



# Landscaping for Pollinators as a Restoration Practice

Marirose Kuhlman, Missoula County Dept of Ecology & Extension

# OUTLINE

Bee diversity overview

Pollinator/insect declines

Conservation in towns?

Lawns, native plants and  
“keystone species”

Honey bee PSA







Wild bees are the world's most important pollinators



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**NATIVE BEES ARE SUPER DIVERSE**



# How many bee species?

20,000 worldwide

4,000 in North America

600+ in Montana (230+ in Missoula Co.)

Nest preferences (70% ground)

Flower preferences (specialist/generalists)

Social structure (90% solitary!)

*Honey bees are unique (and non-native!)*



**Central-place foragers** – like birds!

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

J. C. Biesmeijer,<sup>1\*</sup> S. P. M. Roberts,<sup>2</sup> M. Reemer,<sup>3</sup> R. Ohlemüller,<sup>4</sup> M. Edwards,<sup>5</sup> T. Peeters,<sup>3</sup> A. P. Schaffers,<sup>7</sup> S. G. Potts,<sup>2</sup> R. Kleukers,<sup>3</sup> C. D. Thomas,<sup>4</sup> J. Settele,<sup>8</sup> W. E. Kunin<sup>1</sup>

# Bee declines driven by combined stress from parasites, pesticides, and lack of flowers

Dave Goulson,\* Elizabeth Nicholls, Cristina Botías, Ellen L. Rotheray

# Patterns of widespread decline in North American bumble bees

Sydney A. Cameron<sup>a,1</sup>, Jeffrey D. Lozier<sup>a</sup>, James P. Strange<sup>b</sup>, Jonathan B. Koch<sup>b,c</sup> and Terry L. Griswold<sup>b</sup>

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*Insect Conservation and Diversity* (2020) 13, 595–605

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# Wild bee declines linked to plant-pollinator network changes and plant species introductions

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RESEARCH ARTICLE | ECOLOGY

OPEN ACCESS



# Recent and future declines of a historically widespread pollinator linked to climate, land cover, and pesticides

William M. Janousek<sup>a,1,2</sup>, Margaret R. Douglas<sup>b</sup>, Syd Cannings<sup>c</sup>, Marion A. Clément<sup>d</sup>, Casey M. Delphia<sup>e</sup>, Jeffrey G. Everett<sup>f</sup>, Richard G. Hatfield<sup>g</sup>, Douglas A. Keinath<sup>d</sup>, Jonathan B. Uhuad Koch<sup>h</sup>, Lindsay M. McCabe<sup>h</sup>, John M. Mola<sup>i</sup>, Jane E. Ogilvie<sup>j</sup>, Imtiaz Rangwala<sup>k</sup>, Leif L. Richardson<sup>l</sup>, Ashley T. Rohde<sup>h</sup>, James P. Strange<sup>l</sup>, Lusha M. Tronstad<sup>m</sup>, and Tabitha A. Graves<sup>a,1</sup>

Edited by Brian D. Inouye, Florida State University, Tallahassee, FL; received July 13, 2022; accepted November 1, 2022 by Editorial Board Member Susan P. Harrison

### Interaction Disruption

Climate change is affecting ranges globally. Here ants are invading and consuming wildlife in cloud forest never before exposed to these marauders.

### Nitrification

Fertilizer and products of fossil fuels combustion are nitrifying the planet, challenging the biotas adapted to low-nutrient conditions.

### Fire

Global warming elevates fire risk. Fires in Australia, Amazonia, and California burned an unprecedented >5 million hectares of forest in 2019.

