

# Minnesota bees: who they are and what they need

Presented by Elaine Evans  
PhD Candidate  
Department of Entomology at the U of MN

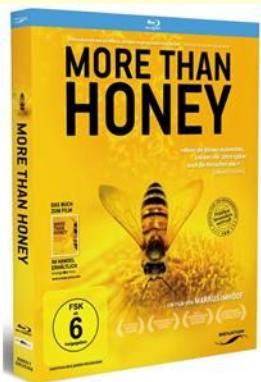
Photo: Karl Foord

## What are bees?

Bees are a specialized lineage of wasps that switched to using pollen and nectar as larval food, rather than insect prey.



## What bees do we have in MN?



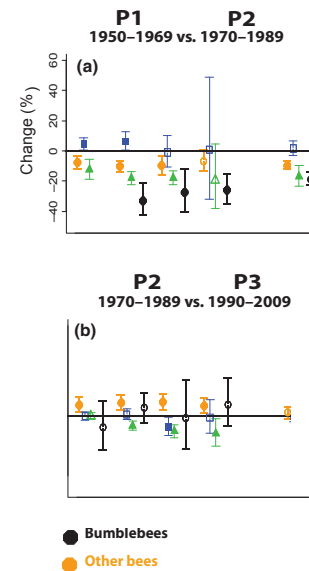
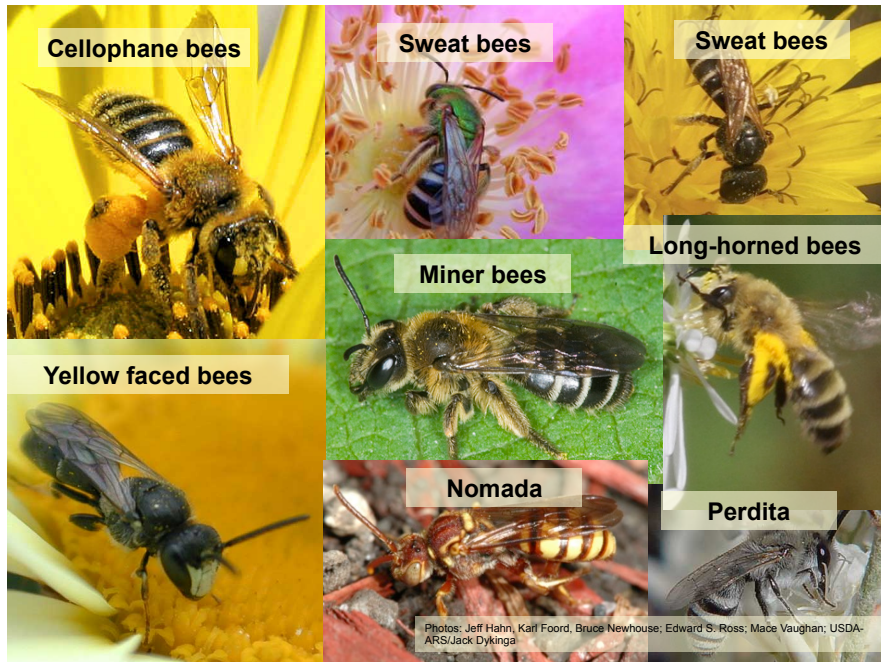
### BEES

- 1 species of honey bee
  - imported and managed
- 6 different families
- ~43 different genera
- ~350 to 400 bee species
  - several non-native or managed,
  - mostly native and wild

**Diverse bee species provide diverse pollination services that support diverse wildlife habitat.**



Photos: James Cane; Robert Parks; Edward S. Ross



## Bee Decline

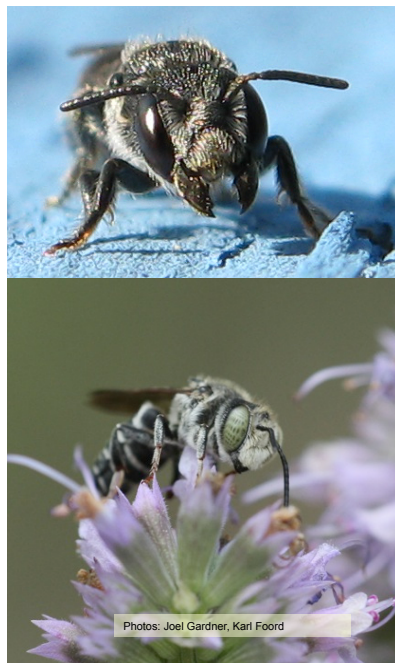
Bee species richness compared pre-1980 vs. post-1980

