

**Ramsey**  
Conservation District



Presents



# Urban Pollinators

Thursday, April 21, 2016

2pm- 4pm

**Free Public Event!**



Follow us on Facebook!



@Ramsey SWCD

# Earth Day Clean Up

Volunteers are needed for the annual Earth Day cleanup at county parks.

Cleanup locations include:

- Battle Creek Regional Park
- Bald Eagle-Otter Lake Regional Park
- Keller Regional Park
- Tamarack Nature Center

To register visit: [www.ramseycounty.us/](http://www.ramseycounty.us/) and search Earth Day



# May Conservation Forum

## Low Impact Landscaping and Green Cities

Wednesday May 18, 2016

2-4 PM

### Speakers:

#### **I'm Tired of Mowing: Alternatives to High Maintenance Turfgrasses**

Jonah Reyes, Turfgrass Research Scientist at the University of Minnesota

#### **Capturing Water Quality Co-Benefits; Solar Energy Gardens in Your Community's Ordinances**

Brian Ross, Senior Program Director at Great Plains Institute

#### **GreenStep Cities: It's Getting Easier to be Green**

Mayor Peter Lindstrom, City of Falcon Heights

#### **Innovative Responses to Infrastructure Challenges**

Mark Maloney, Director of Public Works at the City of Shoreview



Low Impact Lawn, photo by Jonah Reyes



Pervious Pavement, photo by Ashley Bennett



# White Bear Lake: Water Conservation Event

## Saturday, May 7, 2016

### 9 am - Noon

#### **Activities**

- Interactive exhibits
- Children's activities
- Free coloring books
- Native Plant Sale
- Free toilet leak detection tablets
- Chance to win a free rain barrel
- Discounted rain barrels for sale
- Rain barrel workshop
- Cost-share information
- And more!

# Landscape Revival

Native Plant Expo & Market



**Saturday June 4, 2016 9 am – 3 pm**

Community Pavilion at the Roseville Cub Foods  
1201 Larpenteur Ave W  
Roseville, MN 55113

**Sponsored by:**





Saturday, June 4, 2016

11 AM- 4 PM

Lake Phalen in St. Paul

**Activities:**

- Paddling
- Fishing Lessons
- Arts and Crafts
- Native Plant Give-Away
- Exhibits
- Games
- Music
- And More!

**Organized by:**

**Ramsey-Washington Metro**

**Watershed** District

# Pollinator Friendly Ramsey County

Ramsey County Commissioner Victoria Reinhardt



If we die,  
we're taking  
you with us.



## RESOLUTION

### *Board of Ramsey County Commissioners*

Presented By: Commissioner McGuire Date: February 9, 2016 No. B2016-045

Attention: Board of Commissioners

Page 2 of 2

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RESOLVED, The Ramsey County Board of Commissioners declares Ramsey County as a pollinator-friendly county; and Be It Further

RESOLVED, The Ramsey County Board of Commissioners directs the County Manager to expand implementation of pollinator-friendly best management practices on County-owned property, including strategies that will reduce, and seek to eliminate the use of systemic insecticides, such as neonicotinoids; seek to increase pollinator habitat; and source plant and trees from nurseries that do not use neonicotinoids; and Be It Further

RESOLVED, The Ramsey County Board of Commissioners directs the County Manager to increase efforts to educate, support and encourage County residents and businesses to implement pollinator-friendly best practices on their property.

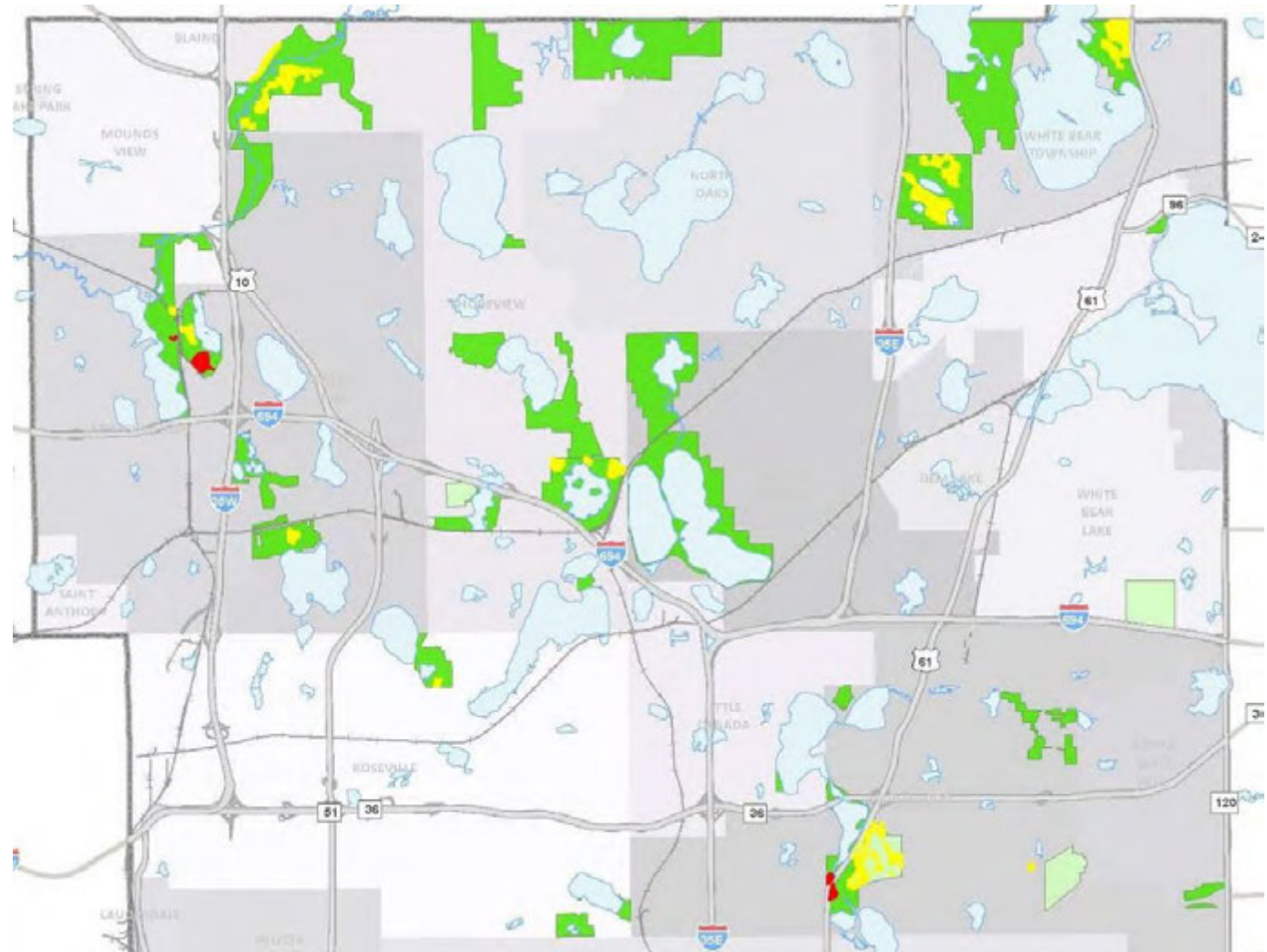
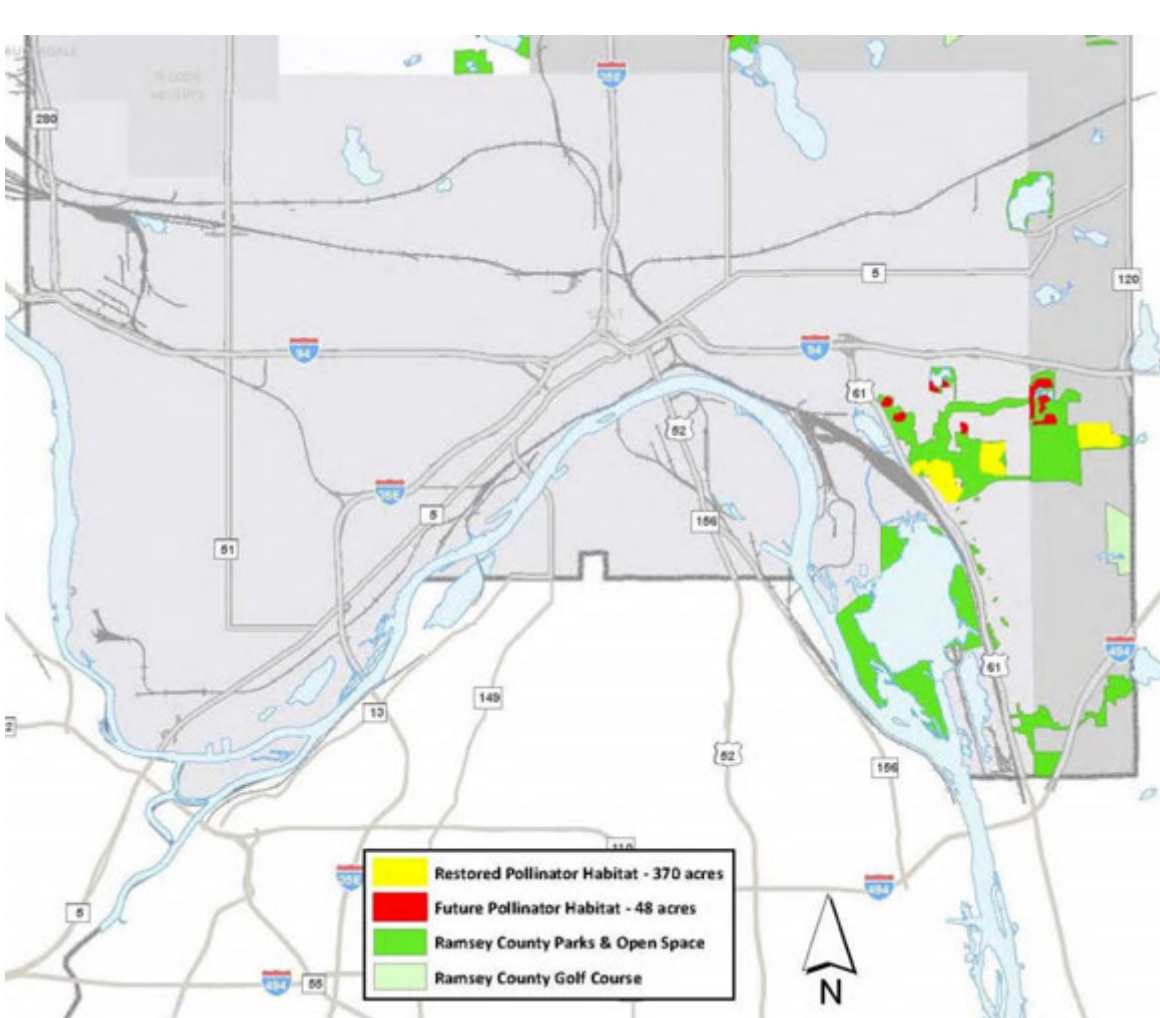
# Ramsey County Goals

- Increase Pollinator Habitat
- Increase Pollinator Forage
- Decrease Toxicity
- Raise Awareness