### Storm Intensity

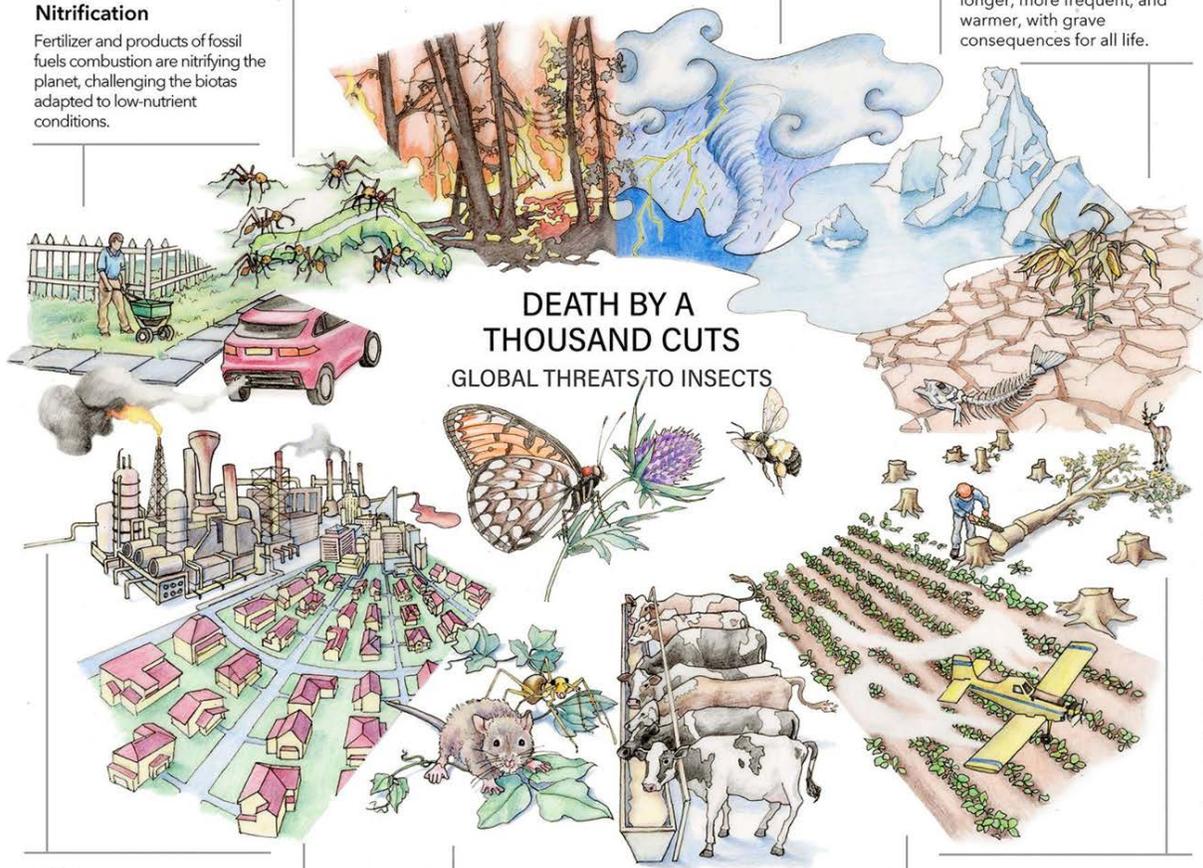
Climate changes bring stronger, more frequent storms and hurricanes; more fire-igniting lightening; and damaging flooding.

### Global Warming

Arctic sea ice is declining precipitously, arctic-alpine and other cold-adapted communities are contracting, while sea-level rise threatens coastal ecosystems.

### Droughts

Periods with diminished precipitation are becoming longer, more frequent, and warmer, with grave consequences for all life.



## DEATH BY A THOUSAND CUTS GLOBAL THREATS TO INSECTS

### Pollution

Chemical, light, and sound pollution of water, air, and soil are impacting plant and animal life worldwide.

### Introduced Species

Global trade is accelerating the movement of pernicious plants, animals, and pathogens to new regions—often with devastating consequences.

### Agricultural Intensification

Industrialized agriculture, with its attendant increases in scale, monoculturalization, nutrient input, and pesticide use, is becoming increasingly nature unfriendly.

### Deforestation

The tropics lost 11.9 million hectares of forest in 2019, mostly to agriculture.

### Insecticides

Modern, industrialized agriculture, with its increasing reliance on chemical insecticides, has led to chronic contamination of wildlands - and impacts to non-target insects.

