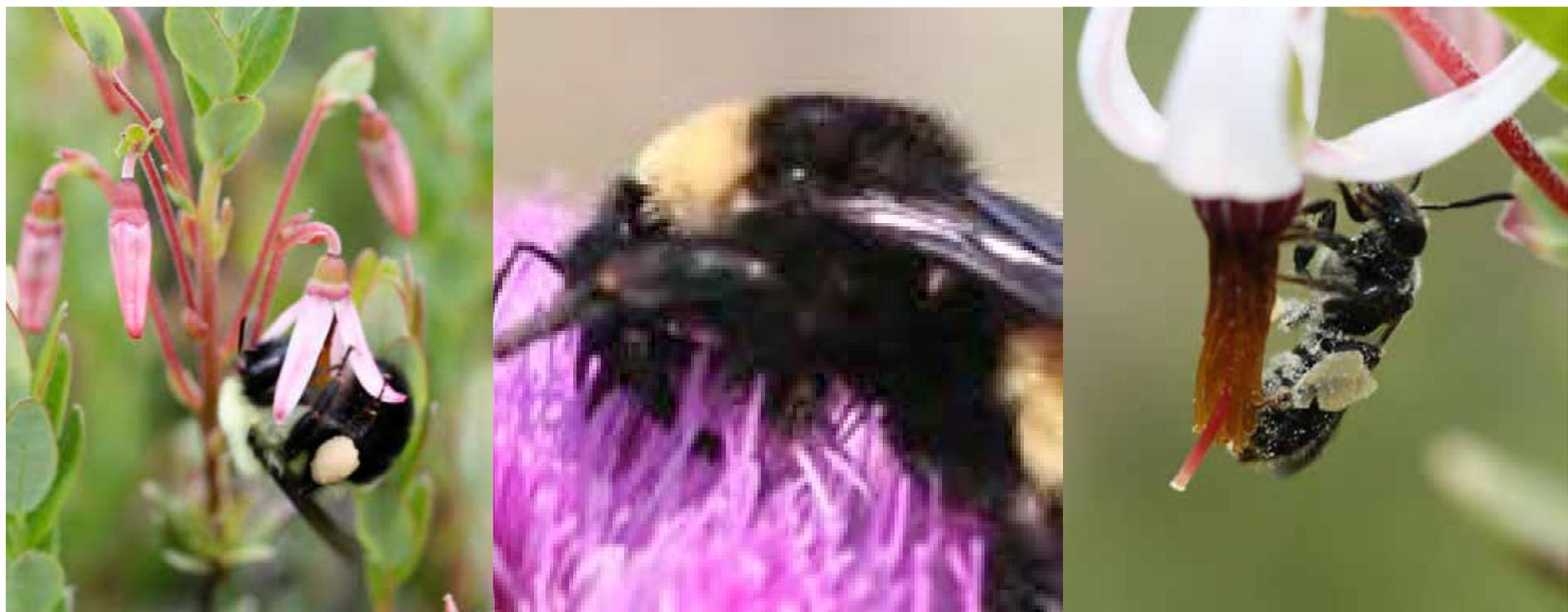


Importance and Concerns of Roadsides for Pollinators



Dan Cariveau- dcarivea@umn.edu

University of Minnesota– Department of Entomology





MN: \$16,000,000

ND: \$83,000,000

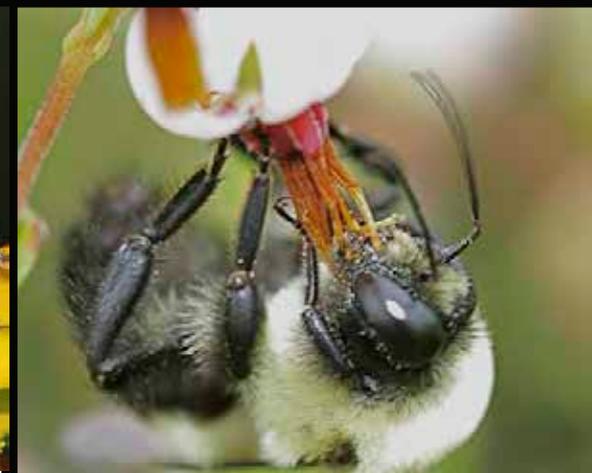




Over 20,000 species globally



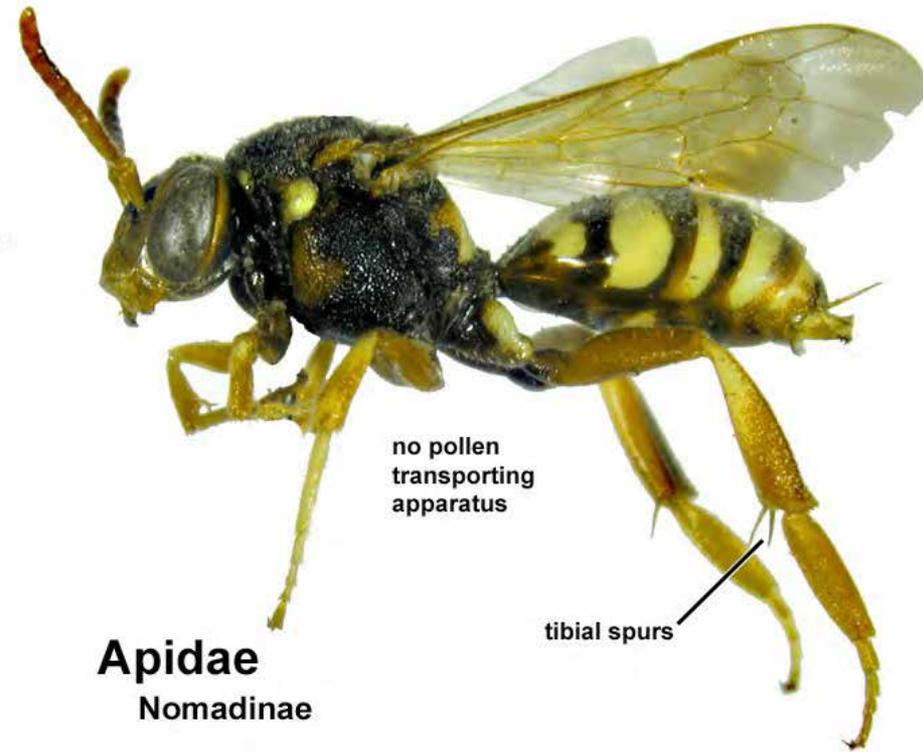
How many in Minnesota?



Solitary to Social



Parasitic Bees



(Almost all) Bees have nests





O: AD BROUWERS

Native Bee Hotel





S. Cameron



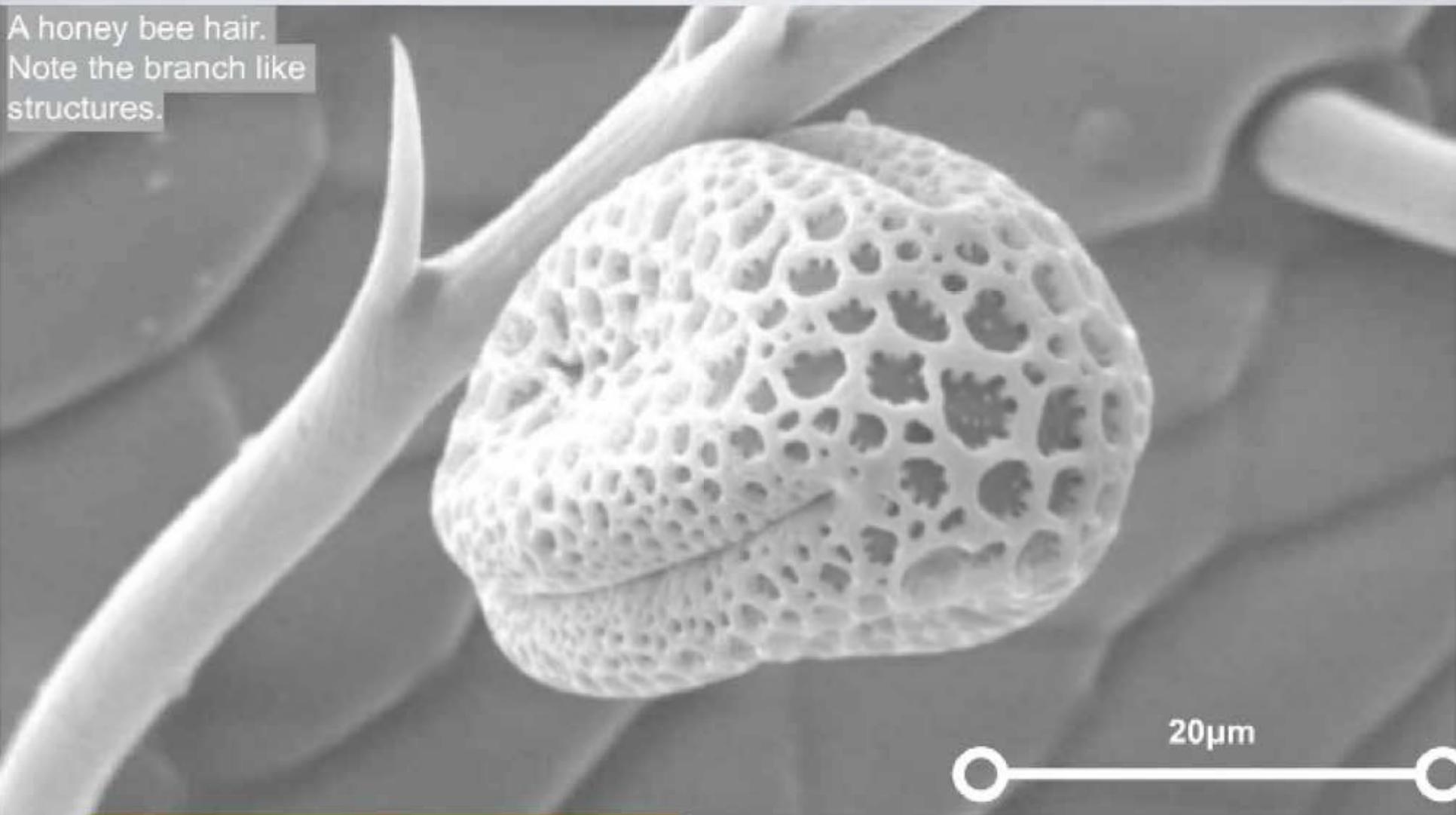


All Bees Rely on Floral Resources





A honey bee hair.
Note the branch like
structures.