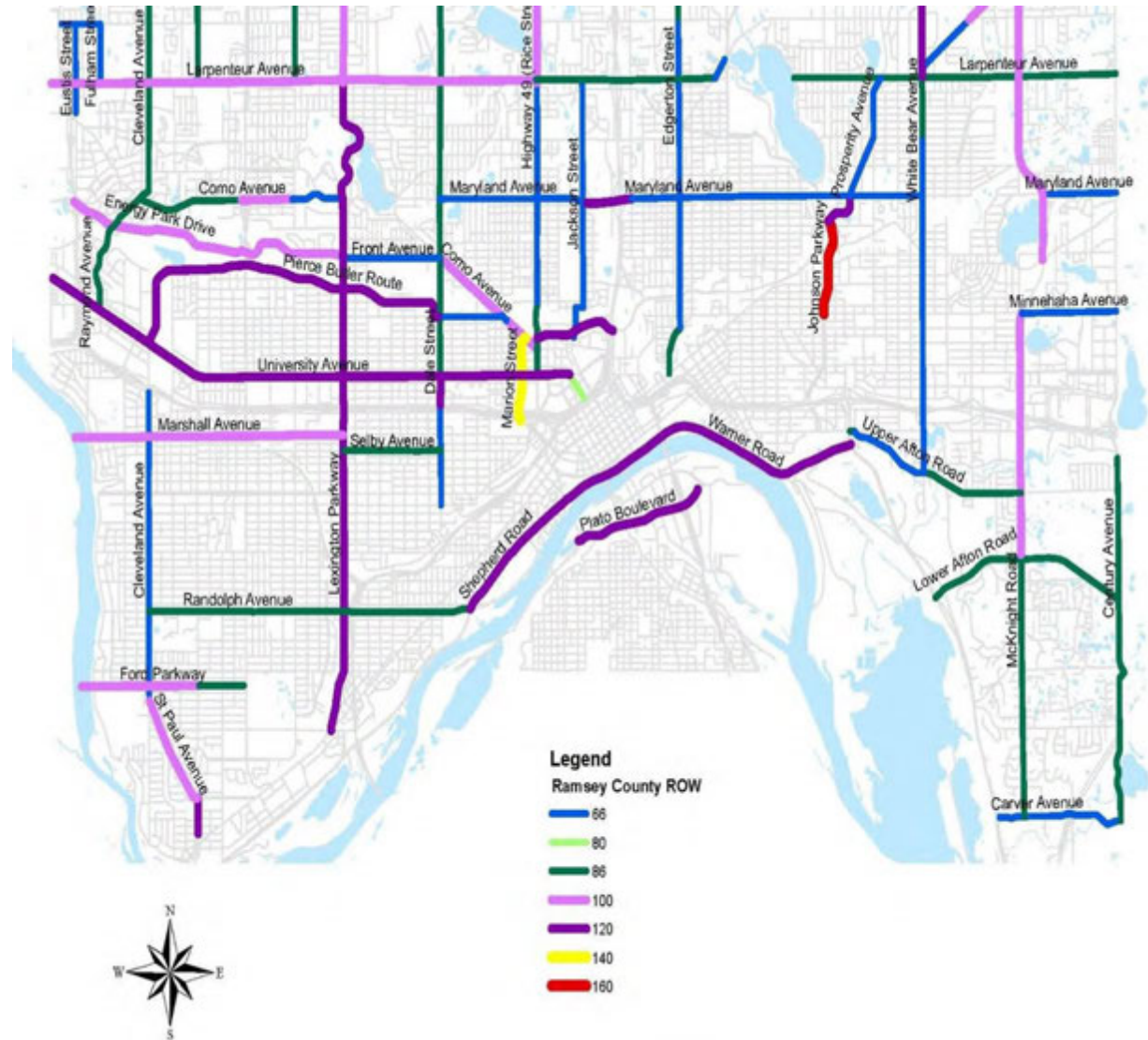
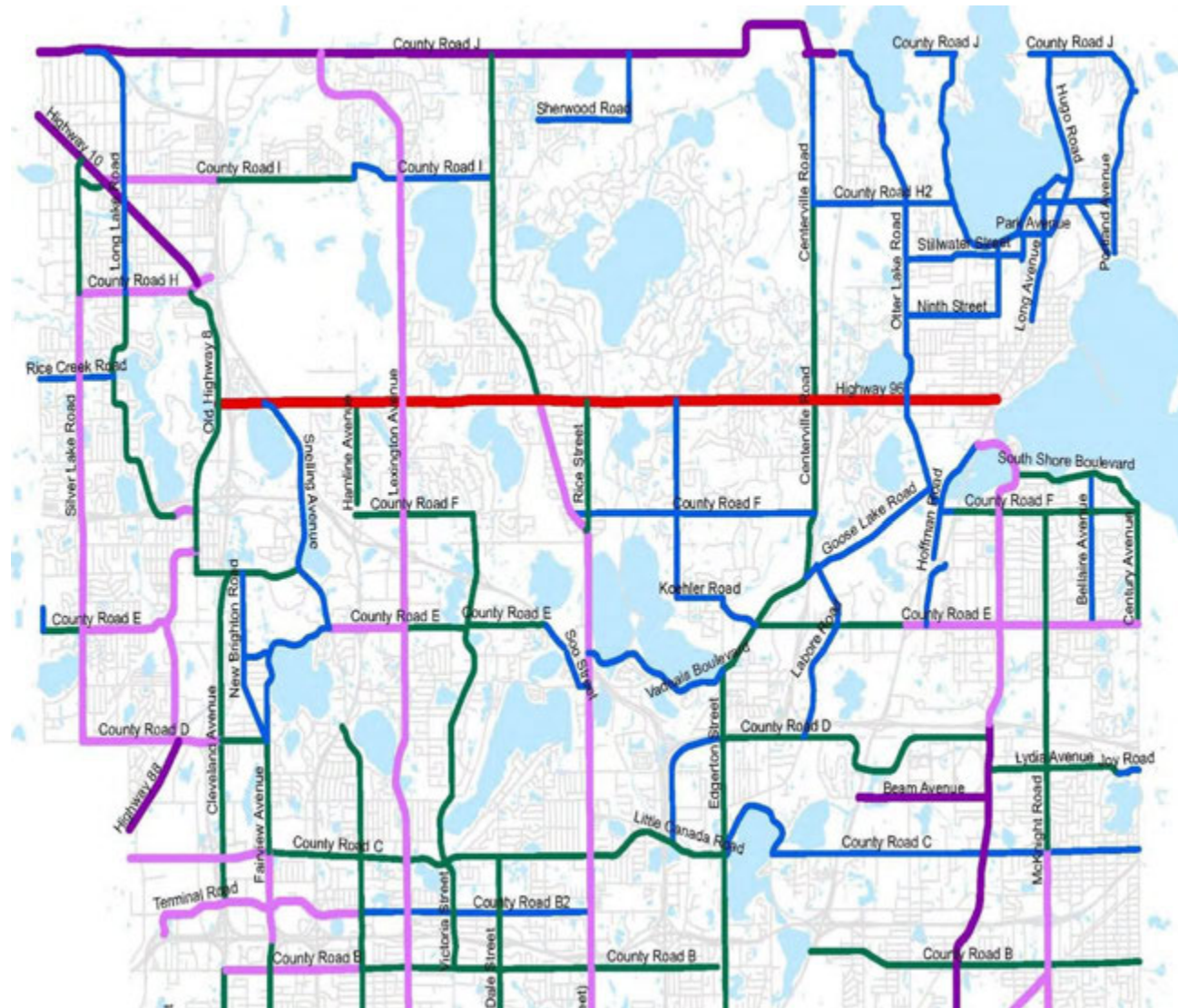
# Increase Habitat and Forage

- Over 1500 Acres of Park and Open Space
- 418 Acres currently restored or scheduled to be native prairie
- Look to other publicly managed properties such as County ROW
- Build partnerships with other local governments to plan together
- Reach out, Learn and Share

# Ramsey County Parks Habitat Restoration



# Ramsey County Road Network



# Decrease Toxicity

- No Systemic Insecticides outside of the golf courses
- Learn Best Practices That Will Eliminate Neonics
- Source plants from suppliers that do not use Systemic Insecticides
- The Green House Operation at the Workhouse is Neonic free
- Work with the Master Gardeners to educate the public
- We Are Preempted From Banning The Use Of Any Insecticides

# Ramsey County Commissioner Victoria Reinhardt

[651-266-8363](tel:651-266-8363)

[Victoria.Reinhardt@co.Ramsey.mn.us](mailto:Victoria.Reinhardt@co.Ramsey.mn.us)

[www.RamseyCounty.US](http://www.RamseyCounty.US)

# Bumble Bees:

*Biology, status, and conservation*



Sarah Foltz Jordan  
Pollinator Conservation Specialist



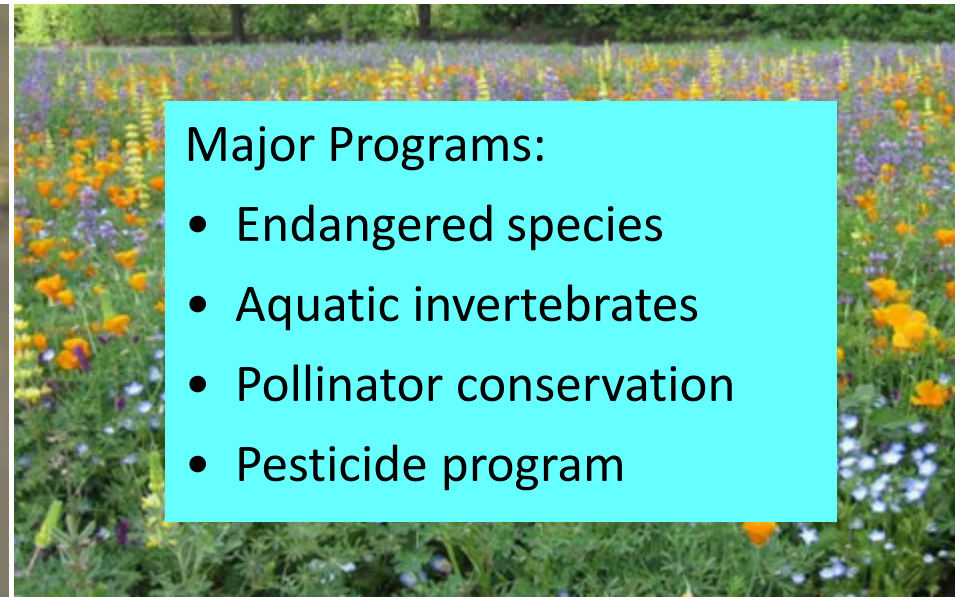
# The Xerces Society: Protecting the Life that Sustains Us



Now-extinct Xerces blue butterfly (*Glaucopsyche xerces*)

Conservation, education, research, & advocacy to protect invertebrates and habitat

# The Xerces Society: Protecting the Life that Sustains Us



## Major Programs:

- Endangered species
- Aquatic invertebrates
- Pollinator conservation
- Pesticide program

**Conservation, education, research, & advocacy to protect invertebrates and habitat**

# Introduction to the Xerces Society

## Xerces Pollinator Team

- Staff in California, Oregon, Washington, Nebraska, Minnesota, Wisconsin, Texas, North Carolina, New Jersey, Vermont, Massachusetts.



## Pollinator Conservation Education

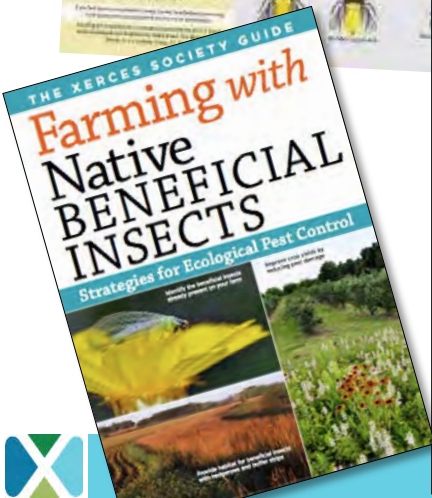
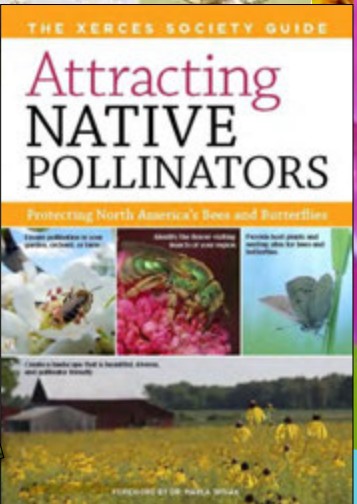
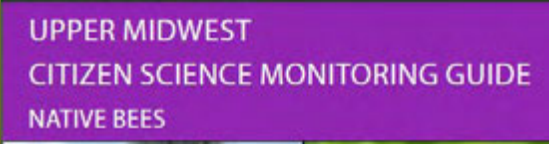
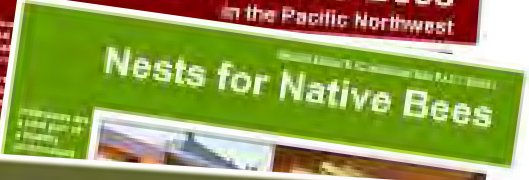
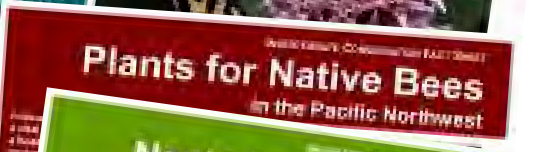
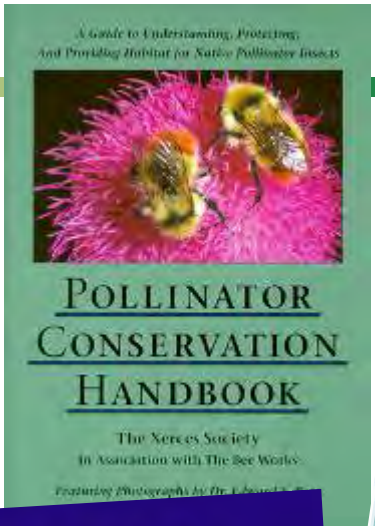
- Outreach to 60,000+ farm and agency professionals since 2008
- Training events in all 50 states, Europe, Asia, Latin America