### Urbanization

Our global population of 7.8 billion, spread planet-wide, comes at great cost to biodiversity and wildlands. Already, over 500 vertebrates have been driven to extinction.



An aerial photograph of a suburban residential area. The image shows a dense grid of houses with dark roofs, interspersed with green lawns and trees. A major highway with multiple lanes runs diagonally through the center of the image. To the right, there is a large, well-maintained golf course with distinct green fairways and brown sand traps. The overall scene depicts a typical suburban landscape with a mix of residential, commercial, and recreational land use.

**Urban and suburban  
land-use types are  
the *fastest growing*  
*ecosystems* in the  
world.**

But *can* support a  
surprising richness and  
abundance of bees!

Tonnietto, et al (2011); Hall, et al (2017).

# Urban areas as restoration sites

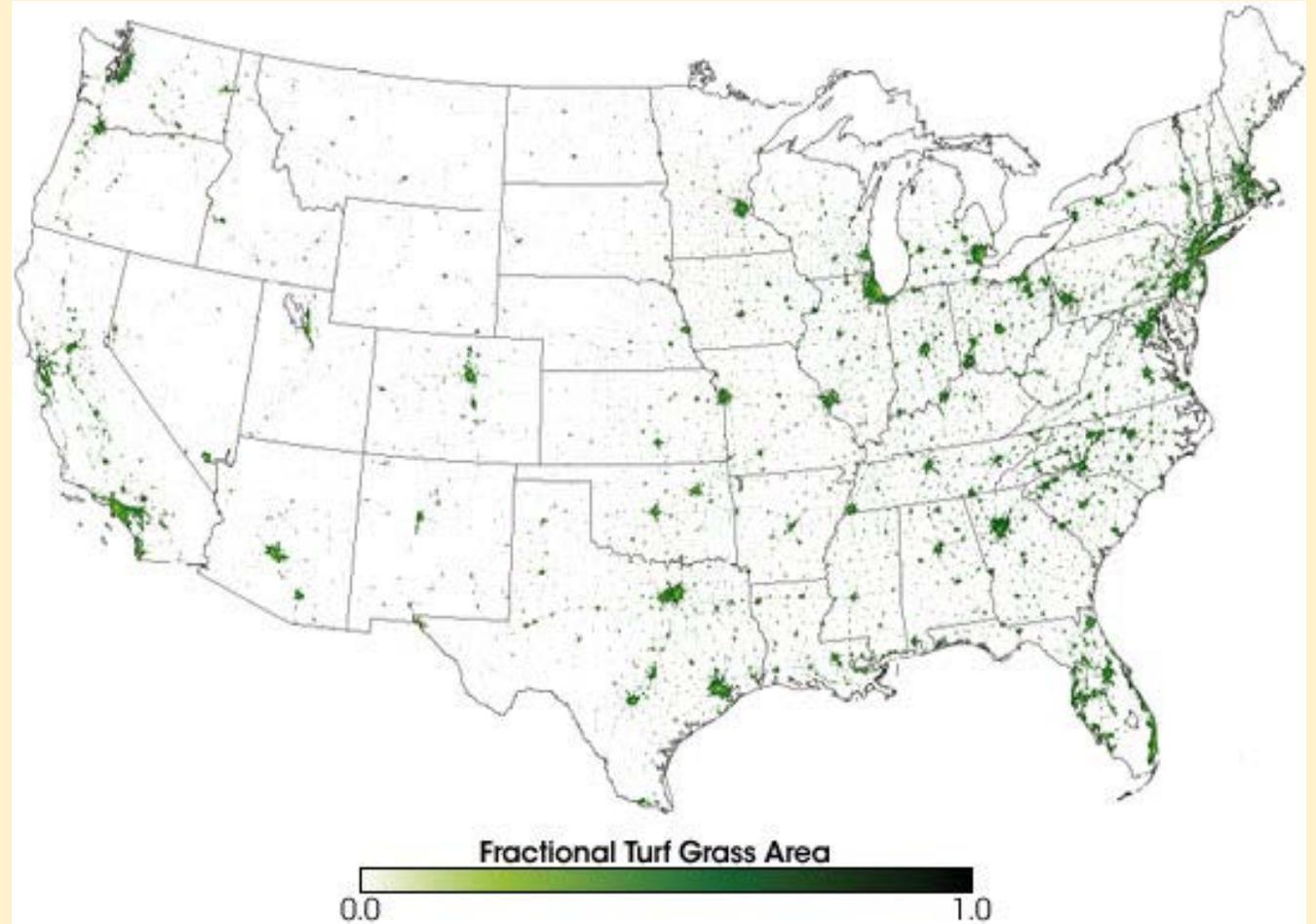
*“Intensifying conservation efforts for urban insect pollinators constitutes an opportunity for meaningful urban conservation.”* Hall, et al (2017).