20µm



~ 87% of all flowering plants



Ollerton et al. 2011
Oikos





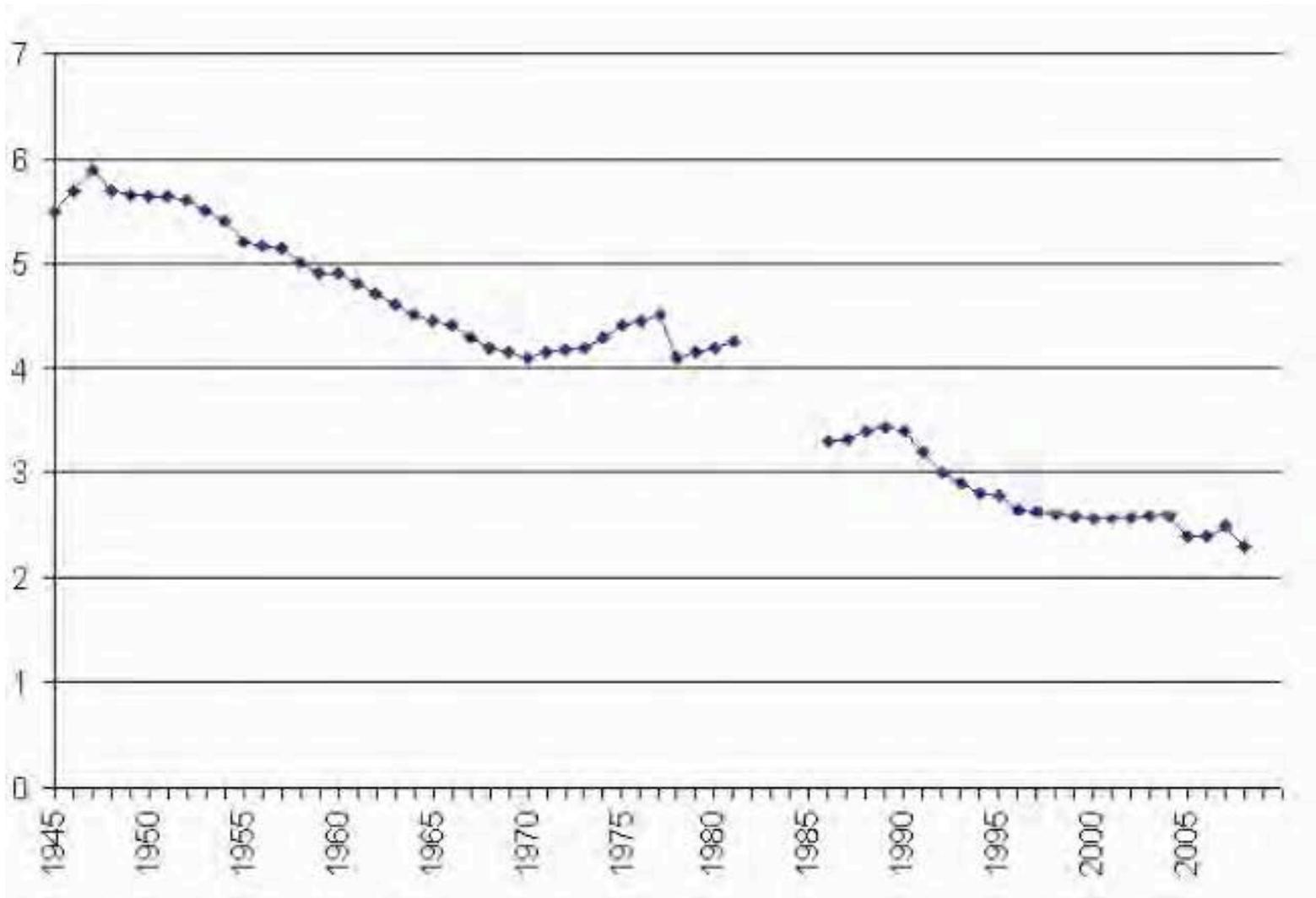
Your produce choices
with bees



Your produce choices
without bees

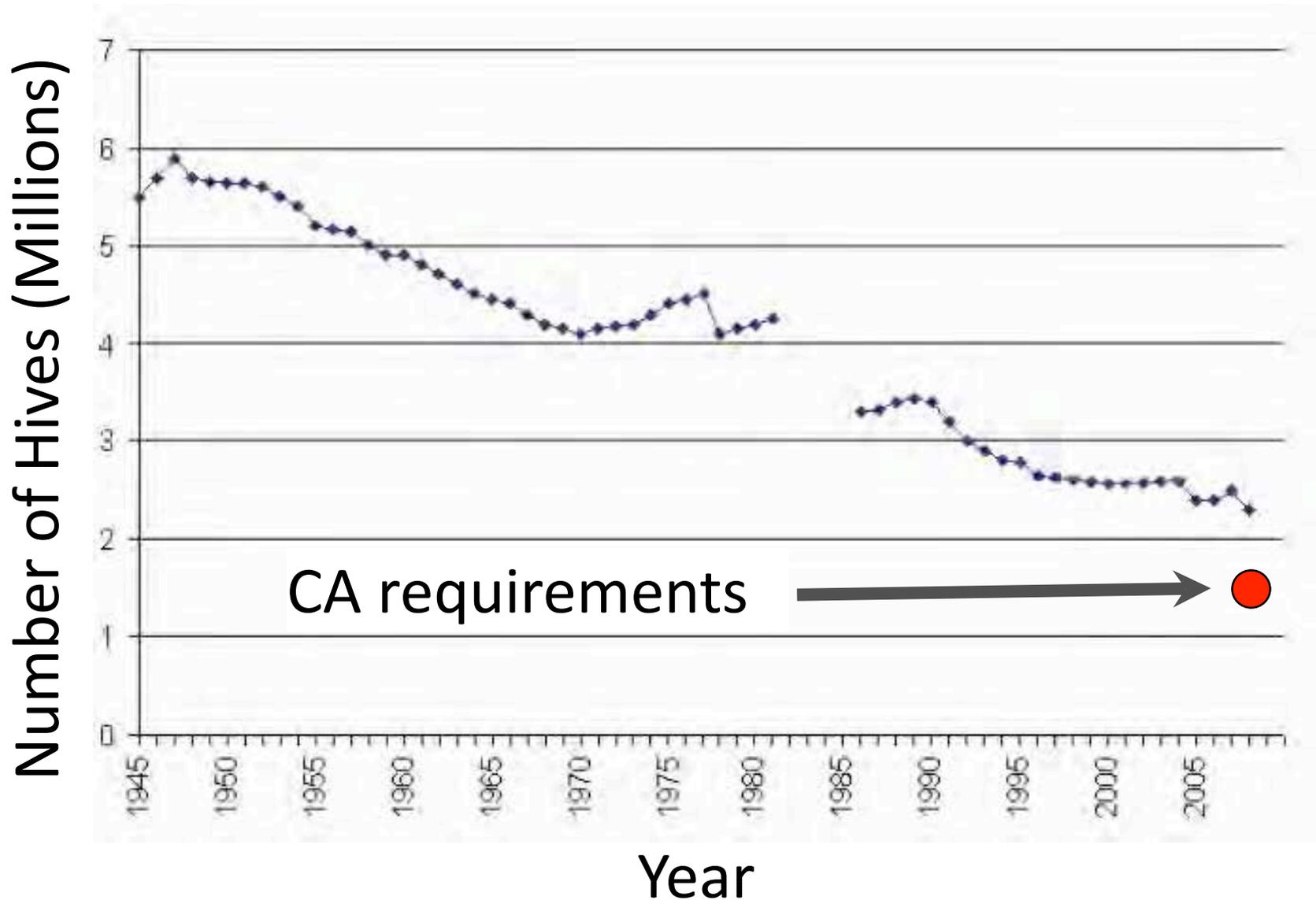
Honey bee decline in the US 1945-2008

Number of Hives (Millions)