- 52% decline in Britain
- 67% decline in the Netherlands

Biesmeijer et al, *Science*, 2006

Bee species richness increased or declined slowed for pre-1990 vs. post-1990, possibly due to Agri-environmental schemes

Carvalho et al, *Ecology Letters*, 2013



## Bee Decline

Compared 1890's vs. 2010 bee species collections from Illinois  
- 50% decline in bee species

Burkle et al, *Science*, 2013

Compared 1937-1938 vs. 2011-2013 leafcutter bees from Itasca State Park

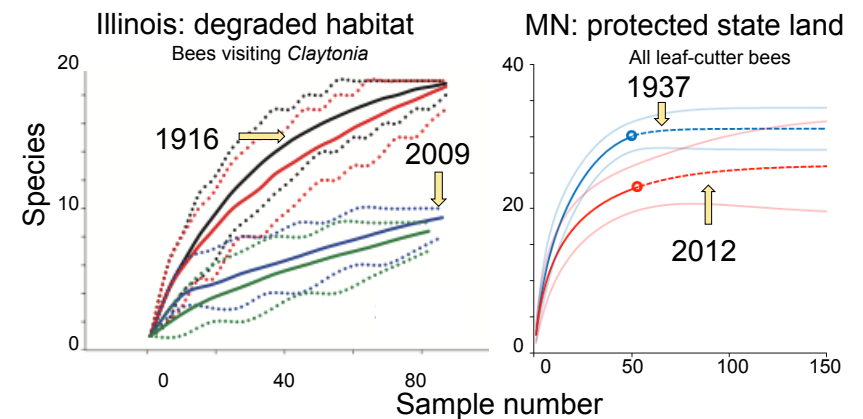
- 11 species not rediscovered
- 3 species not previously collected

Research supported by MN DNR

Gardner, MS thesis, 2013

## Bee Decline: North America

Species preservation in Itasca State Park possibly due to preservation of bee habitat in protected areas





## Bee Decline: MN bumble bees



*Bombus affinis*, *B. terricola*  
Major sudden range declines  
★ Decline linked to disease spread from commercial bumble bees, habitat loss

*Bombus ashtoni*  
Nest parasite of *B. affinis*, *B. terricola*  
Last seen in 2003.  
★ Decline linked to loss of host

Several other *Bombus* declining in other parts of North America, possibly MN



## MN Bumble Bee Survey since 2007

- Survey sites at 7 Twin Cities parks
- Over 2,000 bees recorded
- *Bombus affinis* found at two sites
- Declines seen in several other species



## Current MN bee conservation measures



- DNR has strong interest in addressing concerns about status and conservation of MN bees.
- Thorough knowledge of MN bee diversity currently lacking
- DNR working with U of MN to identify potential bee species for list of Species in Greatest Conservation Need in Minnesota

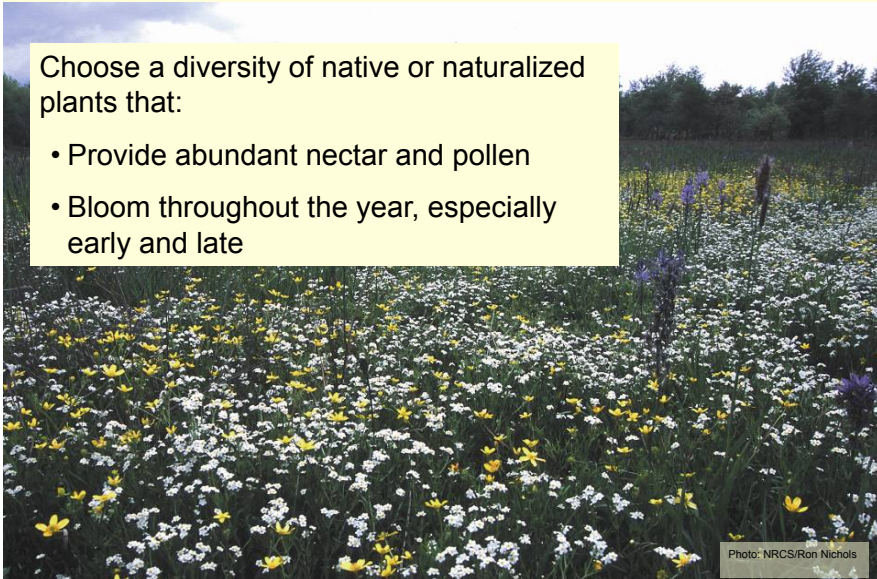
## What we can do?