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3x more acreage of irrigated lawn than corn



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**9 BILLIONS** gals water used *each day*,  
mostly for residential irrigation

- **50%** of that water is lost or wasted



[https://www.ttownmedia.com/tracy\\_press/news/water-restrictions-take-effect/article\\_0d00e220-2746-11e5-8bb8-17972fcb5bbc.html](https://www.ttownmedia.com/tracy_press/news/water-restrictions-take-effect/article_0d00e220-2746-11e5-8bb8-17972fcb5bbc.html)

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**800 million gals fuel burned + 17 million  
gal *spilled* each year**

- **5% of total air pollution in US**



<https://lawnmowerguru.com/wp-content/uploads/2021/07/Can-You-Run-a-Lawn-Mower-Without-A-Gas-Cap.png>

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**125 million lbs pesticides, mostly herbicides**



<https://www.naturalgreenlawnandpest.com/blog/most-common-questions-professional-weed-control-maryland>

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**70 hrs/person/year on lawns**



<https://westseattleblog.com/2020/05/neighborhoods-pitching-in-at-a-park/>



# Missoula County Flowering Lawn Project

- U of MN Extension Bee Lawn Program
- Application process - over 90 applicants in 2022!
- 2 yr commitment
- Flowering Lawn seed for 400 sqft
- Attend 3 workshops
- Provide us with info!

## Outgrow Your Lawn!

We need your help initiating the Flowering  
Lawn Project in Missoula County!



Help us improve urban and suburban habitats by establishing a flowering pollinator lawn that can provide floral resources for bees and other pollinators.

## Unlock your Pollinator Potential

Establishing these lawns will help support a diversity of pollinators by incorporating low-growing perennial flowering plants into existing turfgrass lawns.

Interested in participating?



# Flowering Lawns

Typical turfgrasses mixed with flowers

Low-growing, resilient to foot traffic

Less watering

Less mowing

No additional fertilizer

**NO HERBICIDES OR INSECTICIDES**



Native grassland near Florence, Montana



# ReWild Your Yard!



Missoula County

**DEPARTMENT OF  
ECOLOGY & EXTENSION**

**“Keystone plants”** - *native plants critical to food webs and that are necessary for many species to complete their life cycles.*



# Partnerships with local native plant nurseries

*Fill out the form below to schedule your Design Consultation!*

**native yards**  
missoula montana

Home Services - Projects - Company - Contact Us

Call 406-543-2532 for a FREE Consultation



**Native Planters**

406.880.8809 | POTOMAC, MONTANA

**Blackfoot**  
native plants

Home Plant Care Speaking Consultations Contact About

**Pollinator Friendly Plants**

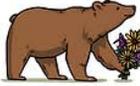
**Insects**



Hera Buckmoth

PLANT COMMUNITIES

- BIRD-FRIENDLY
- DEER RESISTANT
- DROUGHT TOLERANT
- EDIBLE & MEDICINAL
- GRASSES
- POLLINATOR FRIENDLY
- SHRUBS
- WILDFLOWERS