Year

Honey bee decline in the US 1945-2008



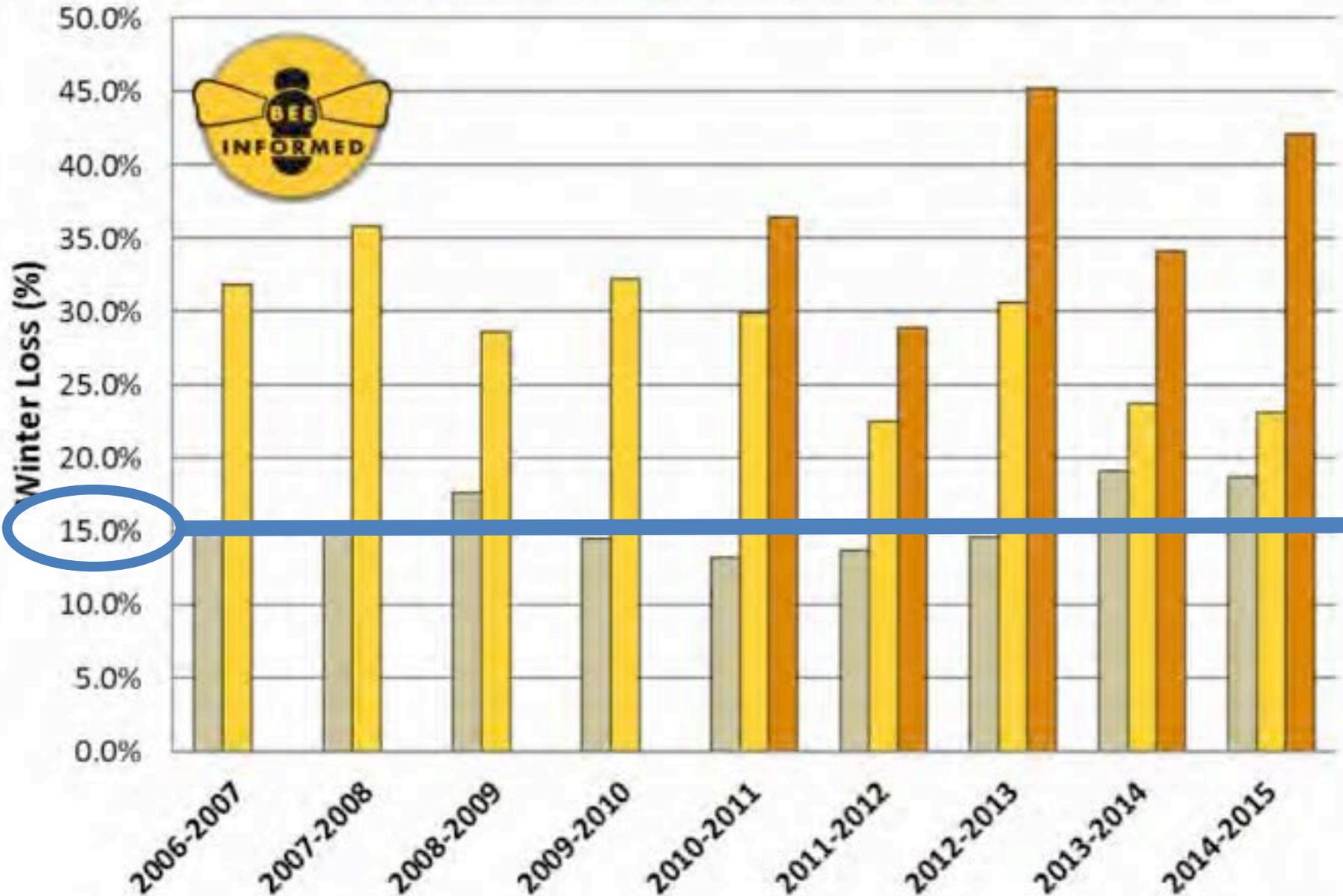
Total US managed honey bee colonies Loss Estimates

Acceptable level Total Winter Loss Total Annual Loss



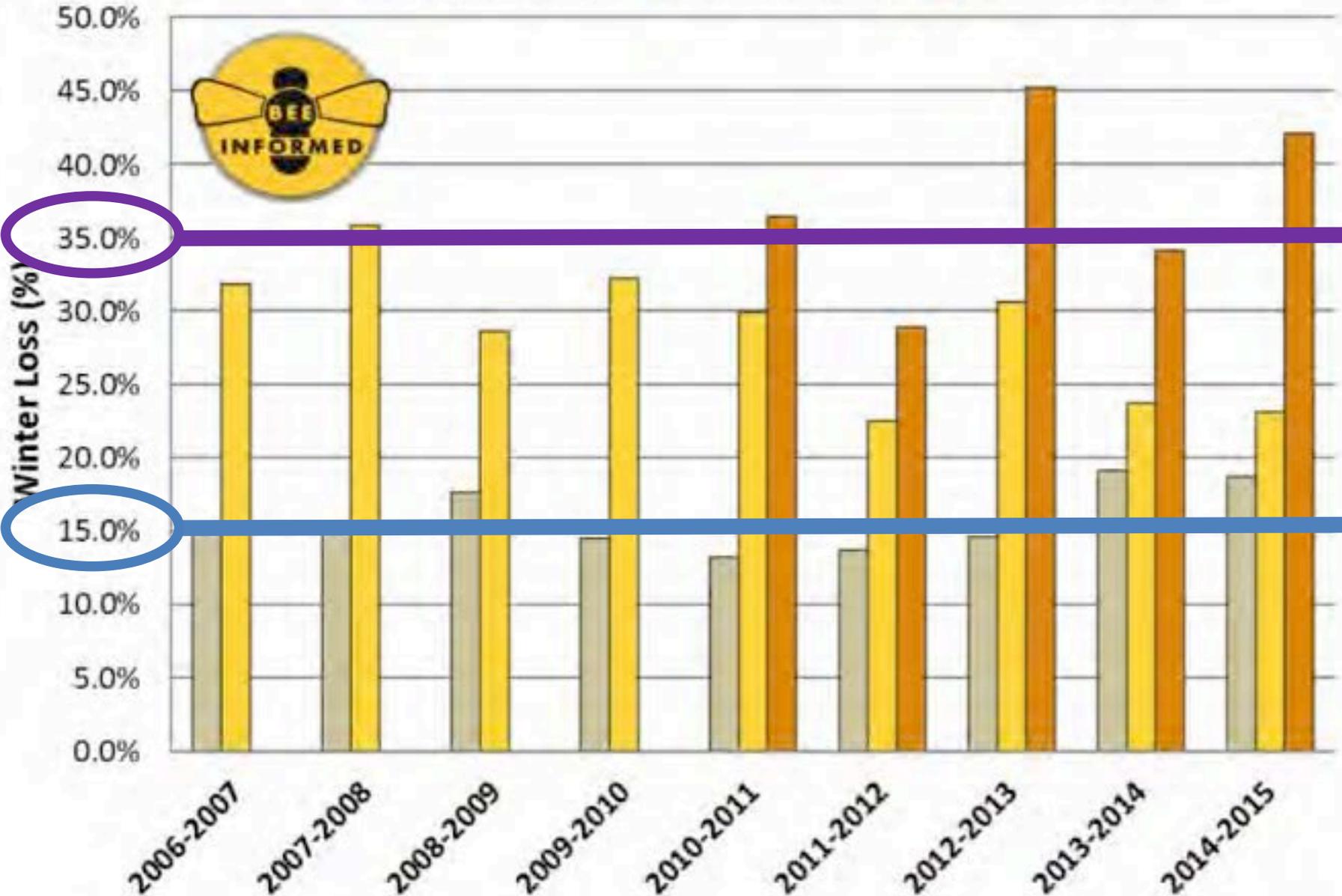
Total US managed honey bee colonies Loss Estimates

Acceptable level Total Winter Loss Total Annual Loss



Total US managed honey bee colonies Loss Estimates

Acceptable level Total Winter Loss Total Annual Loss



What about wild bees?