## Habitat Restoration

- Supporting >200,000 acres of habitat created in the U.S. since 2008

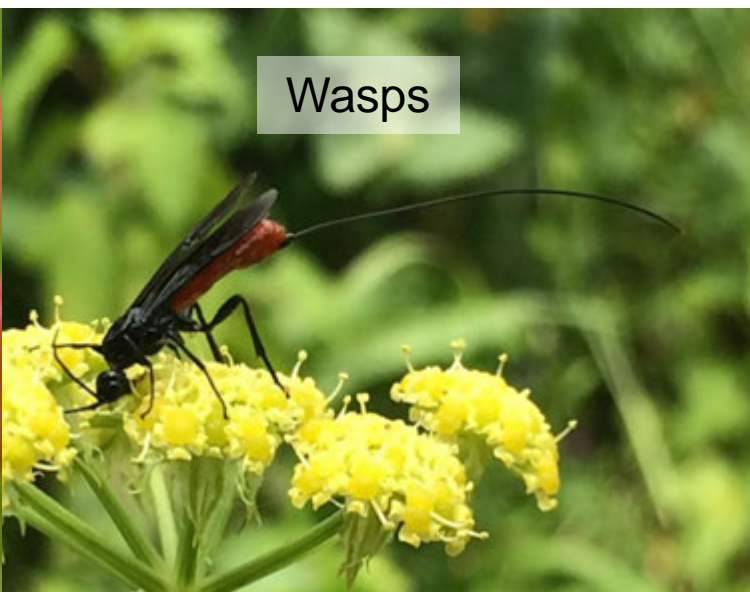




# Meet the Pollinators



Bees



Wasps



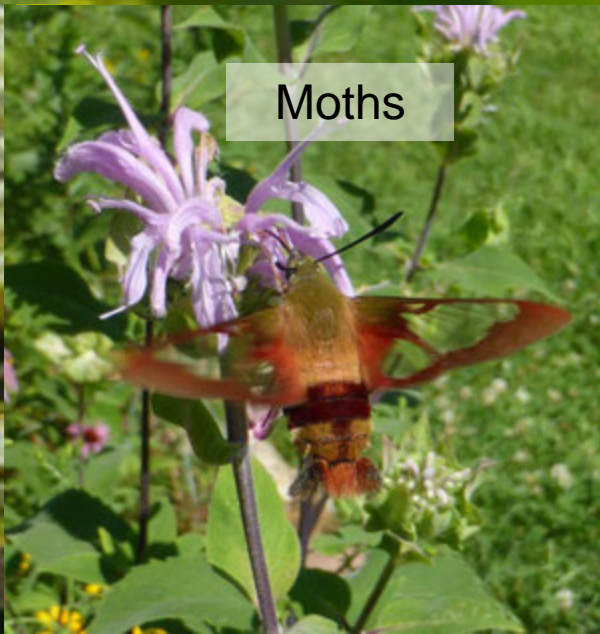
Flies



Beetles



Butterflies



Moths



# Why are bees the most important pollinators?

- Bees actively collect and transport pollen to feed their young
- Bees exhibit flower constancy



# Why bumble bees?

- Important pollinators of native flora
- Important crop pollinators (and can be managed for crop pollination)
- Good indicator species
- Amazing creatures



# Bumble bees are exceptional pollinators of many crops

- Active earlier and later in the day, and in cooler weather
- Variable tongue lengths, visit a wide variety of flowers
- Can learn to access resources from complicated flowers
- Buzz pollination



- Tomatoes
- Peppers
- Blueberries
- Cranberries
- Clover
- Squash
- Melon
- Native Seed



# Bumble bees are exceptional pollinators of many crops



## Blueberries

- Bumble bees are 8-10 times more efficient at pollinating blueberries than honey bees
- Handle flowers more quickly and thoroughly
- More faithful to crop blooms
- Broader range of acceptable flight conditions



# Bumble bees are exceptional pollinators of many crops



## Cherry tomatoes

When bumble bees and other native bees are present, the production of Sungold cherry tomatoes almost triples.



# Pollinators are Critical to Ecosystem Health

- Natural ecosystems rely on pollinators for seed and fruit set
- More than 85% (~240,000 sp.) of flowering plants require an animal, mostly insects, to move pollen.
- Longevity and diversity of remnant and restored plant communities requires healthy and diverse pollinator communities

Ollerton et al. 2011. How many flowering plants are pollinated by animals? *Oikos* 120: 321-326.

Burkle, L.A., Marlin, J.C., and T.M. Knight. 2013. Plant-Pollinator Interactions over 120 Years: Loss of Species, Co-Occurrence, and Function. *Science* 339: 6127 pp. 1611-1615.



# Certain Plants Need Certain Bees

Open Access



Restricted Access



## Some wildflowers require buzz pollination



*Dodecatheon amethystinum*  
(Jeweled Shooting Star)



# Bumble Bee Life History



- Social colonies with 3 castes: queens, workers, males
- Colonies last only one season
- Nests may contain 25-400 workers

# Life Cycle of a Bumble Bee Colony

**Fall:** Mated queens seek overwintering sites, founding queen dies

**Winter:** Hibernating queen

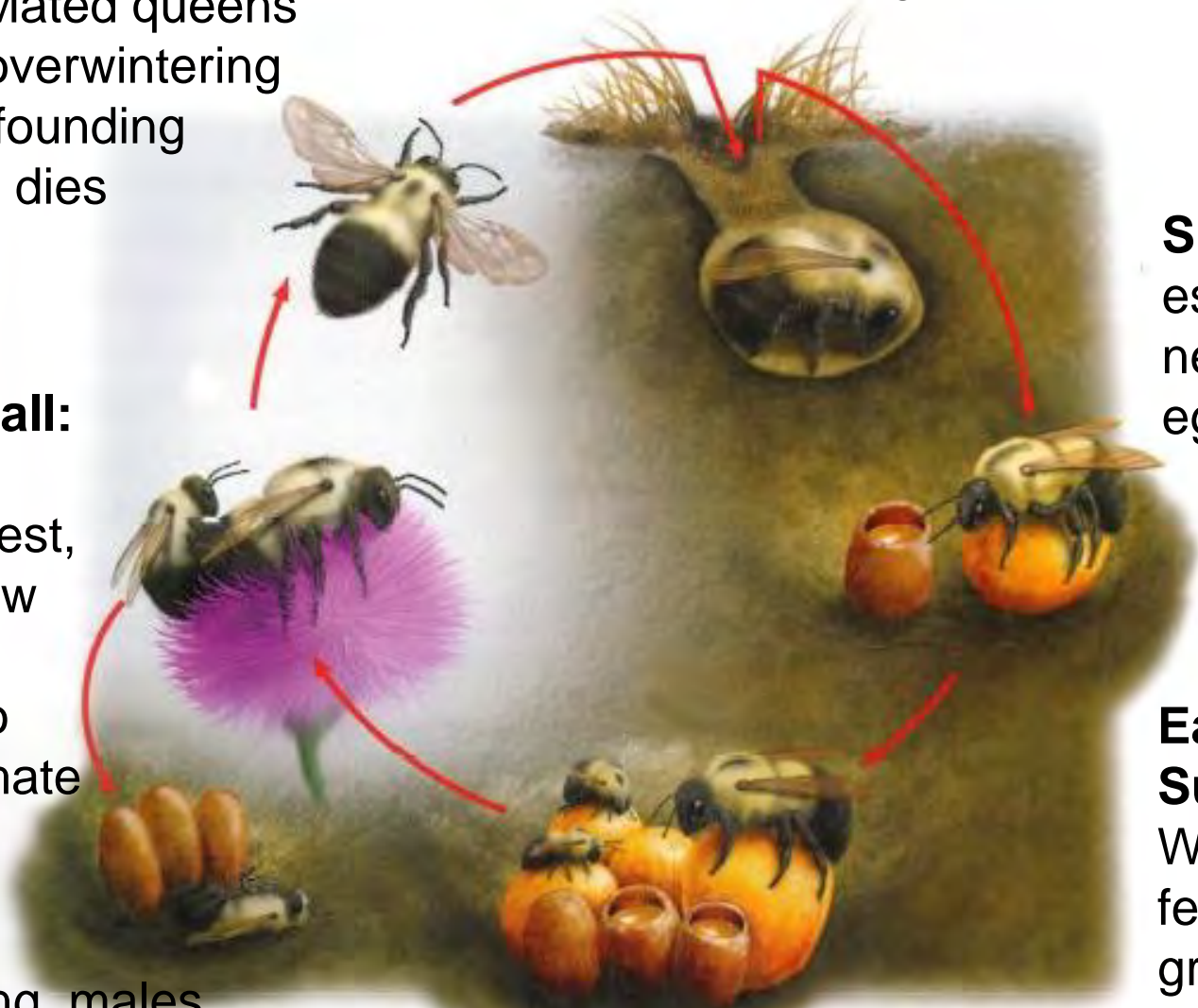
**Early Fall:** Males leave nest, then new queens leave to find a mate

**Spring:** Queen establishes nest and lays eggs

After mating, males die

**Summer:** Colony peak

**Early Summer:** Worker females help grow the colony



# Nest Establishment

- Nests are established by a solitary queen in spring
- Can spend 2-3 weeks looking for a nest





# Bumble Bee Nests: pre-existing cavity; often rodent nest

All of these nests on my farm had evidence of an abandoned mouse nest!



# Bumble Bee Nests



# Bumble Bees: Inside the Nest



Egg



Larvae



Colony



Pupa

Photos: Marion Ellis, Elaine Evans



# Bumble Bee Mating

New queens and males are produced at peak of colony growth cycle



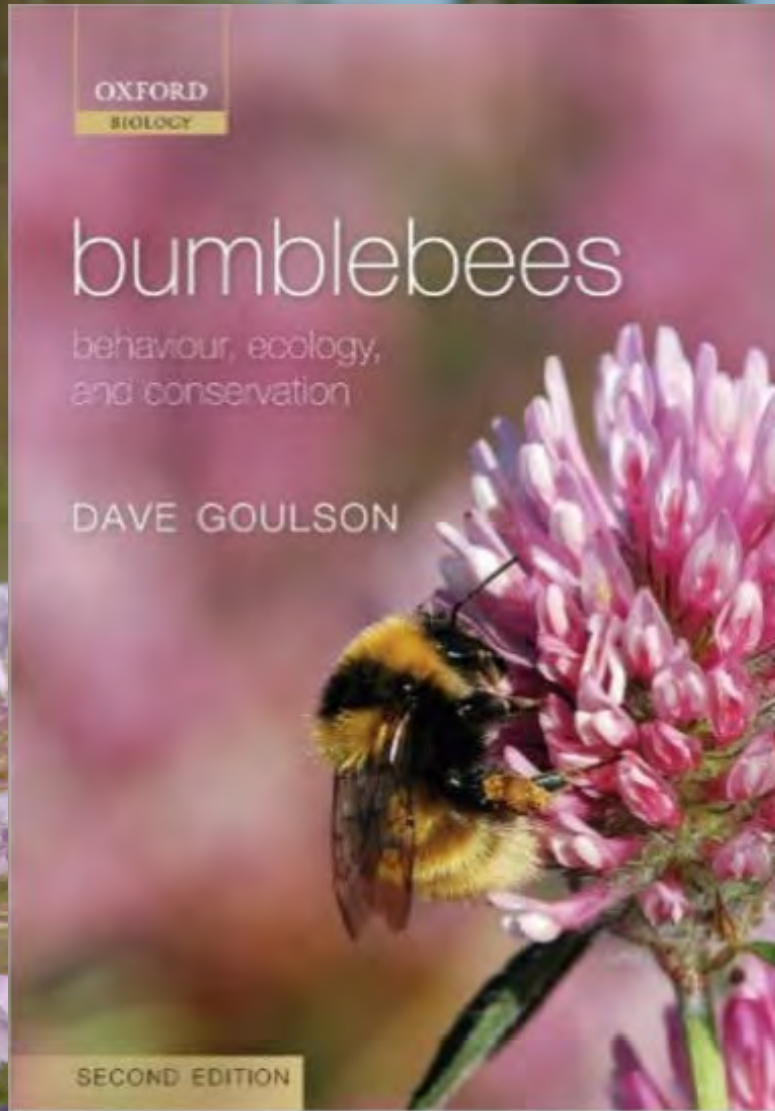
## Males

- Result of unfertilized egg
- No nest duties
- Leave nest to mate and do not return
- Often sleep on flowers
- No stinger; fun to pet!