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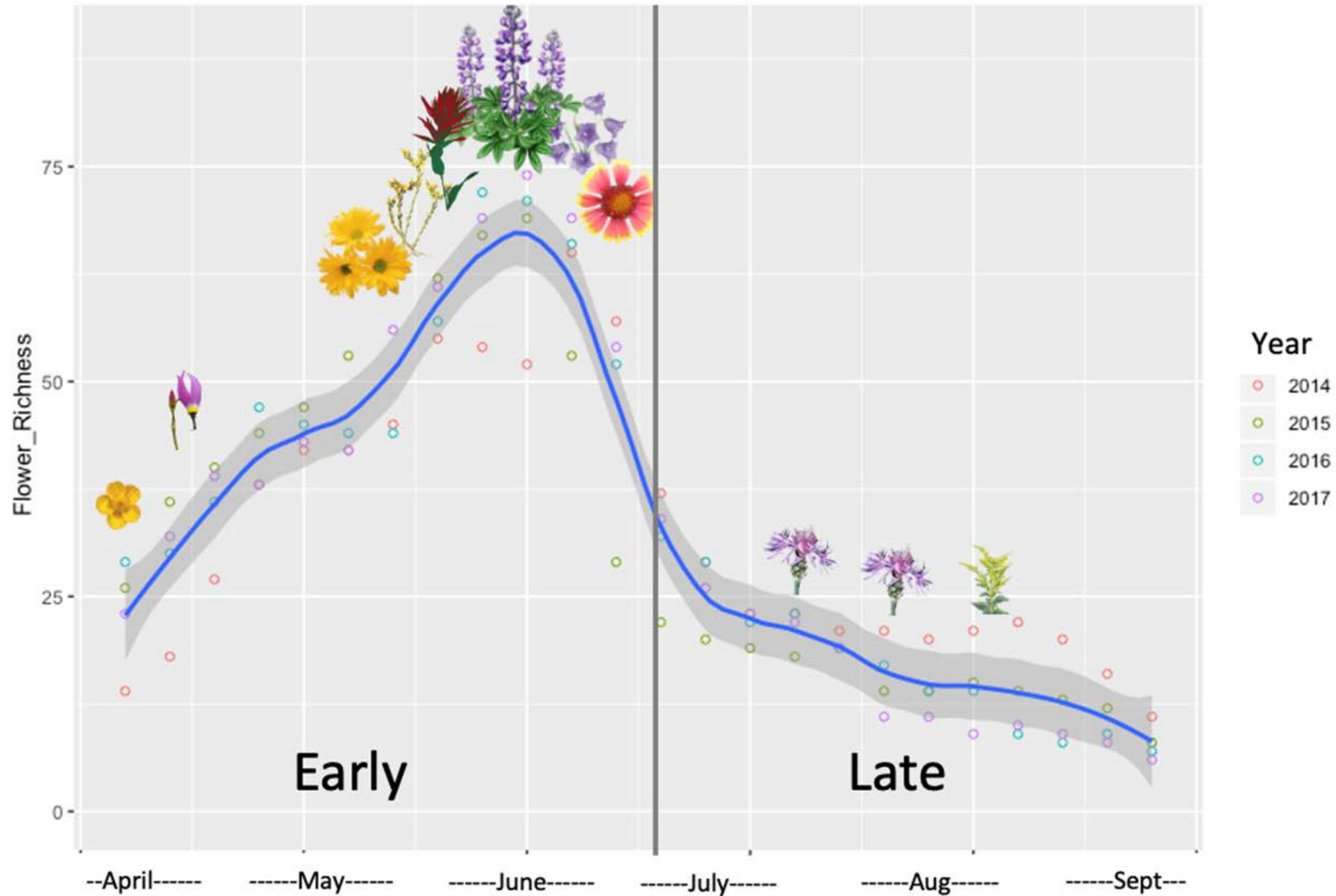
## Purchase Plant Packs and Seed Mixes