Common eastern bumble bee

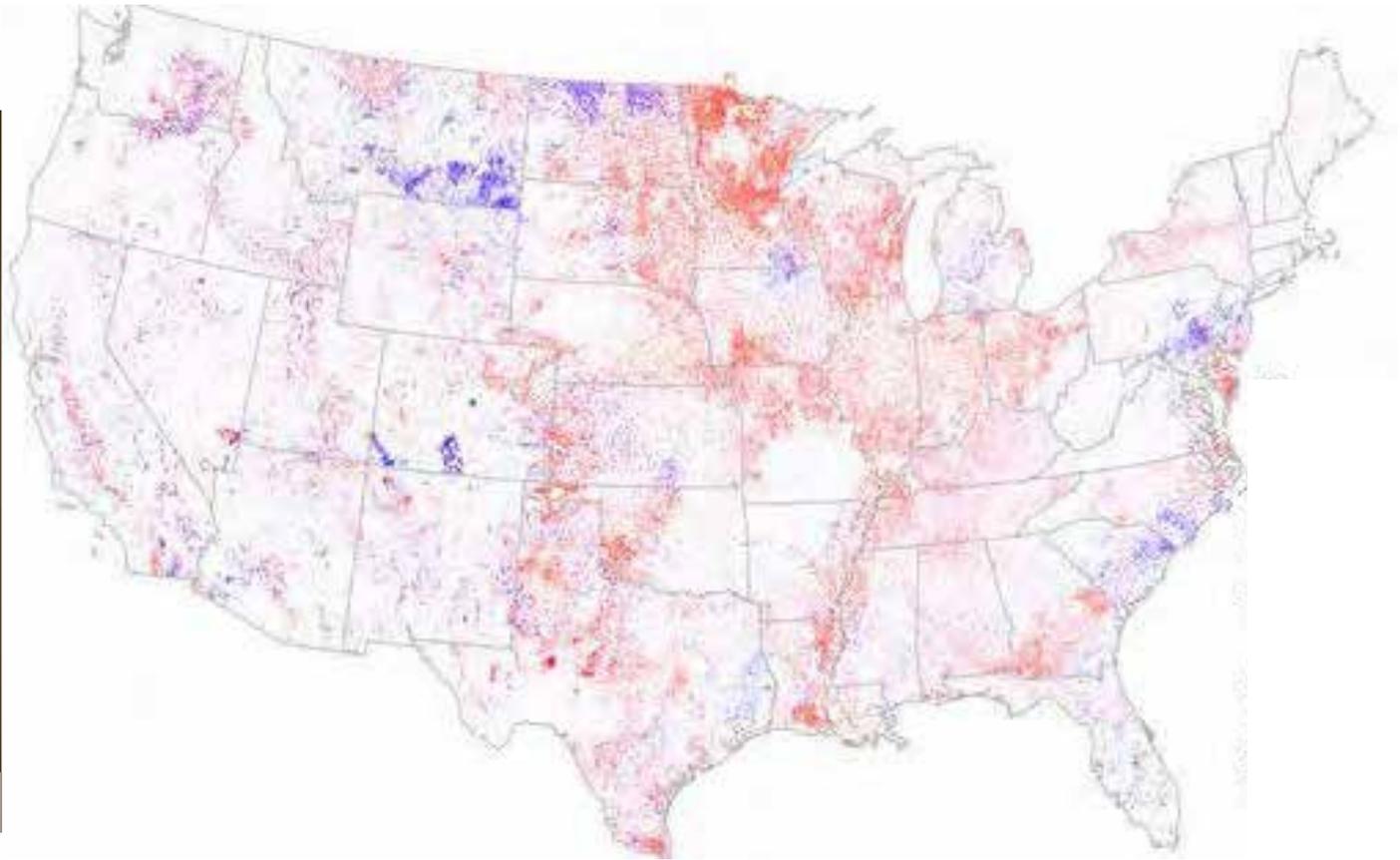


Rusty patched bumble bee

What about wild bees?



Heather Holm



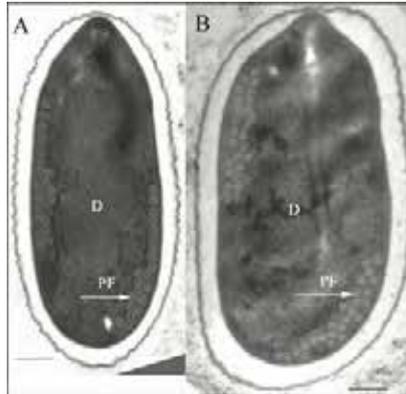
Stressors: Disease and Parasites



Stressors: Disease

Rusty-patched bumble bee

e.g. *Nosema bombi*



Johanna James-Heinz

Stressors: Pesticides



Stressors: Pesticides

- Neonicotinoids: Negative effects on reproduction, behavior, and homing ability
- Some evidence that wild bees are more affected

Stressors: Pesticides

- Other pesticides could be problematic
 - E.g. Pyrethroids/organophosphates for soy bean aphid