1. Food
2. Nesting habitat
3. Don't kill them (pesticides)

## What we can do: Food

Choose a diversity of native or naturalized plants that:

- Provide abundant nectar and pollen
- Bloom throughout the year, especially early and late



## What we can do: Food Special considerations for wild bees



Foraging range  
-smaller bees, shorter distance  
vary from  $\sim\frac{1}{4}$  to 2 miles

Diet breadth  
-specialists versus generalists  
i.e. *Dufourea monardae* only  
collect pollen from *Monarda* sp.  
flowers

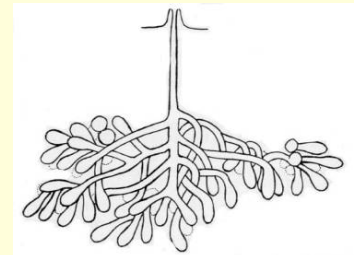
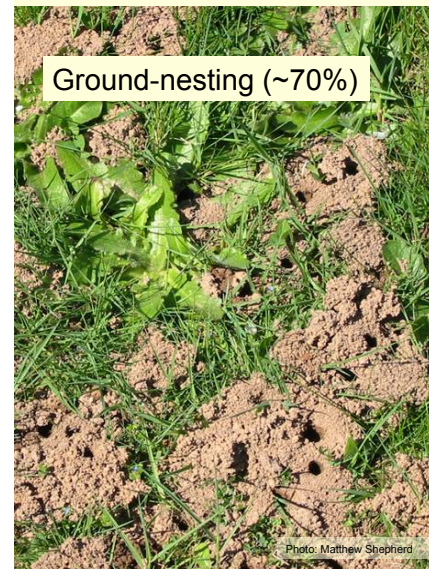
**DNR: Minnesota Prairie  
Conservation Plan**

## What we can do: Nesting habitat

Where do bees live?



## What we can do: Nesting habitat



Source: Stephen, Bohart, and Torchio, 1967



## What we can do: Nesting habitat

Retain or create bare soil

- Keep areas of bare ground
- Plant native bunch grasses
- Clear away some plants from well drained slopes
- Piles of soil



Photos: Matthew Shepherd

## What we can do: Nesting habitat

Tunnel-nesting (~30%)

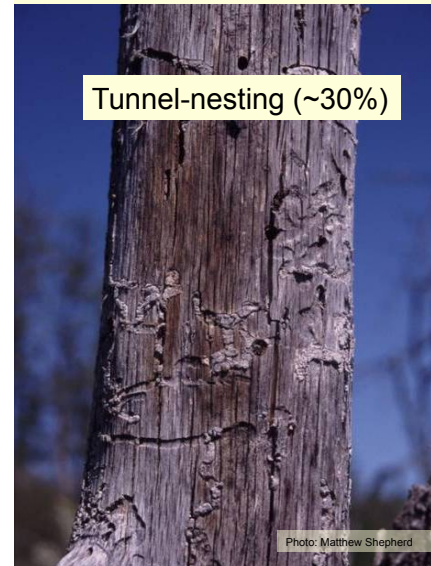
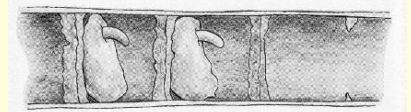


Photo: Matthew Shepherd



© Edward Ross



Source: Stephen, Bohart, and Torchio, 1967

## What we can do: Nesting habitat

Retain or create tunnels

- Protect snags wherever possible
- Provide artificial nests



Wood block nest



Stem bundle nest



Foam block nest

Photos: Mace Vaughan, Katharina Ullman

## What we can do: Nesting habitat

Switch nests out every 2 years to reduce pests and parasites.



Photos: Jeff Adams, Matthew Shepherd, Mace Vaughan



## What we can do: Nesting habitat

### Bumble bees

- old rodent holes or above ground in clumps of brush or grass
- undisturbed land
- brush, grass, rodent holes
- boxes with nesting material
- some species can be raised by people

## Key habitat elements for MN wild bees

### For all bees

- Abundant and diverse flowers from spring to fall
- Honey bees need large tracts of nectar rich flowers whereas wild bees better at using sparser resources

### For ground nesting bees

- Access to bare, undisturbed ground

### For tunnel nesting bees

- Access to stems and dead wood

### For bumble bees

- Access to undisturbed ground, rodent holes, vegetation

## Future directions and needs LCCMR proposed projects

- Coordination of pollinator habitat initiatives
  - UMN, DNR, MDA, NRCS, BWSR
- Statewide survey of MN bees
  - DNR survey wild bees in prairie and grassland habitats throughout MN
- Identifying landscape needs of wild bees
  - Research in prairie pothole region in ND
  - Identifying landscape elements that support bee diversity and abundance
  - UMN and USGS compiling pollen library