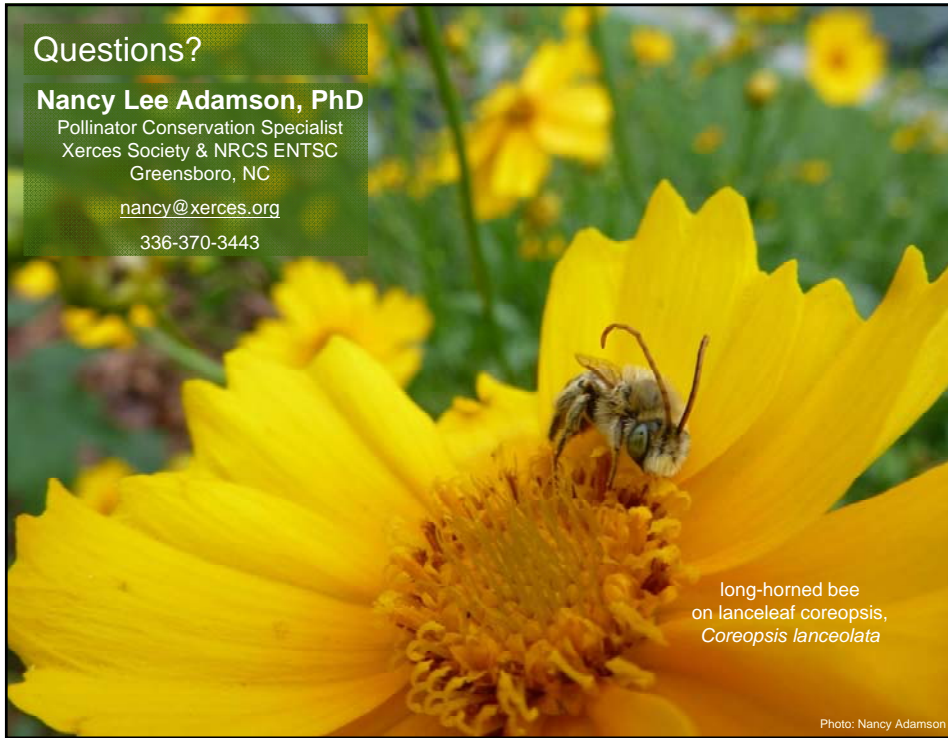
Questions?

Nancy Lee Adamson, PhD

Pollinator Conservation Specialist
Xerces Society & NRCS ENTSC
Greensboro, NC

nancy@xerces.org

336-370-3443



long-horned bee
on lanceleaf coreopsis,
Coreopsis lanceolata

Photo: Nancy Adamson