Stressors: Habitat Loss

Stressors: Habitat Loss

- Loss of Conservation Reserve Program



Stressors: Habitat Loss

- Fewer weedy plants in agricultural areas



One solution: Pollinator Habitat



One solution: Pollinator Habitat

- Nest sites are critical for wild bees



One solution: Pollinator Habitat

- Pollinator habitat may ameliorate negative effects of other stressors



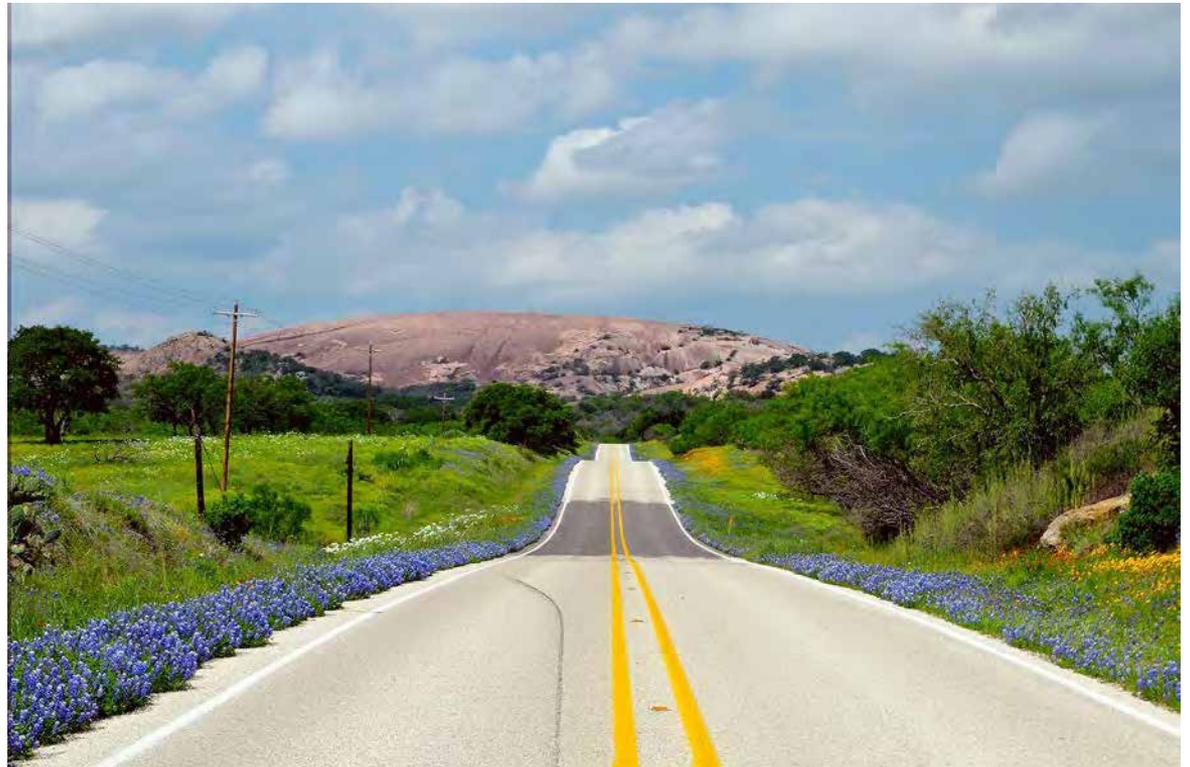
Roadsides and Pollinator Habitat



Roadsides and Pollinator Habitat

~40% of Iowa's butterfly species along roads

In Kansas, wild bee diversity similar in roadside and prairie



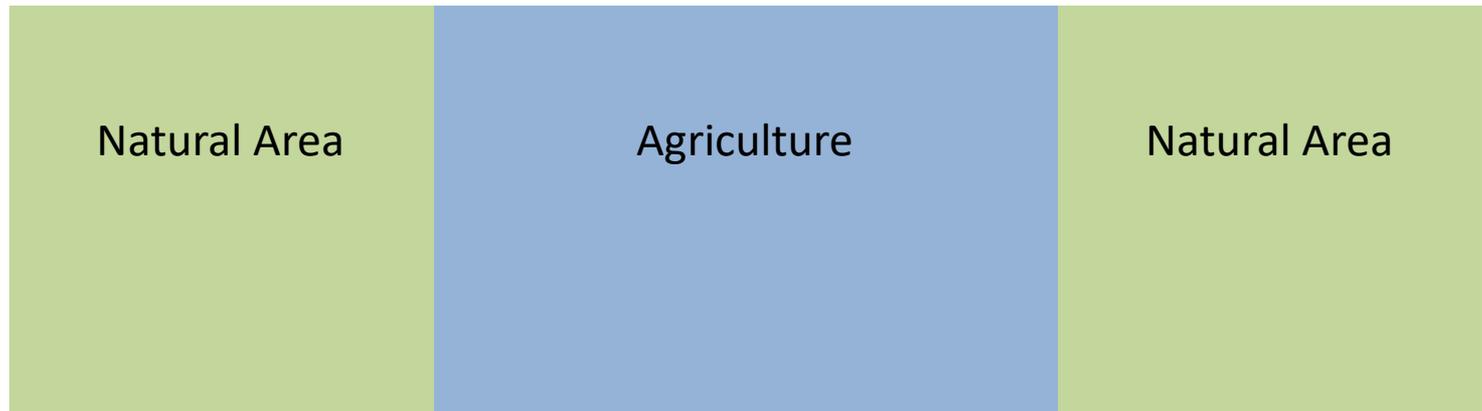
Roadsides and Pollinator Habitat

Roads may provide linkages across habitats



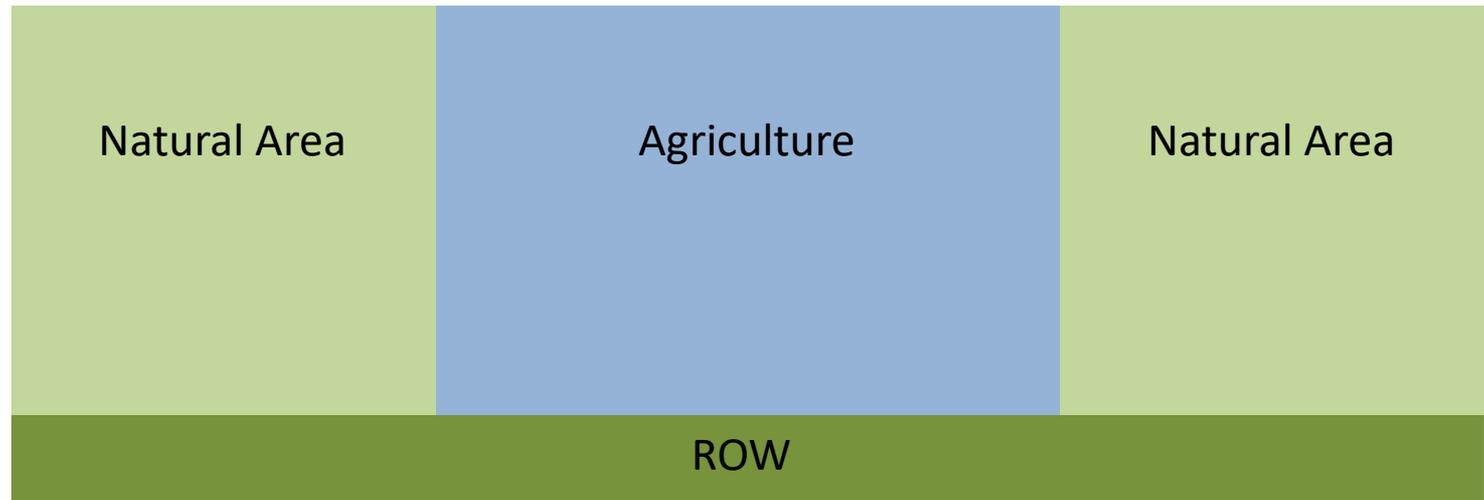
Roadsides and Pollinator Habitat

Roads may provide linkages across habitats



Roadsides and Pollinator Habitat

Roads may provide linkages across habitats



Roadsides and Pollinator Habitat

May allow us to increase habitat for wild bees and honey bees





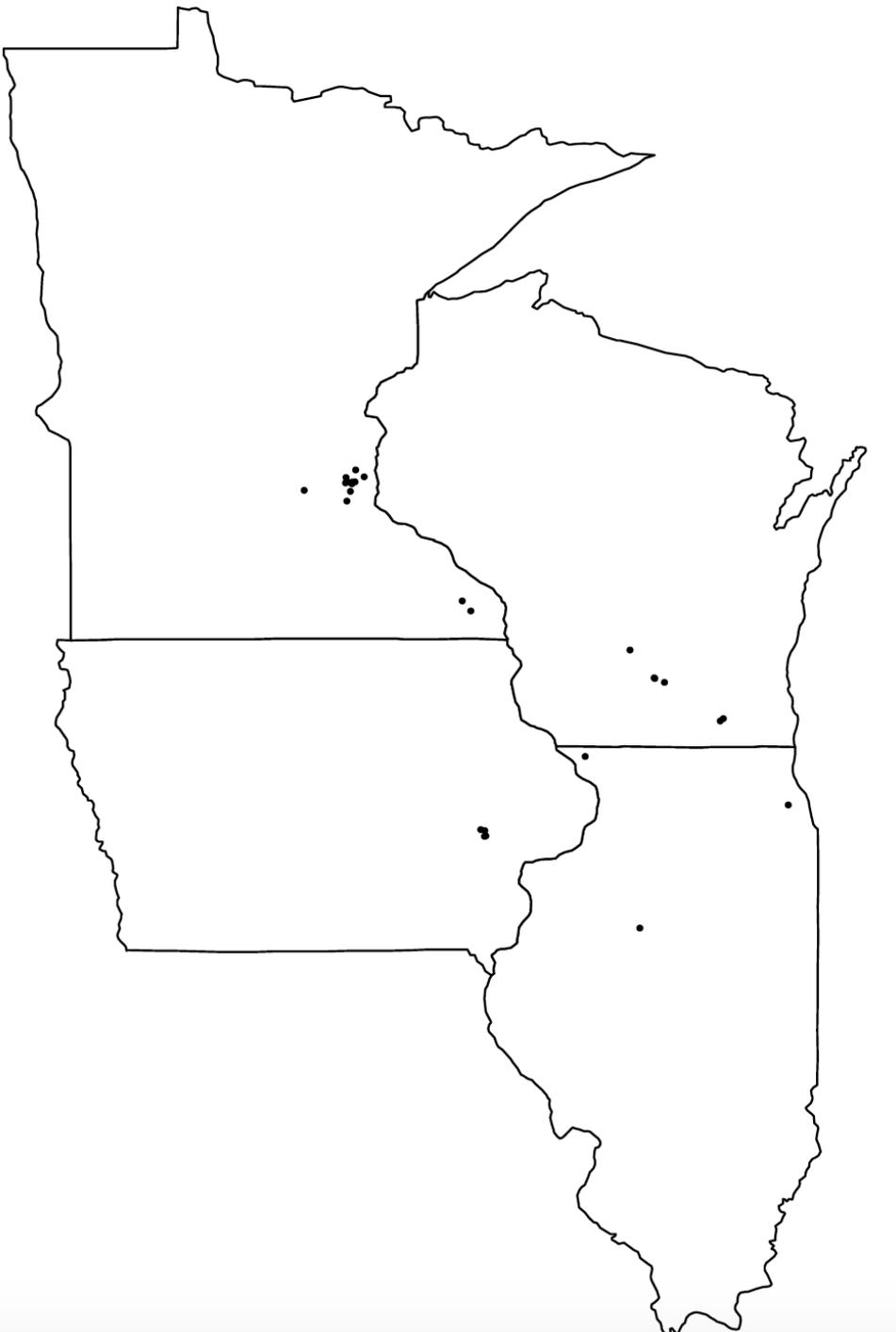
26 sightings (2016)