# Bumble Bee High Fives!



# Bumble Bee Foraging Behavior



# New queens are the only caste that overwinters

Mated queens forage to build up reserves

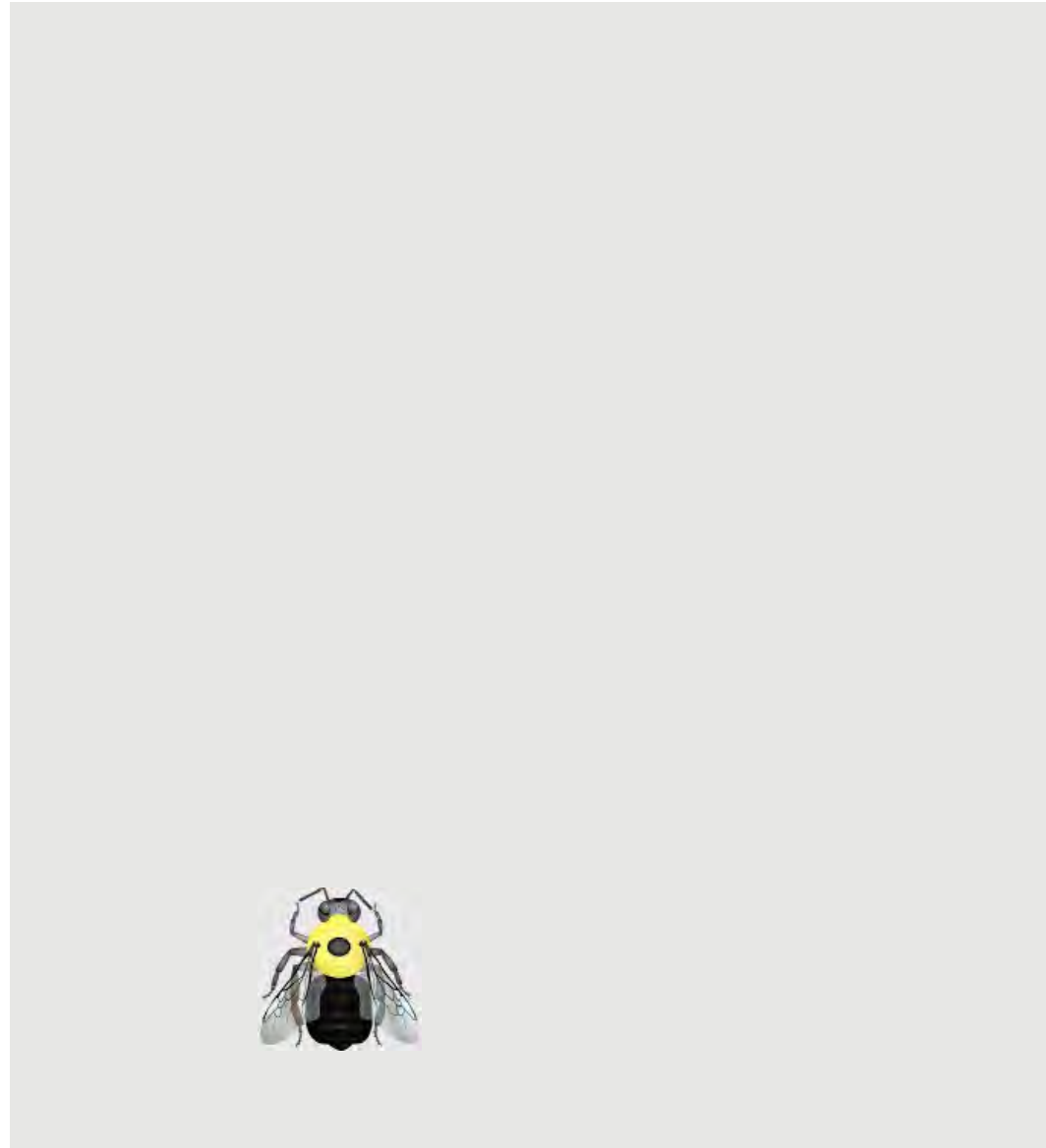
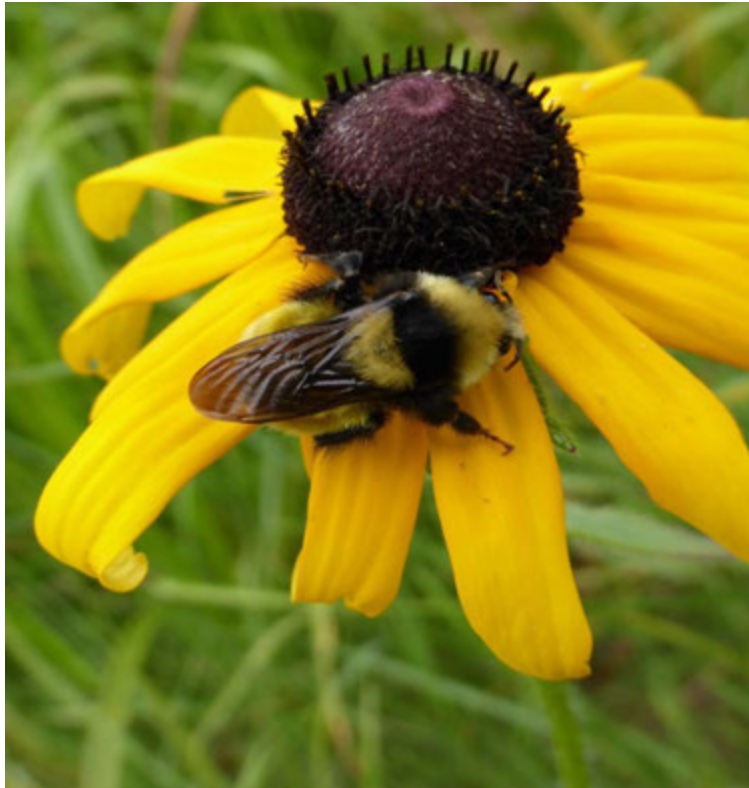
Select an overwintering site (hibernacula)

Hibernacula include:

- short burrows in soil
- under trees
- in rotten wood
- under leaf litter or mulch



# Bumble Bee Diversity



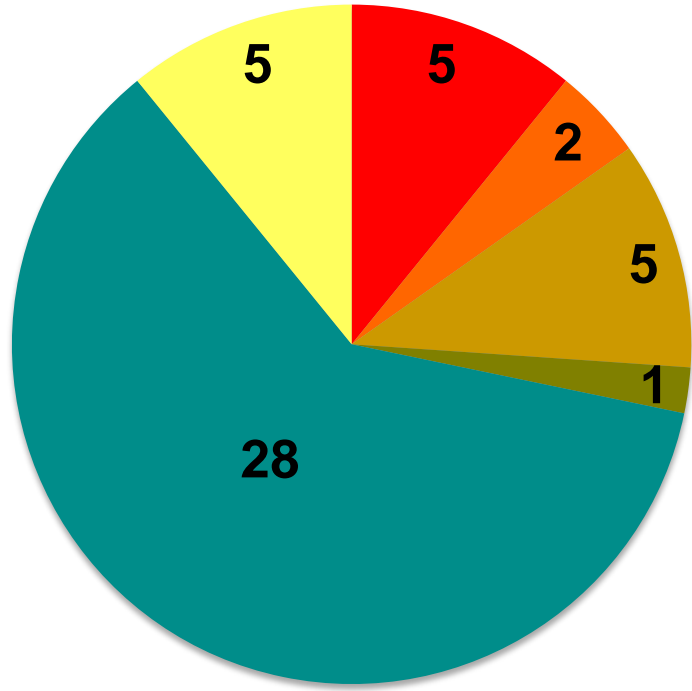
By Elaine Evans, U of MN, [www.befriendingbumblebees.com](http://www.befriendingbumblebees.com)





# Bumble bees are in decline

- 1-in-4 NA bumble bees at risk of extinction today
- Causes: Disease spread by commercial bees, habitat loss, pesticide use, global climate change

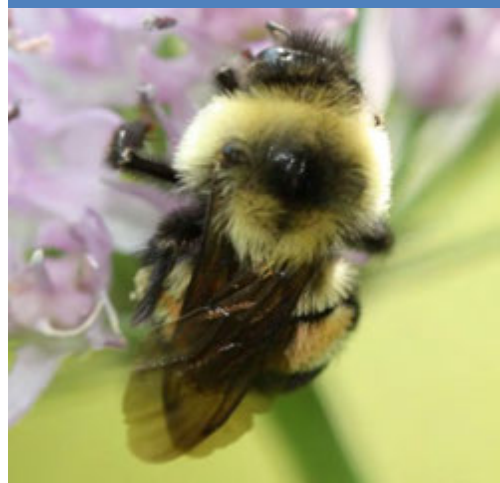


- Critically Endangered
- Endangered
- Vulnerable
- Near Threatened
- Least Concern
- Data Deficient

Yellow banded bumble bee



Rusty patch bumble bee



Hatfield et al. 2014 Xerces Society-IUCN status review;  
Cameron et al. 2011. PNAS

# Bumble bees are in decline

## IUCN Red List Criteria for Evaluating Extinction Risk

2014 Status review of all NA Bumble Bees

Database of 250,000+ records from museum & surveys

Used this database to evaluate changes in:

- Range (EOO)
- Relative abundance



## IUCN Red List Categories version 3.1

<b>EX</b>	<b>Extinct</b>	There is no doubt that the last individual in the taxon (a species or group or species) has died.
<b>EW</b>	<b>Extinct in the Wild</b>	The only living individuals in the taxon are living in captivity or were born in captivity.
<b>CE</b>	<b>Critically Endangered</b>	Evidence shows that the taxon has an extremely high risk of extinction in the wild.
<b>EN</b>	<b>Endangered</b>	Evidence shows that the taxon has a very high risk of extinction in the wild.
<b>VU</b>	<b>Vulnerable</b>	Evidence shows that the taxon has a high risk of extinction in the wild.
<b>NT</b>	<b>Near Threatened</b>	The taxon is not in a threatened category (Critically Endangered, Endangered, or Vulnerable), but is likely to move into a threatened category in the near future.
<b>LC</b>	<b>Least concern</b>	The taxon is not in a threatened category. It is widespread and abundant.
<b>DD</b>	<b>Data deficient</b>	The taxon has been well studied, but there is not enough information about its distribution and population to decide what category it belongs in.
<b>NE</b>	<b>Not evaluated</b>	The taxon has not been studied to decide what category it belongs in.