 <p><b>Western Montana Native Grass Mix</b></p> <p>Drought tolerant, workhorse grasses native to the Bitterroot Valley &amp; Western MT</p>	 <p><b>Western Montana Meadow Mix</b></p> <p>Iconic, Western MT wildflowers &amp; grasses that support wildlife.</p>	 <p><b>HOT POCKET small</b> Plants for full sun</p>	 <p><b>HOT POCKET large</b> Plants for full sun</p>
<p><b>Western MT Native Grass Mix (seed)</b></p> <p>\$18.00 \$18.00 / 1lb</p>	<p><b>Western Montana Meadow Mix (seed)</b></p> <p>\$50.00 \$50.00 / 1lb</p>	<p><b>Hot Pocket (small) - Plants for Full Sun</b></p> <p>\$60.00</p>	<p><b>Hot Pocket (large) - Plants for full sun</b></p> <p>\$115.00</p>
 <p><b>BUTTERFLY SNACKS small</b> Plants to attract butterflies</p>	 <p><b>BUTTERFLY SNACKS large</b> Plants to attract butterflies</p>	 <p><b>SHADY PLANTS FOR COOL PEOPLE small</b> Plants for partial shade</p>	 <p><b>SHADY PLANT FOR COOL PEOPLE large</b> Plants for partial shade</p>
<p><b>Snacks (small) - to Attract butterflies</b></p> <p>\$60.00</p>	<p><b>Butterfly Snacks (large) - Plants to Attract Butterflies</b></p> <p>\$115.00</p>	<p><b>Shady Plants for Cool People (small) - Plants for Partial Shade</b></p> <p>\$60.00</p>	<p><b>Shady Plants for Cool People (large) - Plants for Partial Shade</b></p> <p>\$115.00</p>

Urban landscapes can support a wide diversity of pollinators!



# Flowering Richness at MPG Ranch, April - September



Bloom periods of native plants match  
with flight periods of native bees



# Bee City USA & Bee Campus USA

Connecting Communities and Pollinators

<https://beecityusa.org/>





# \*LIVESTOCK\*



Western honeybee (*Apis mellifera*) **NON-NATIVE DOMESTICATED ANIMAL**

# Environments where honeybees are necessary: large-scale agricultural areas







Keeping honeybees to “help the pollinators” is like  
keeping chickens to “help the birds”



# Resources for pollinator-friendly lawns and yards

## Bee Lawns and alternative turfgrasses

- Missoula County Weed District “Flowering Lawn Project”
- University of Minnesota Extension “Flowering Bee Lawns”
- MT Native Plant Society “Water-wise grasses”

## Info about native bees and other pollinators

- Xerces Society for Invertebrate Conservation
- Pollinator Partnership

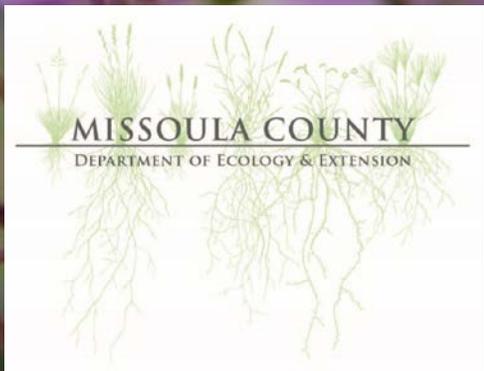
## Info about native plants for Montana landscaping

- Montana Native Plant Society website
- Xerces Society website
- Great Bear Native Plants, Mount Jumbo Nursery

## Info about making bee hotels

- Xerces Society website

Questions?



# 70% of bee species nest in the ground





NATIVE BEES HAVE  
DIFFERENT NESTING  
REQUIREMENTS

90% of North American bee species are **solitary** nesters



Arizona Carpenter bee (*Xylocopa californica arizonensis*)