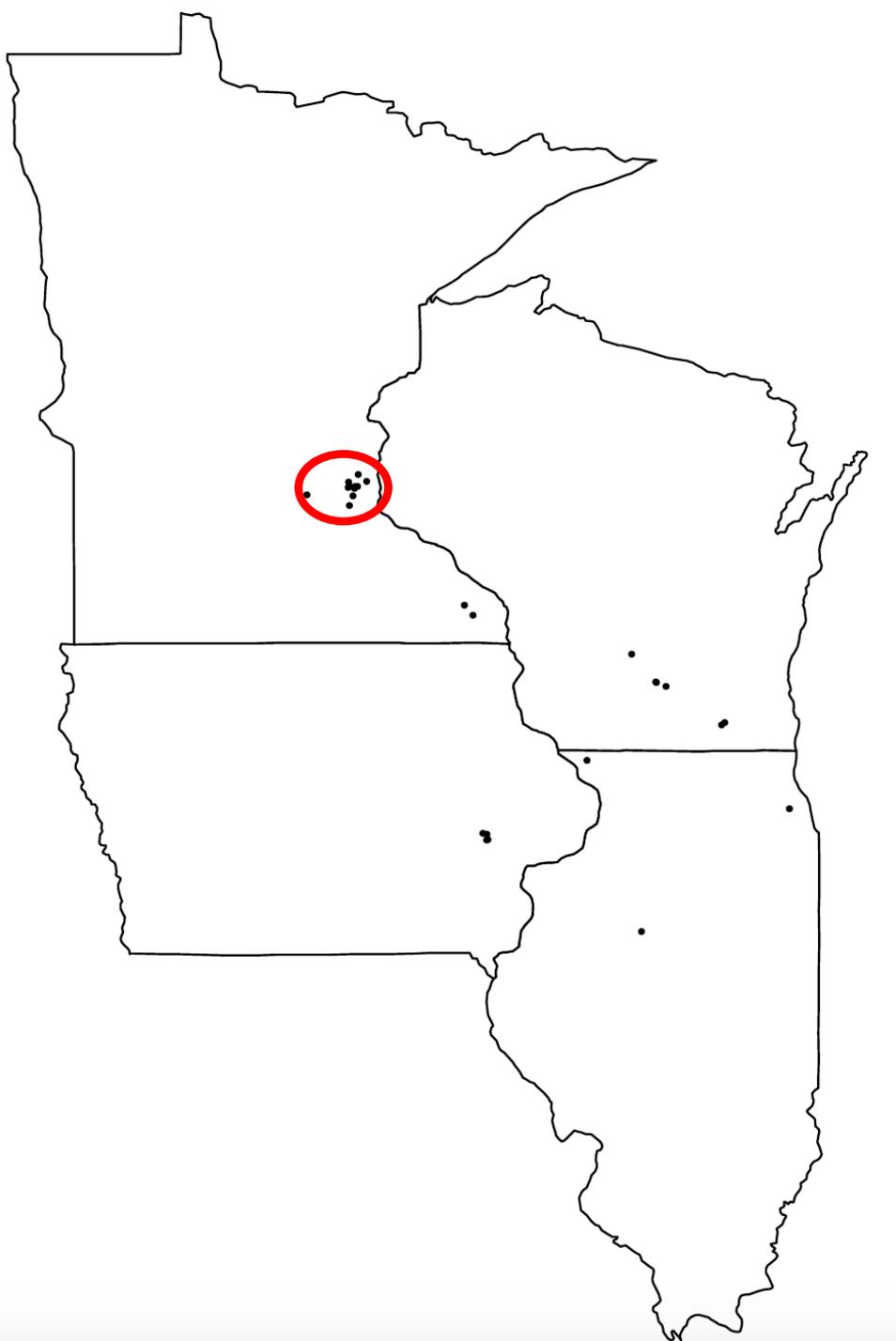
Minnesota 13

Wisconsin: 6

Iowa: 4

Illinois: 3





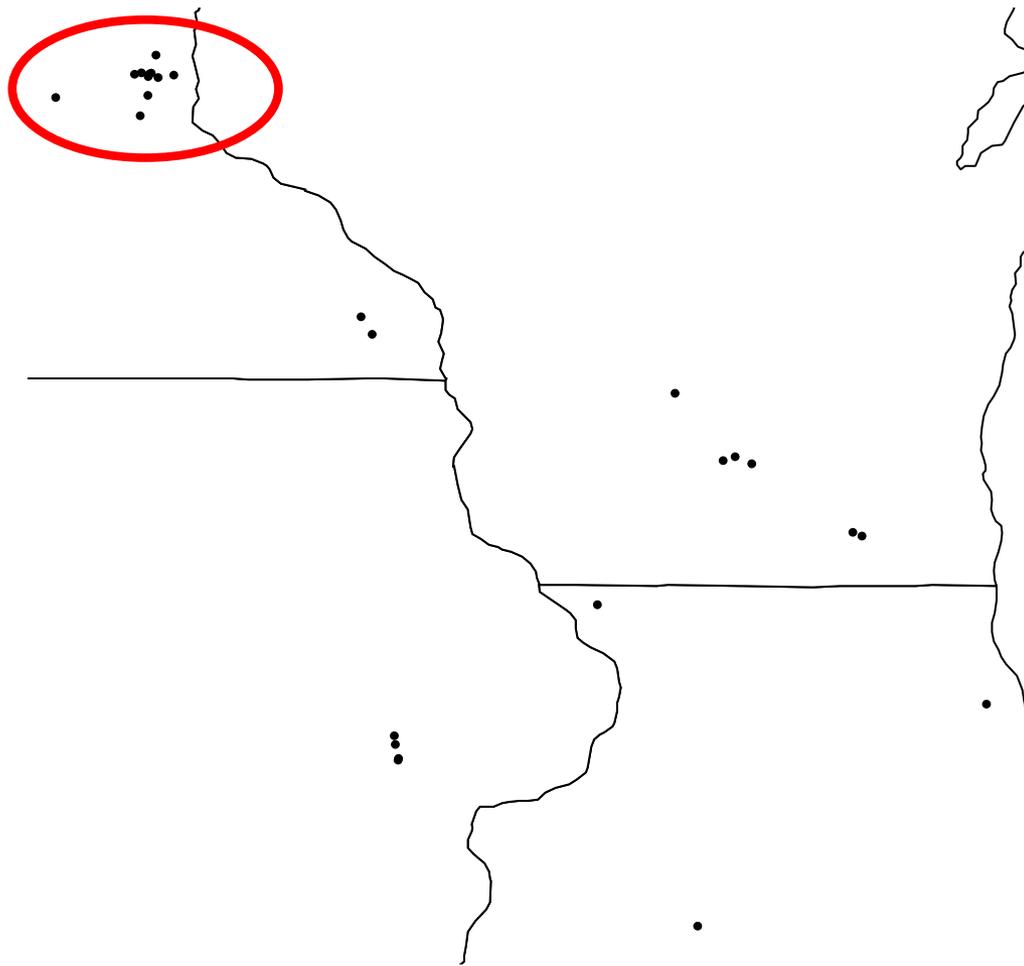
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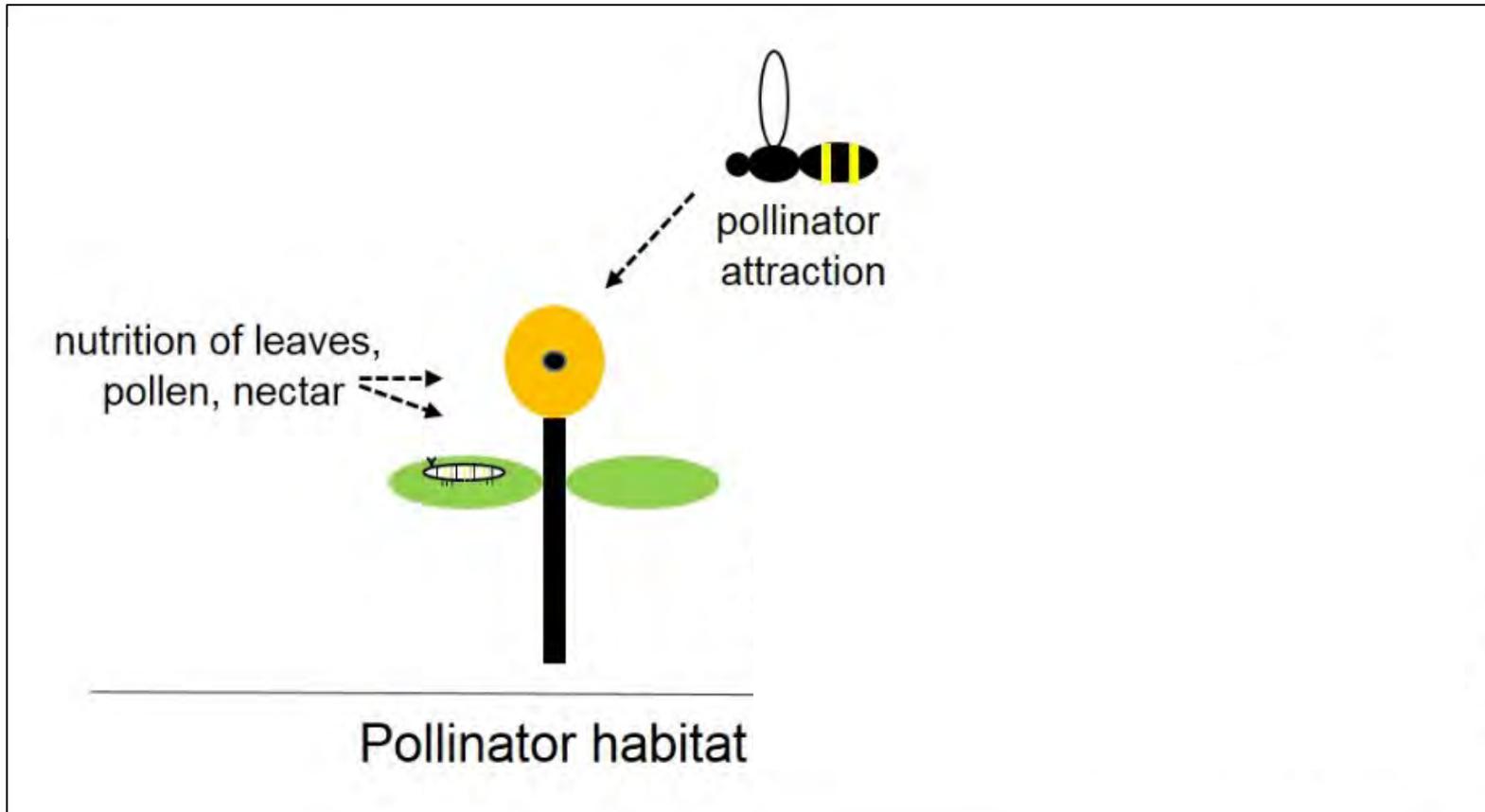