[inquisitiveclassroom.com](http://inquisitiveclassroom.com)

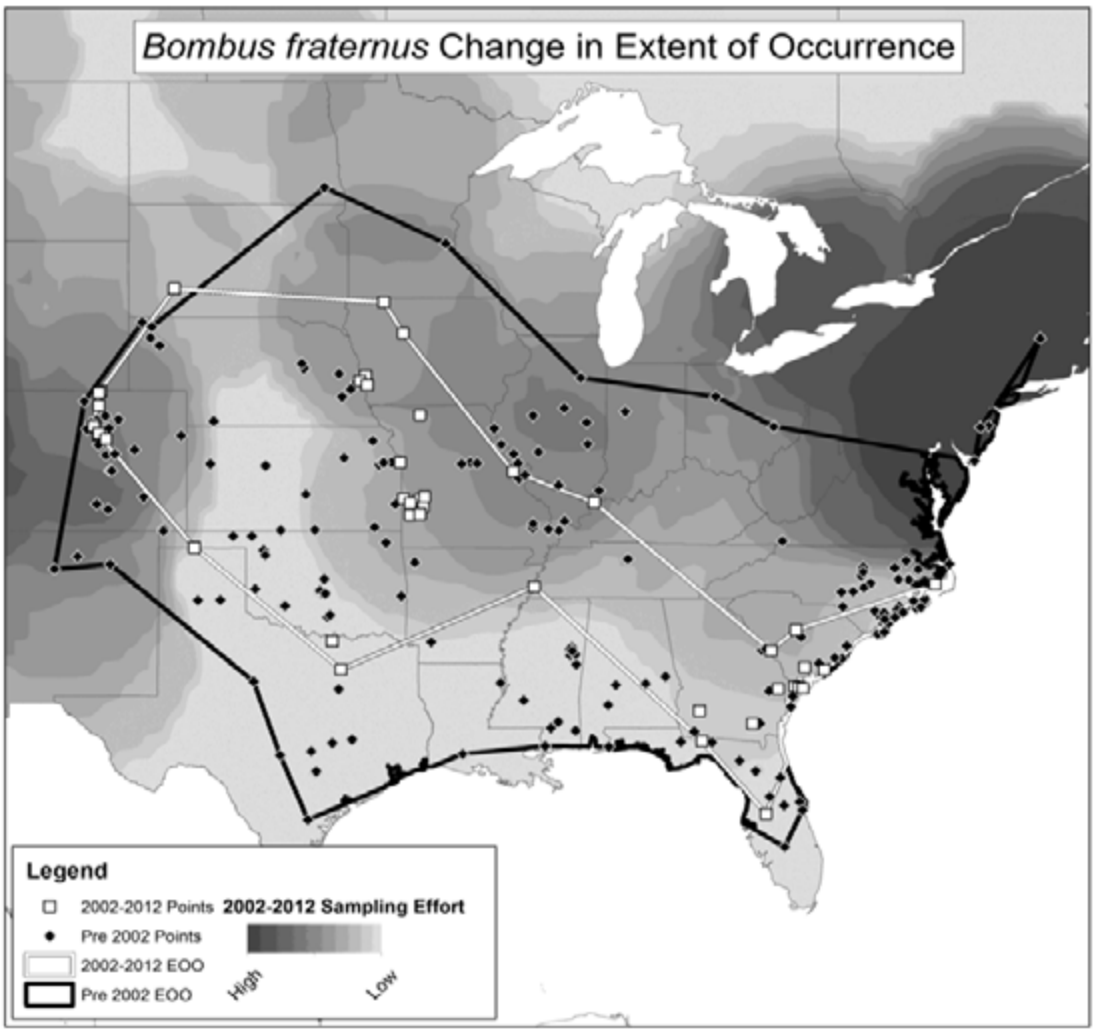
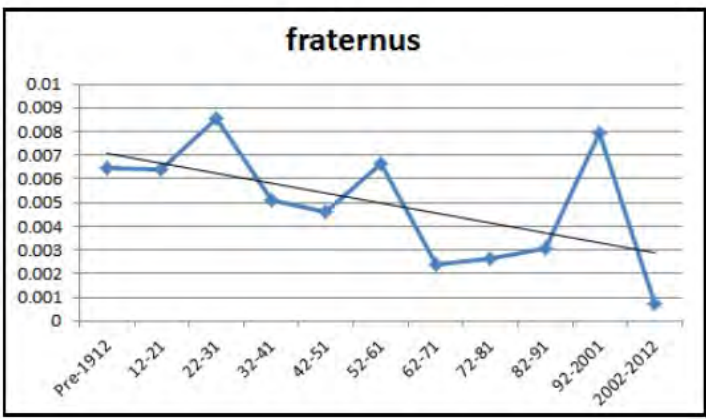
# Evaluating Bumble Bee Status: Declining Species

## *Bombus fraternus*

Range loss (adjusted by collection effort): **28.62%**

Relative abundance decline: **85.6%**

IUCN Red List: **Endangered**



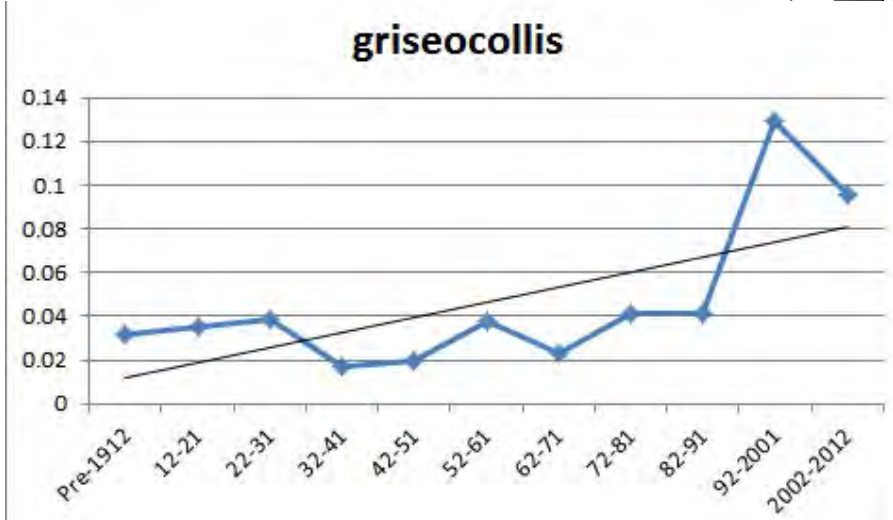
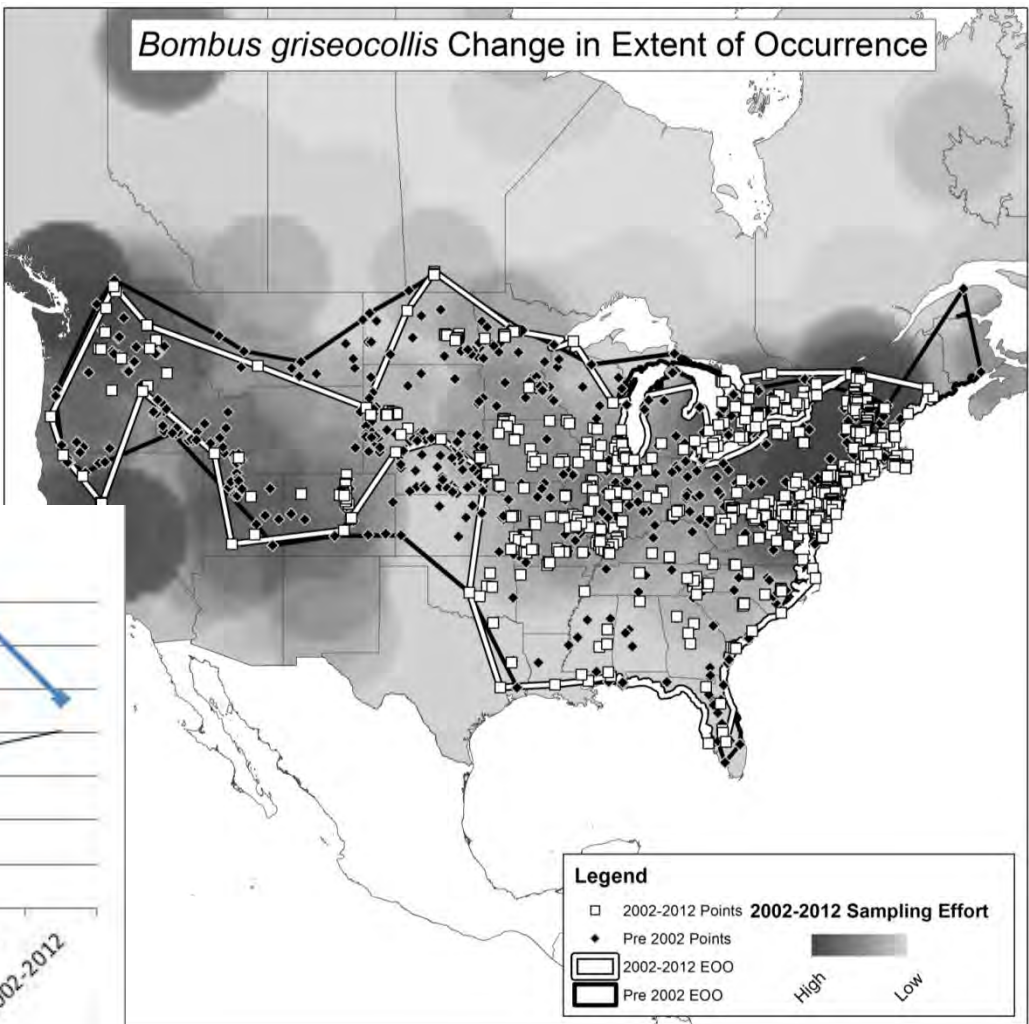
# Evaluating Bumble Bee Status: Stable Species

*Bombus griseocollis*  
Brown-belted bumble bee

Range loss (adjusted by collection effort): **9.8%**

Relative abundance decline: **0%**

IUCN Red List:  
**Least Concern**



# Bumble Bees: How to Help



Photo: Michael  
Durham, Oregon Zoo

# Pollinator Conservation Begins at Home



# Provide Food!



**Bumble bees need a succession of bloom: spring, summer, and fall**



# Provide Nesting and Overwintering sites



- **Plant native bunchgrasses**
- **Leave areas of your yard unmown**
- **Leave brush and dead wood**
- **Leave leaf litter and other debris**





## Bumble Bee Watch

[Welcome, sarah\\_foltz\\_jordan](#) | [My profile](#) | [Log](#)

[Home](#) [About](#) [Record a Sighting](#) [Bumble Bee Species](#) [Map](#) [Gallery](#) [Resources](#) [Sign Up](#)

### 1 **Welcome to Bumble Bee Watch!**

*The brown belted bumble bee (*Bombus griseocollis*) on beebalm. Photo by Chris Koester.*

2

3

4

5



# Xerces Citizen Science – Bumble Bee Watch

## Bumble Bee Identification Guide

[How to use this guide](#)

This is an identification guide to help you determine the species of bumble bee in your photo. This guide will only work for females, and is not comprehensive as there are many additional color forms, and many look alike species. [See this page](#) for more information about bumble bee anatomy. To use the ID guide, compare your photo(s) on the left to the illustrations and select the features of each body part that most closely match the features on the bee in your photograph. Once you have chosen the correct features, choose a matching species. For more help with this identification guide, watch this video.

## My Bee Sightings



All yellow



Yellow in front



*Bombus occidentalis*



*Bombus vosnesenskii*



# Xerces Citizen Science – Bumble Bee Watch

## Brown-belted bumble bee

*Bombus griseocollis*

[Delete](#) | [Edit](#)



📍 Minnesota

📅 2013-07-30

by [Sarah Foltz Jordan](#)

### Date that the nest was first noticed

2013-07-30

### How much traffic was at the nest?

1 to 5 bees per minute

### Where was the nest located? \*

On the surface of the ground

### Describe any additional details about the nesting sight that might be of interest.

The nest was in an undisturbed grassy area with smooth brome grass, black raspberries, and poison ivy.

## Uses of data from citizen scientists:

- Understand distribution and status of imperiled species
- Target land managers with extant populations of imperiled species
- Understand climate change impacts
- Track invasive species



# Get Involved: MN Bumble Bee Survey

- Surveys at parks in Twin Cities Metro
- Since 2007, over 2,000 bees recorded
- Sign up at [www.befreindingbumblebees.com](http://www.befreindingbumblebees.com)



facebook Search for people, places and things Elaine Evans

You are posting, commenting, and liking as Minnesota Bumble Bee Survey — Change to Elaine Evans

Admin Panel Edit Page Build Audience Help Show

**MINNESOTA BUMBLE BEE SURVEY**

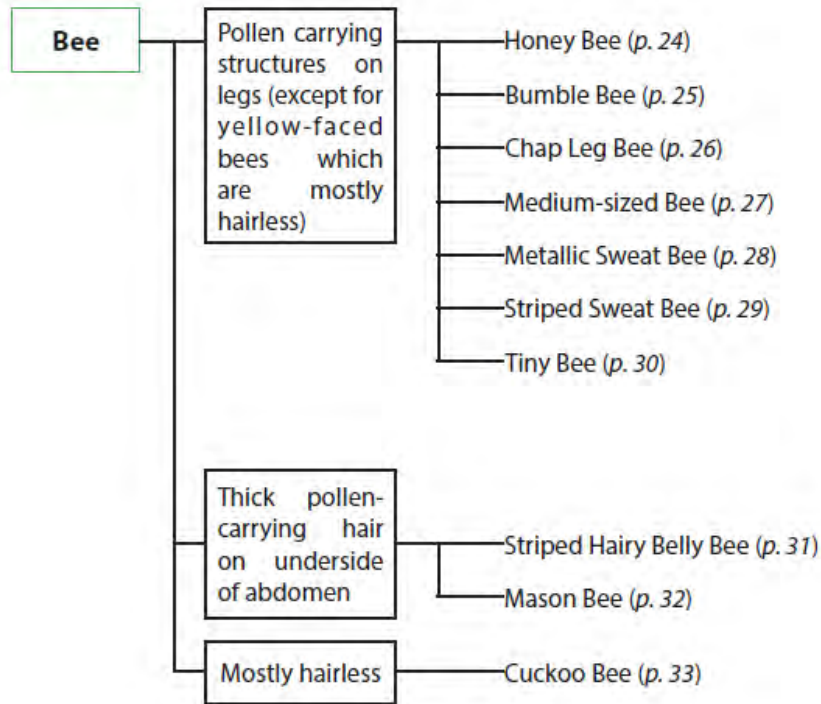
**Minnesota Bumble Bee Survey**  
99 likes · 4 talking about this

Community  
keeping track of MN bumble bees

About Photos Likes Events

# Xerces Citizen Science – Native Bee Monitoring

- Streamlined Habitat Monitoring tools for farmers and citizens
- Learn the 10 basic bee groups
- Record abundance and diversity over time, in response to habitat improvement



## UPPER MIDWEST CITIZEN SCIENCE MONITORING GUIDE NATIVE BEES



THE XERCES SOCIETY  
FOR INVERTEBRATE CONSERVATION  
Protecting the life that sustains us

# Xerces Citizen Science – Native Bee Monitoring

- Who's doing the pollinating around here?
- If you build it, will they come?
- How does pollinator abundance/diversity change in response to restoration?
- How do remnant sites compare to restored sites?
- How does pollinator community change with the seasons?
- What plants are most attractive to native pollinators?