Nesting – solitary, cavity-nesting

# Solitary Bee Life Cycle

Female bee lays  
egg on pollen and  
nectar ball

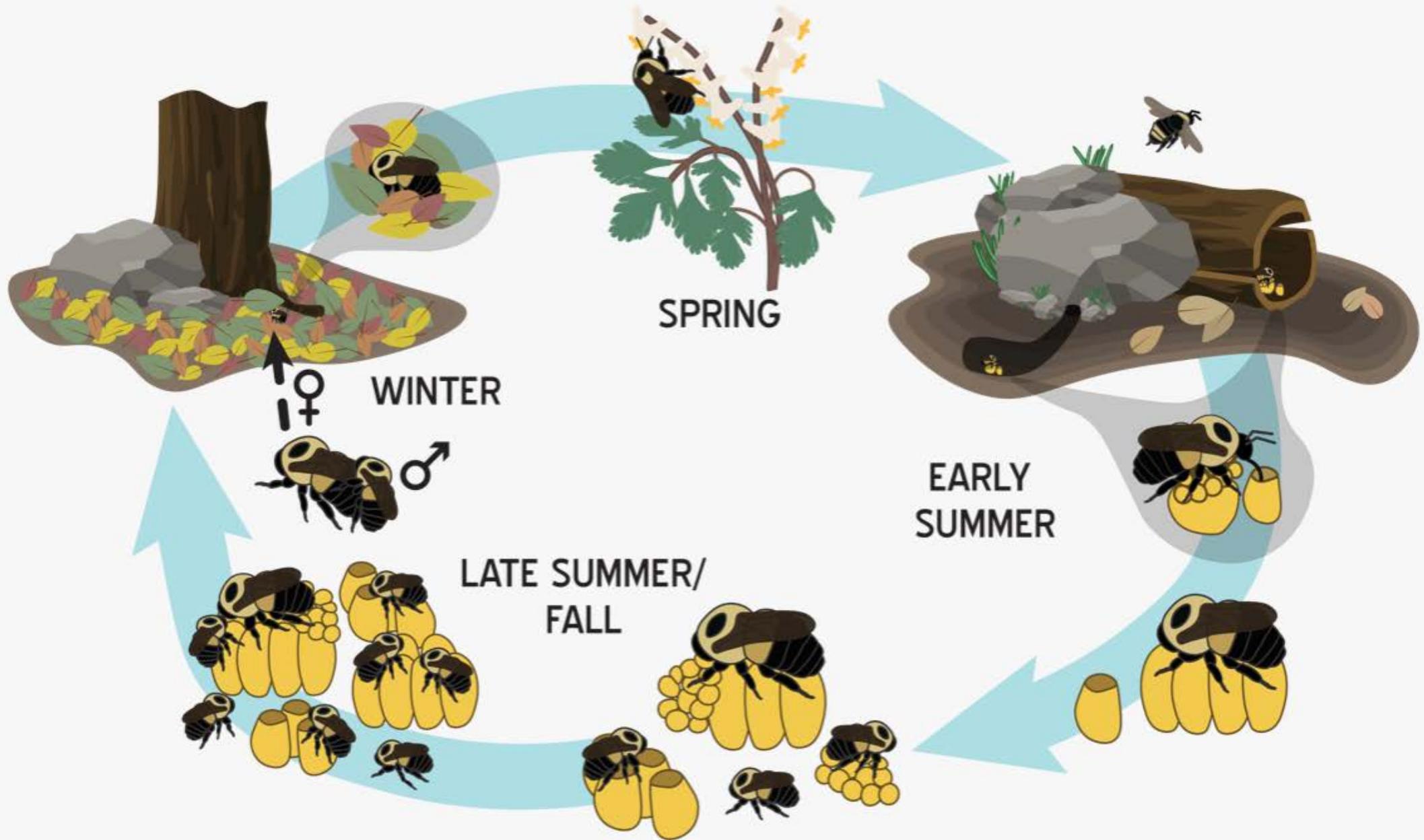
Larva feeds  
on pollen and  
nectar ball

Larva develops  
into a pupa

The pupa emerges  
as an adult the  
next season



# Bumble Bee Colony Life Cycle





[https://www.reddit.com/r/Beekeeping/comments/8v0mi9/bumble\\_bee\\_nest\\_for\\_those\\_who\\_have\\_not\\_seen\\_a/](https://www.reddit.com/r/Beekeeping/comments/8v0mi9/bumble_bee_nest_for_those_who_have_not_seen_a/)



# What about Dandelions?

*Fine, but encourage other plants*