Optimizing the nutrition of roadside plants for pollinators

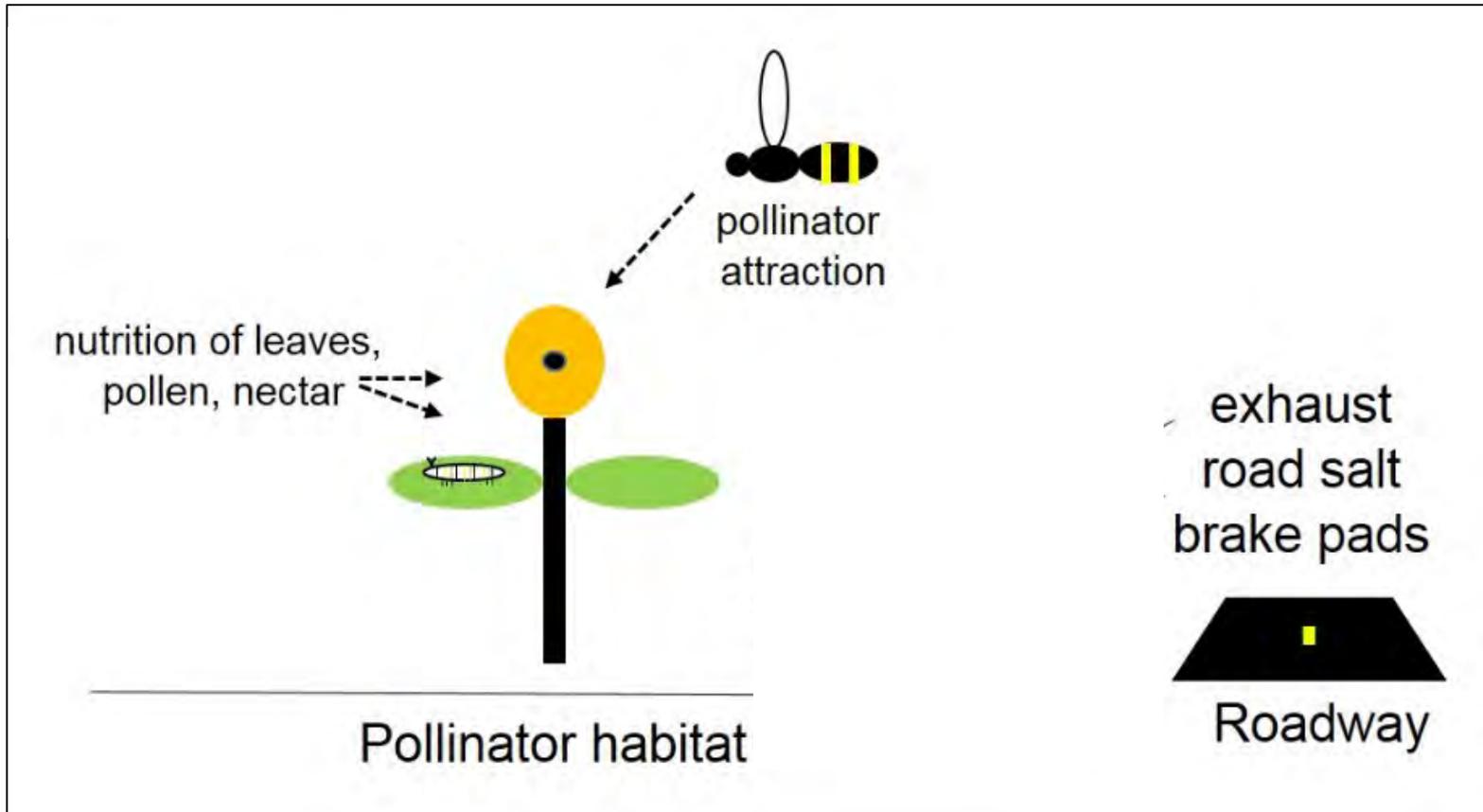
Dr. Emilie Snell-Rood
U of Minnesota



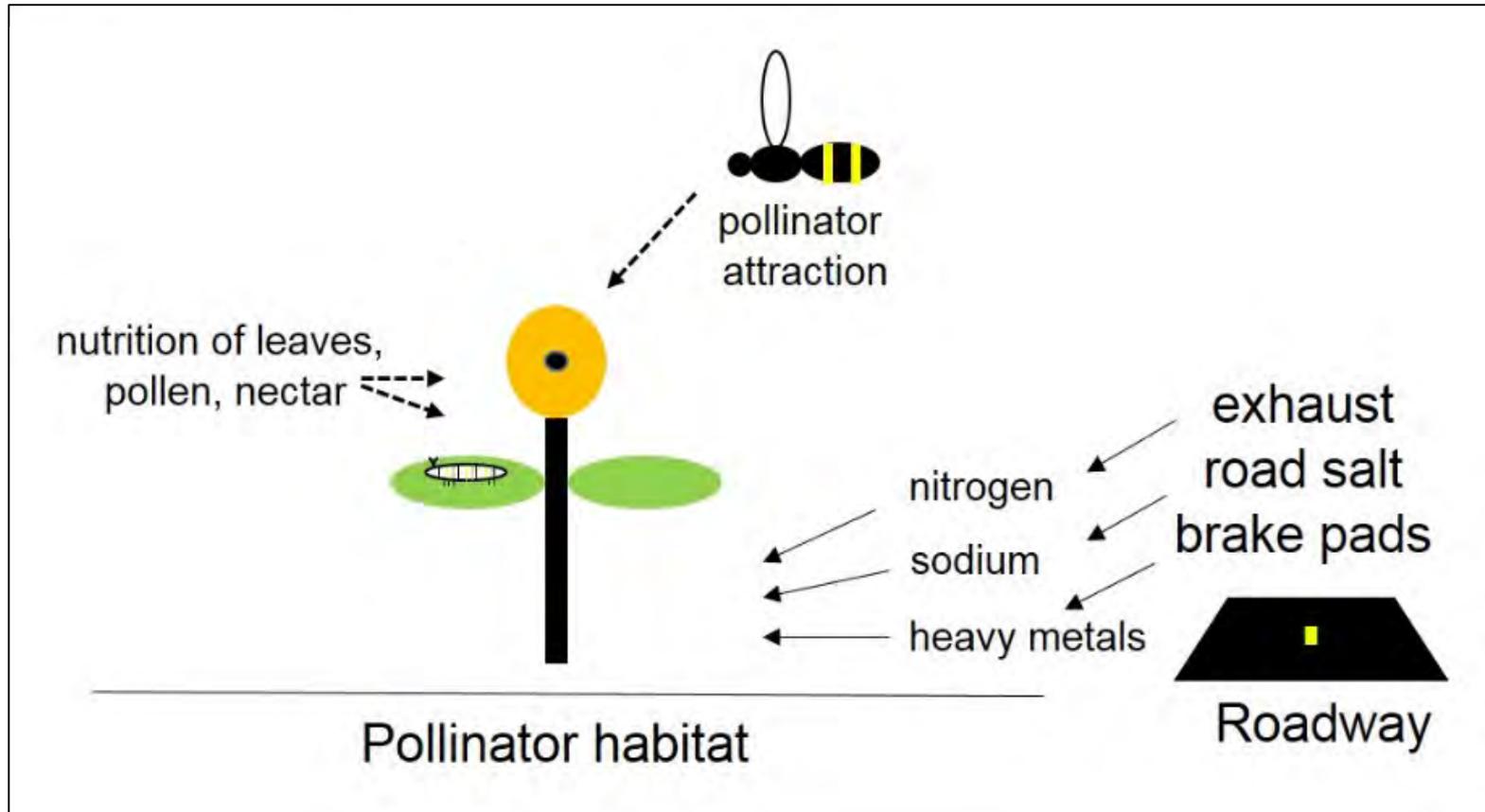
Optimizing the nutrition of roadside plants for pollinators



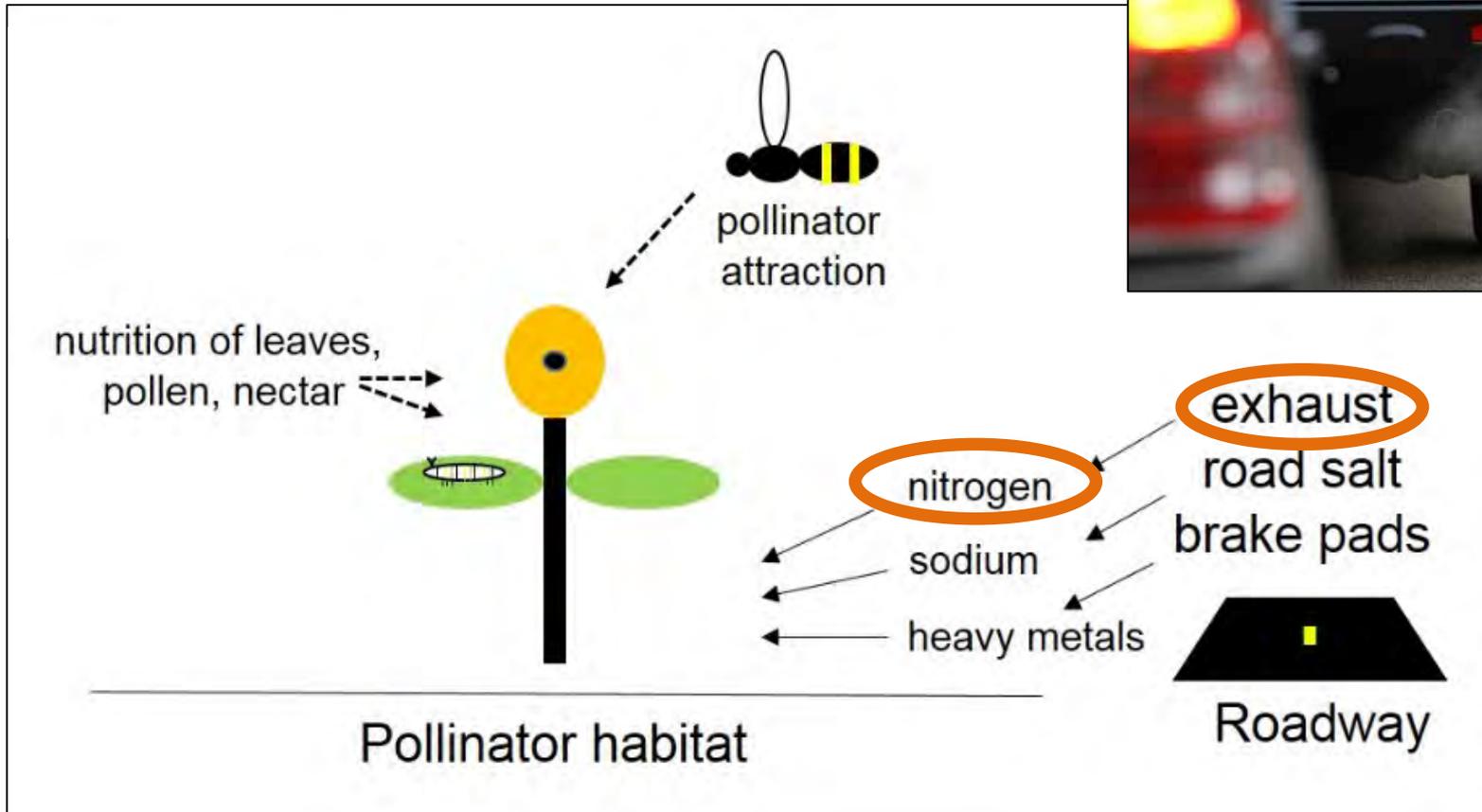
Optimizing the nutrition of roadside plants for pollinators