# Special thanks to Ramsey Conservation District

## THANK YOU FARMERS:

Vilicus Farms  
Open Hands Farm  
Little Hill Berry Farm  
Prairie Drifter Farm  
Spring Winds Farm  
Del's Orchard  
Keepsake Farm  
Longdale Farm  
Heidel Family Farm  
Uproot Farm  
Nelson Family Farm  
Grinnell Heritage Farm  
Paul Mugge Farm

## THANK YOU

Xerces Staff  
Colleen Satyshur, UofM

## THANK YOU ENTRF/LCCMR and Collaborators:

Great River Greening  
Maplewood Nature Center



## XERCES SUPPORT FROM:

Xerces Society Members  
Sustainable Agriculture Research and Education (SARE)  
USDA Natural Resources Conservation Service (NRCS)  
Cascadian Farm  
Ceres Trust  
Cheerios  
CS Fund  
Disney Worldwide Conservation Fund  
The Dudley Foundation  
Endangered Species Chocolate  
Gaia Fund  
General Mills  
Häagen-Dazs  
Irwin Andrew Porter Foundation  
Nature Valley  
National Co-op Grocers  
Prairie Moon Nursery  
Sarah K. de Coizart Article TENTH Perpetual Charitable Trust  
Turner Foundation, Inc.  
Whole Foods Market and its vendors  
Whole Systems Foundation

[www.xerces.org](http://www.xerces.org)

Sarah Foltz Jordan: sarah@xerces.org



# Native Bees and Beneficial Flower-Visiting Insects

Heather Holm

Author of *Pollinators of Native Plants*

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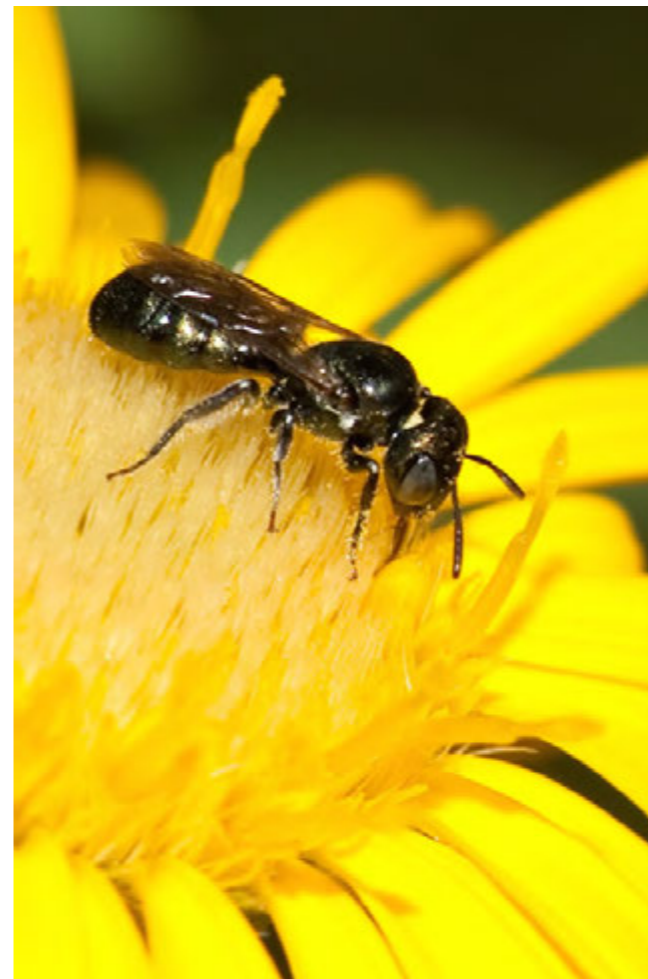
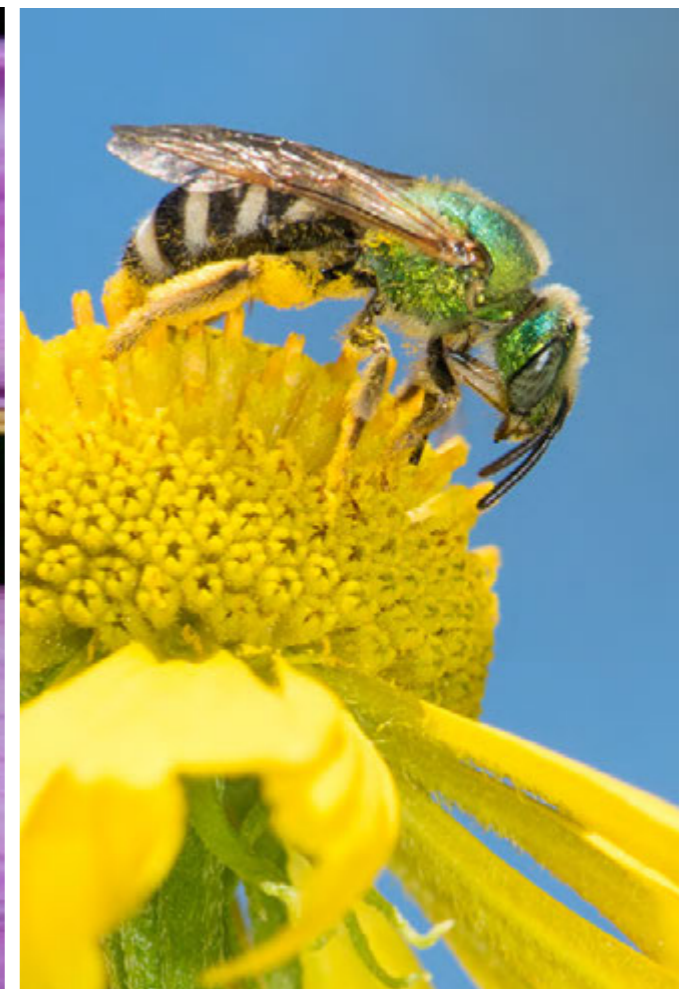
RestoringTheLandscape  
PollinatorsNativePlants



BeesNativePlant



houzz.com/pro/heatherholm





# Presentation Overview

Attracting Beneficial Insects

Beneficial Insects: Nesting biology and prey

Bees

Social Wasps

Solitary Wasps

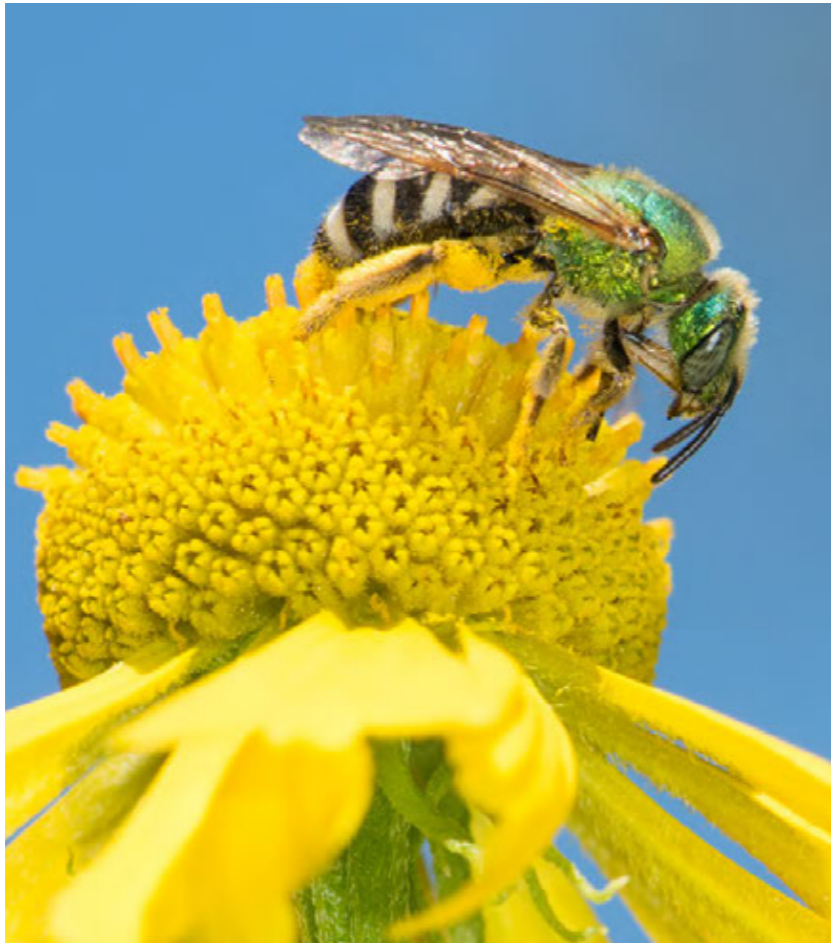
Beetles

Flies

Lacewings

Planting for Beneficial Insects

# Beneficial Insects - Human Perspective



## Insects that provide an ecosystem service

- pollination of plants
- pest control of insects deemed to be destructive of plants or crops



# Attracting Beneficial Insects



Photo: MSU Native Plants and Ecosystem Services

## **Diverse Native Plantings**

Undisturbed plantings next to **farm fields** - serve as pollinator strips and beneficial insect habitat

**Home gardens** providing a continuous succession of flowering plants, and variety of flower colors and flower forms

## **Commercial landscapes**

# Attracting Beneficial Insects

## Many Opportunities for Improvement

Most Anthropocene landscapes lack an adequate amount of forage, nesting sites, prey, and overwintering habitat for beneficial insects



# Beneficial Insects - Pollination Services



## Bees

Over 4000 species  
of bees in North America

425 species in Minnesota

Majority have solitary nests

# Bees - Nesting Sites

## Ground

Bare soil  
(sparsely vegetated)

Well drained soil  
(easier excavation)



Aggregation of Nests



Lawns



Between Rocks

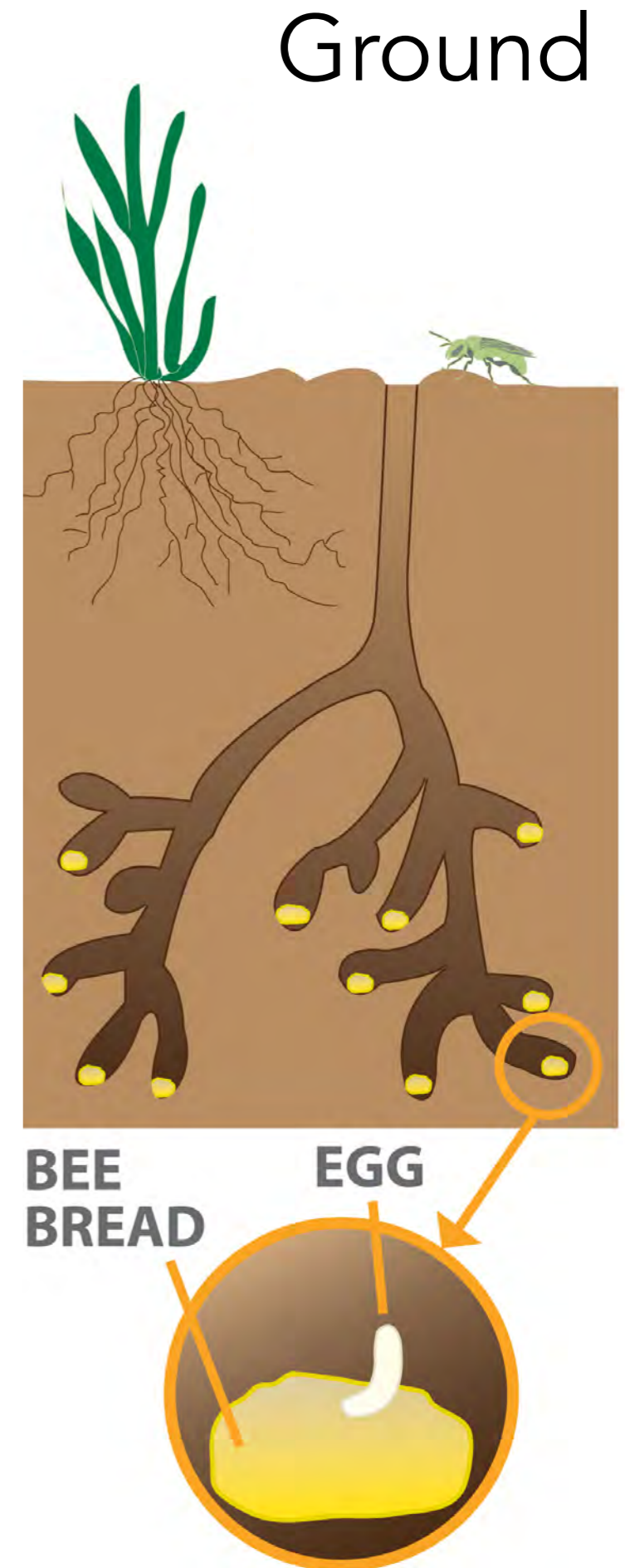


Sandy Shoreline

# Bees - Nesting Sites

Nest architecture varies from a single short tunnel to complex branching tunnels

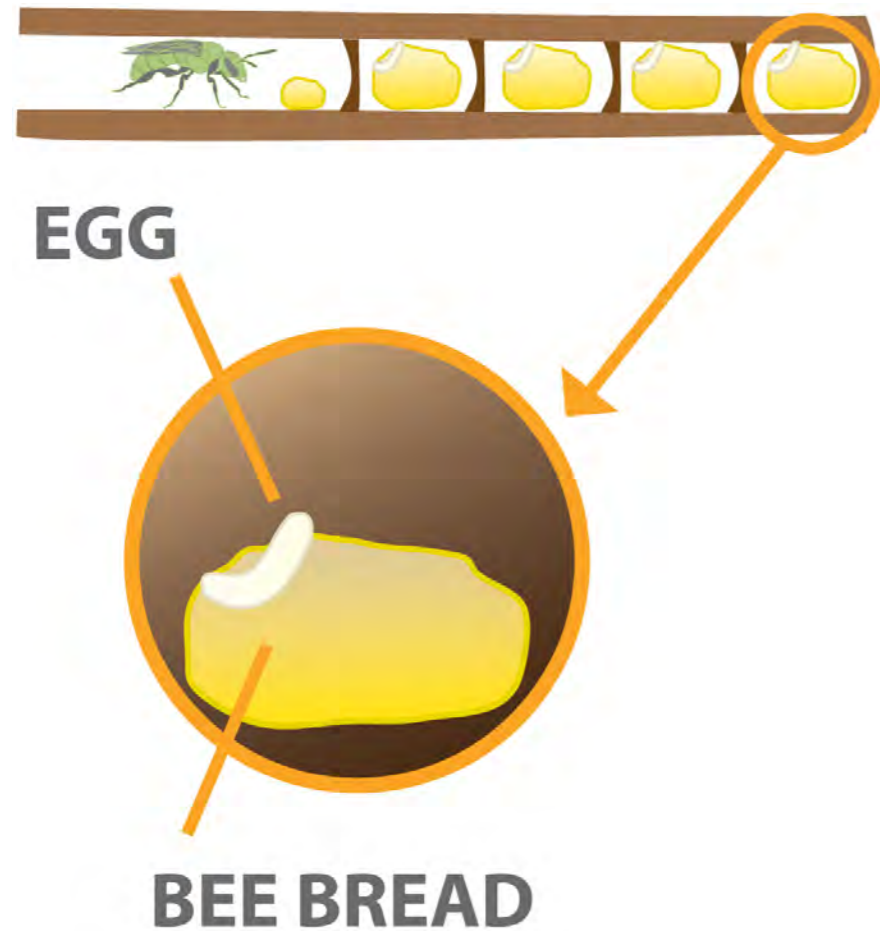
Females apply resin, oil, or glandular secretions on cell walls (waterproofing, prevent fungal/bacterial growth)





# Bees - Nesting Sites

## Cavities



Rotting wood on the ground

Cavities are dry, warm, and offer protection from predators.

Tunnels are divided with leaf pieces, leaf pulp, tree resin, pith, or mud to create separate brood cells.



Standing dead trees

# Bees - Nesting Sites



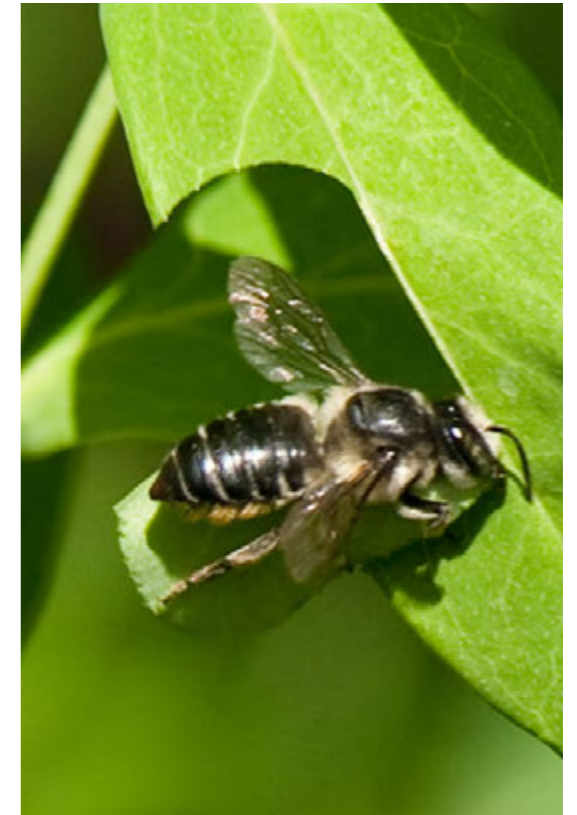
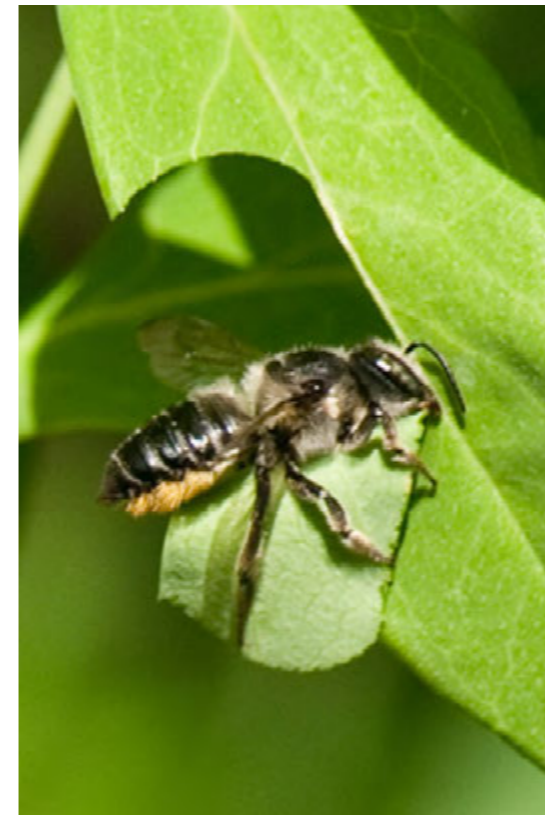
Photo © Joel Gardner

**Cavities**  
Plant Stems



# Bees - Nesting Sites

## Cavities

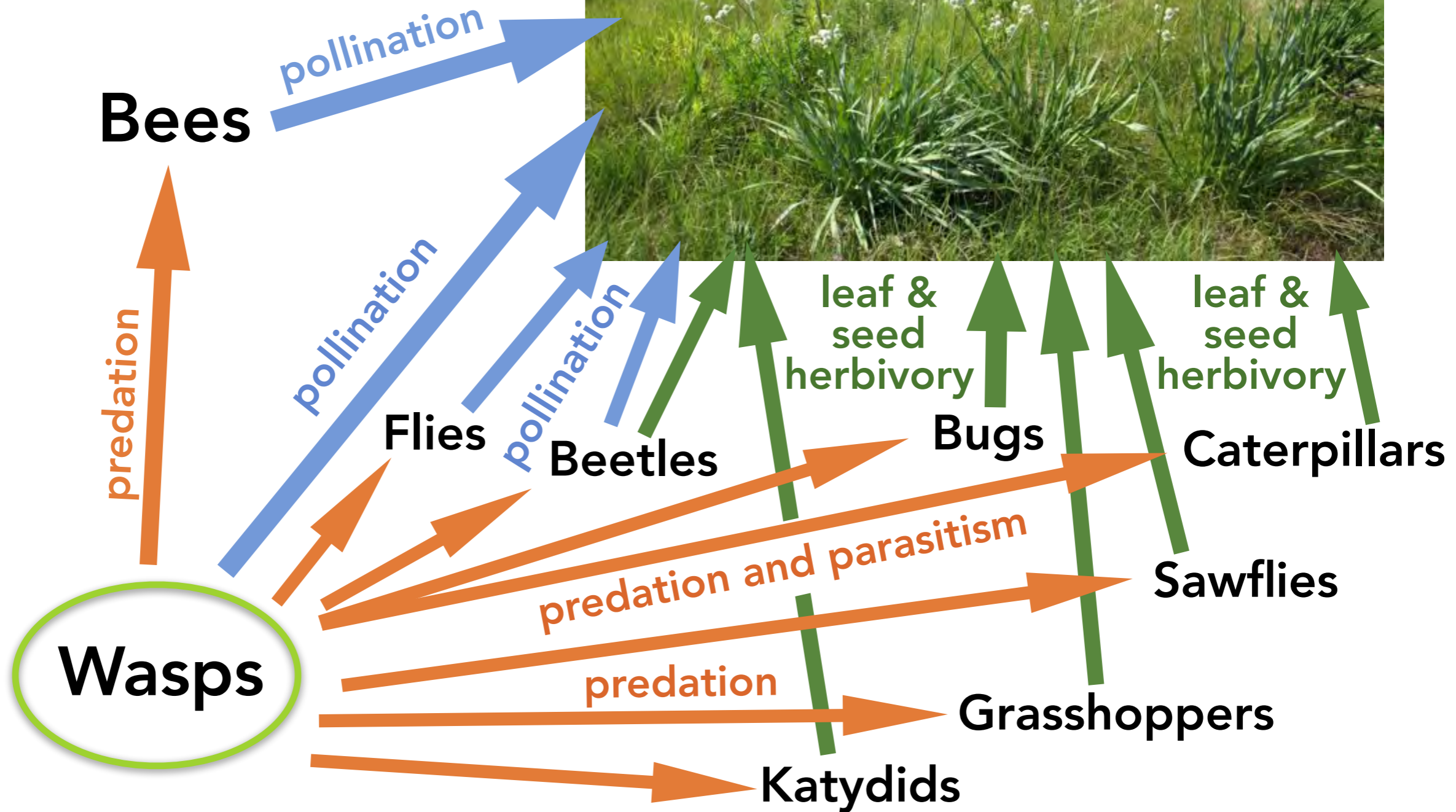


**Holes in Rocks**

Leafcutter Bee, *Megachile* sp.

# Wasps

Pest Control  
Pollination



Wasp species richness has been shown to correlate with landscape complexity and habitat diversity, positively influencing rates of predation and parasitism.

# Social Wasps - Generalist Predators

## Prey includes:

- Flies
- Beetle larvae
- Caterpillars
- Sawflies

Prey is chewed (masticated) then fed to larvae

## Paper Nest Below Ground



Eastern Yellowjacket  
*Vespula maculifrons*

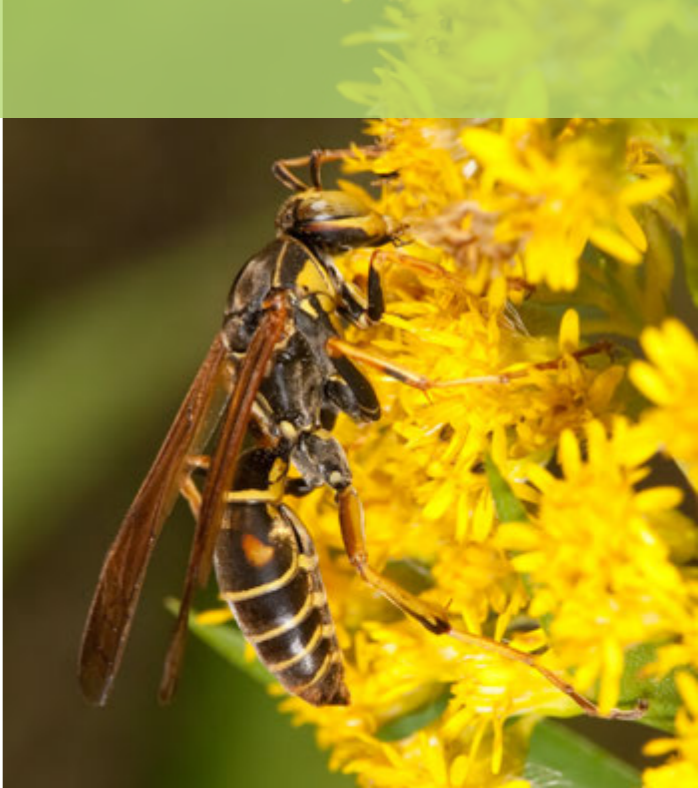
## Paper Nest Above Ground



Bald-Faced Hornet  
*Dolichovespula maculata*



Aerial Yellowjacket  
*Dolichovespula arenia*



Northern Paper Wasp  
*Polistes fuscatus*

# Solitary Wasps - Many specialist predators

Construct Solitary Nests - NOT Aggressive



**Grass-Carrying Wasp**  
*Isodontia mexicana*



# Solitary Wasps Thread-Waisted Wasps, Sphecidae

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## Great Golden Digger Wasp, *Sphex ichneumoneus*

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### **Prey**

Crickets

Katydids

### **Nest**

Burrows in the ground (well-drained soil)

# Beetles

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## Ladybird Beetles, Family Coccinellidae

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### **Prey**

Aphids, scales, mites, whiteflies, thrips, and insect eggs

### **Life Cycle**

Eggs are laid on plants near prey.

Adults overwinter under leaf litter or other sites offering protection.



# Predatory Flies

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## Syrphid (Flower) Flies, Subfamily Syrphinae

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*Toxomerus* spp.



*Chrysotoxum* spp.



### Prey

Aphids, scales, whiteflies, mites, thrips, and insect eggs

### Life Cycle

Larvae, pupae, or adults overwinter in leaf litter or in the soil

# Brown and Green Lacewings

Families Chrysopidae and Hemerobiidae



Adults feed on nectar and pollen.  
Eggs are laid on foliage near prey.

# Lacewings

Families Chrysopidae and Hemerobiidae



Brown lacewing larva



Green lacewing larva

## Prey

Aphids

Small caterpillars

Thrips

Mites

Mealybugs

Whiteflies

# Planting for Bees and Beneficial Insects

## Bee a Habitat Hero



Diverse native plantings

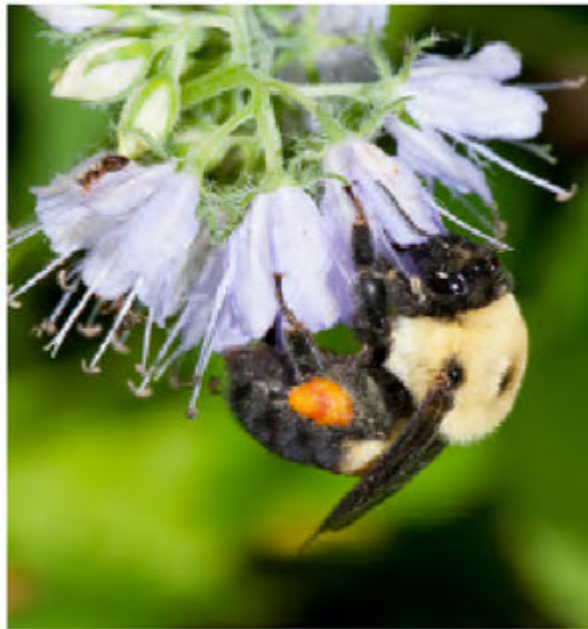
Rain gardens or other  
water infiltration schemes



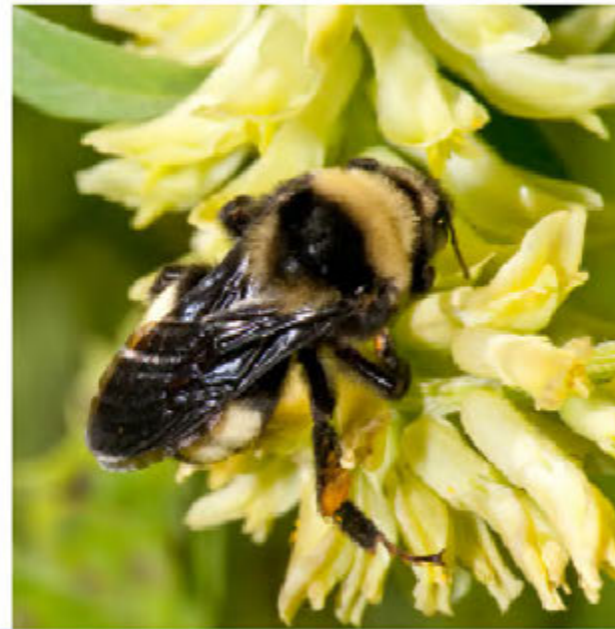
Photo: Metro Blooms

# Planting for Bees and Beneficial Insects

Provide a continuous succession of flowering plants throughout the growing season.



spring



summer

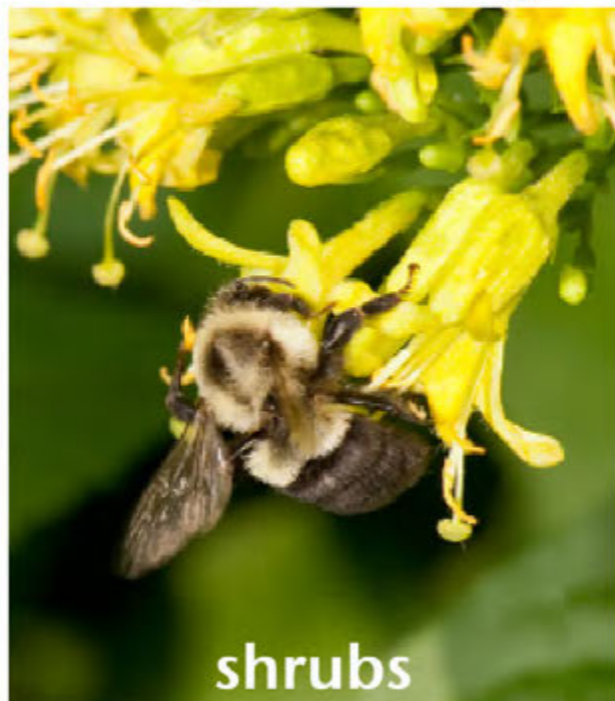


fall

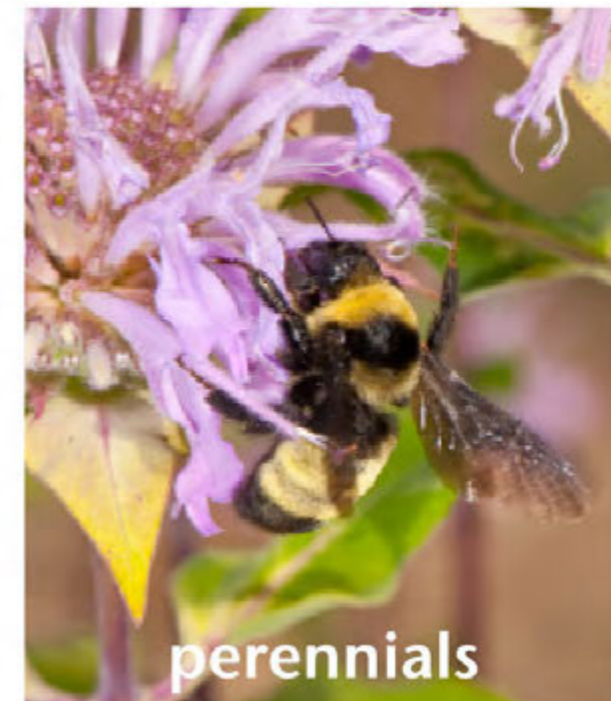
diversity of native plants



trees



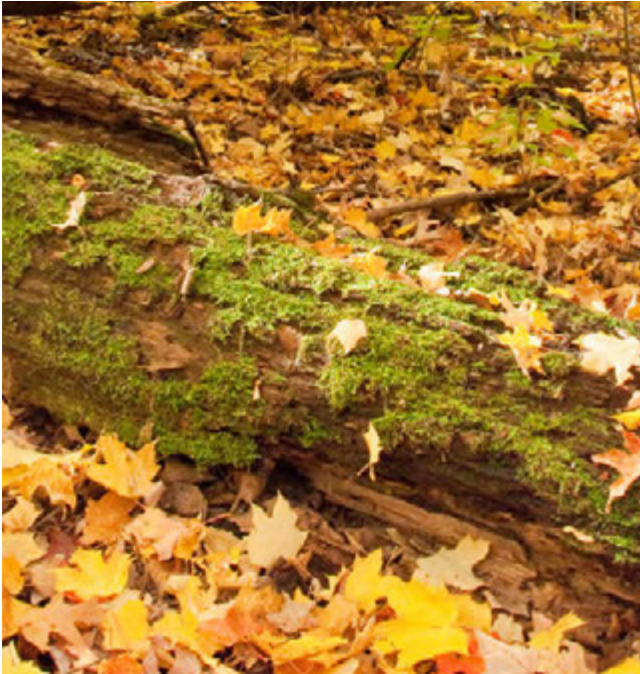
shrubs



perennials

# Planting for Bees and Beneficial Insects

Modify landscape maintenance practices to support **ALL** life stages of bees and beneficial insects



Leave **leaf litter**

Provide **stem stubble**

Incorporate **logs** on the ground

Leave **standing dead trees**

Provide areas of **bare soil**

Transition from wood mulch to **plant debris** and leaves



# Planning your garden – think like a pollinator.

**Go Native.** Pollinators are "best" adapted to local, native plants, which often need less water than ornamentals.

**Bee Bountiful.** Plant big patches of each plant species for better foraging efficiency.

**Bee Showy.** Flowers should bloom in your garden throughout the growing season. Plant willow, currant, and Oregon grape for spring and aster, rabbit brush and goldenrod for fall flowers.

**Bee Patient.** It takes time for native plants to grow and for pollinators to find your garden, especially if you live far from wild lands.

**Bee Gentle.** Most bees will avoid stinging and use that behavior only in self-defense. Male bees do not sting.

CHEMICAL FREE GARDEN

**Bee Chemical Free.** Pesticides and herbicides kill pollinators.

**Bee Sunny.** Provide areas with sunny, bare soil that's dry and well-drained, preferably with south-facing slopes.

**Bee Homey.** Make small piles of branches to attract butterflies and moths. Provide hollow twigs, rotten logs with wood-boring beetle holes and bunchgrasses and leave stumps, old rodent burrows, and fallen plant material for nesting bees. Leave dead or dying trees for woodpeckers.

**Bee a little messy.** Most of our native bee species (70%) nest underground so avoid using weed cloth or heavy mulch.

**Bee Aware.** Observe pollinators when you walk outside in nature. Notice which flowers attract bumblebees or solitary bees, and which attract butterflies.

**Bee Friendly.** Create pollinator-friendly gardens both at home, at schools and in public parks. Help people learn more about pollinators and native plants.

**Bee Diverse.** Plant a diversity of flowering species with abundant pollen and nectar and specific plants for feeding butterfly and moth caterpillars.