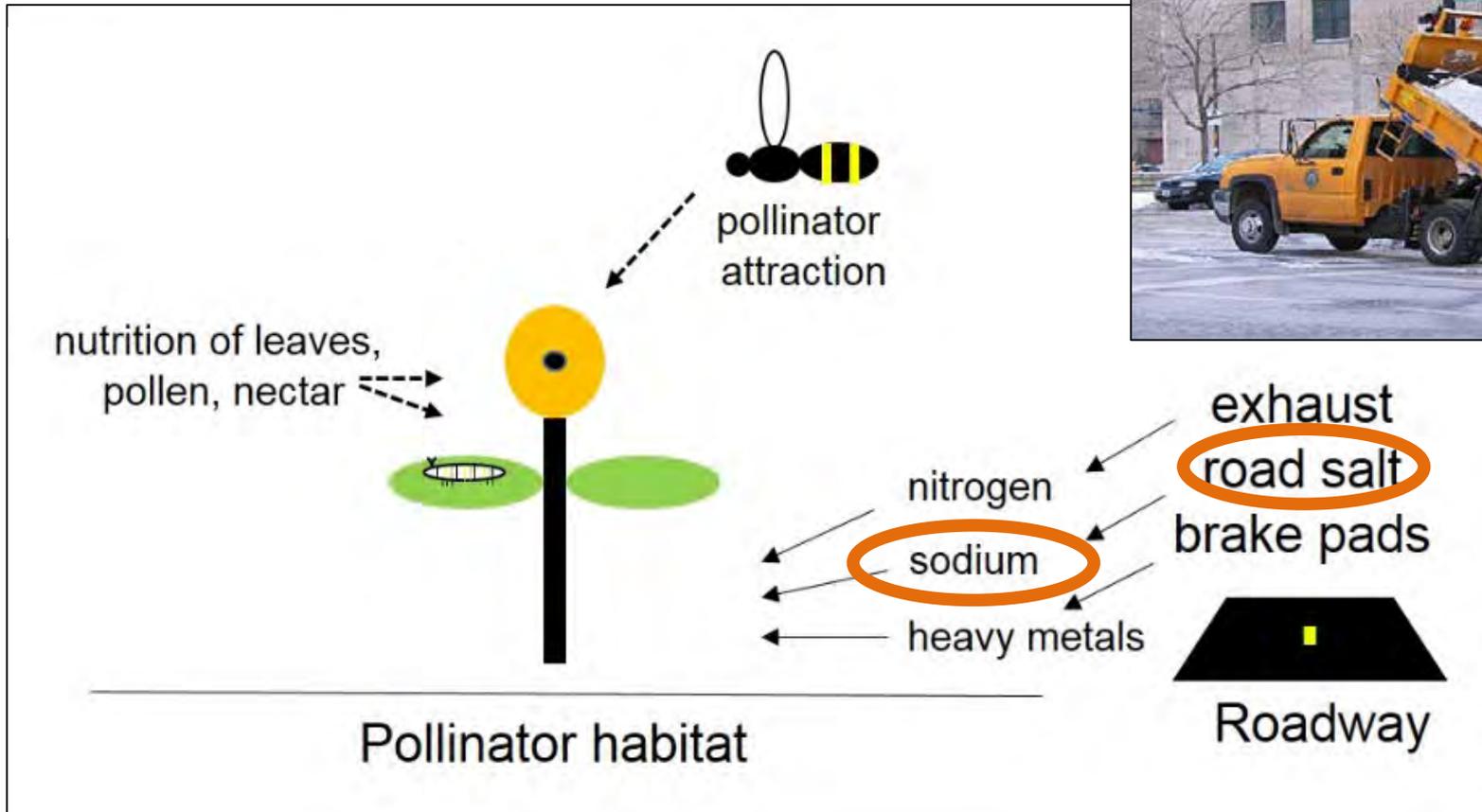
Optimizing the nutrition of roadside plants for pollinators



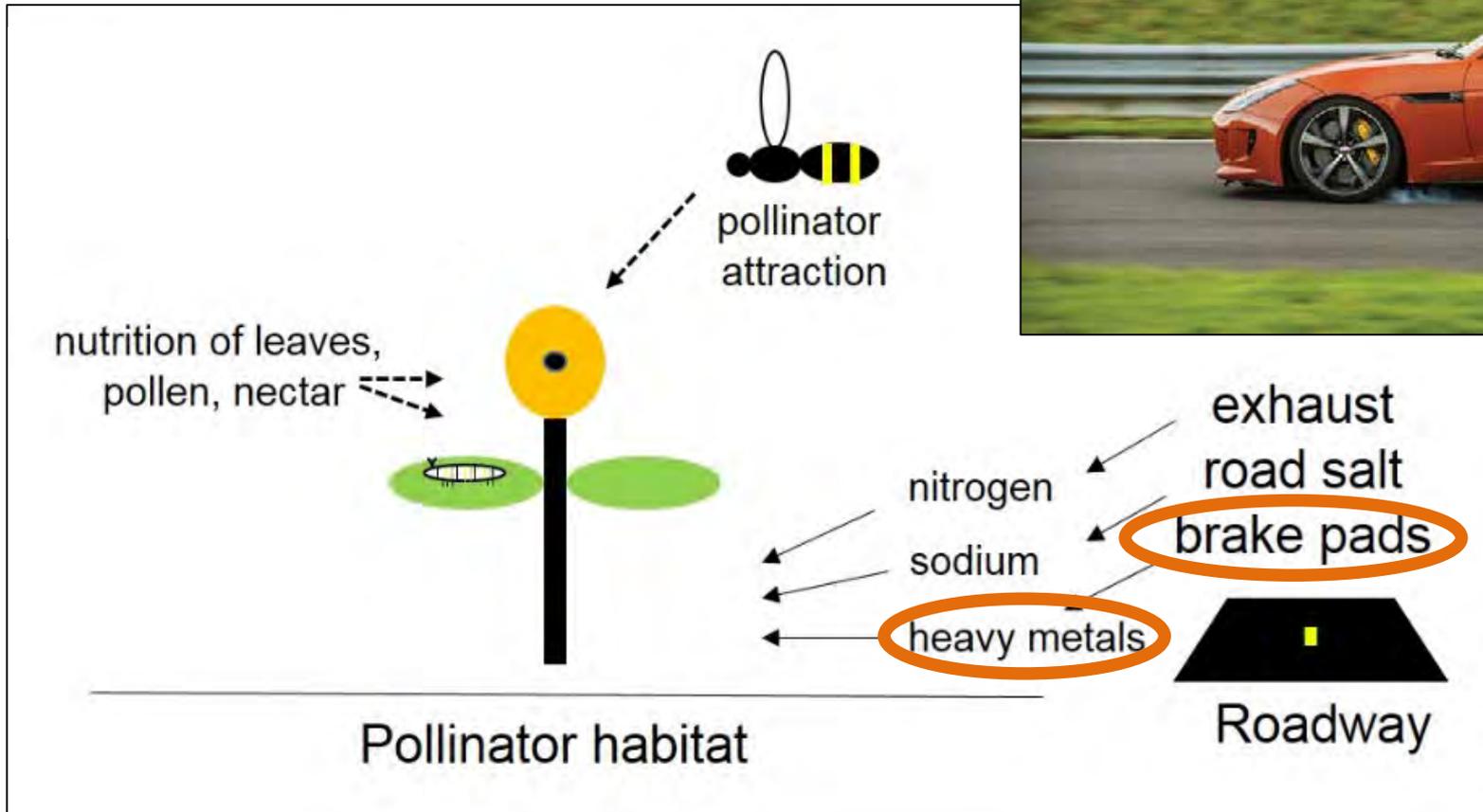
Optimizing the nutrition of roadside plants for pollinators



Optimizing the nutrition of roadside plants for pollinators



Optimizing the nutrition of roadside plants for pollinators



Roadsides and Pollinator Habitat Best Management Practice

Plant high diversity of native plants

Provide plants that bloom throughout the growing season



Roadsides and Pollinator Habitat Best Management Practice

Limit mowing to late in the year or every few years



Roadsides and Pollinator Habitat Best Management Practice

Research is lacking

Roadsides and Pollinator Habitat Best Management Practice

Research is lacking

How much habitat is needed?

Roadsides and Pollinator Habitat Best Management Practice

Research is lacking

How much habitat is needed?

Where should new habitat be added?

Roadsides and Pollinator Habitat Best Management Practice

Research is lacking

How much habitat is needed?

Where should new habitat be added?

Which plant species are most effective?

honey bees

native bees

low maintenance

Roadsides and Pollinator Habitat Best Management Practice

Research is lacking

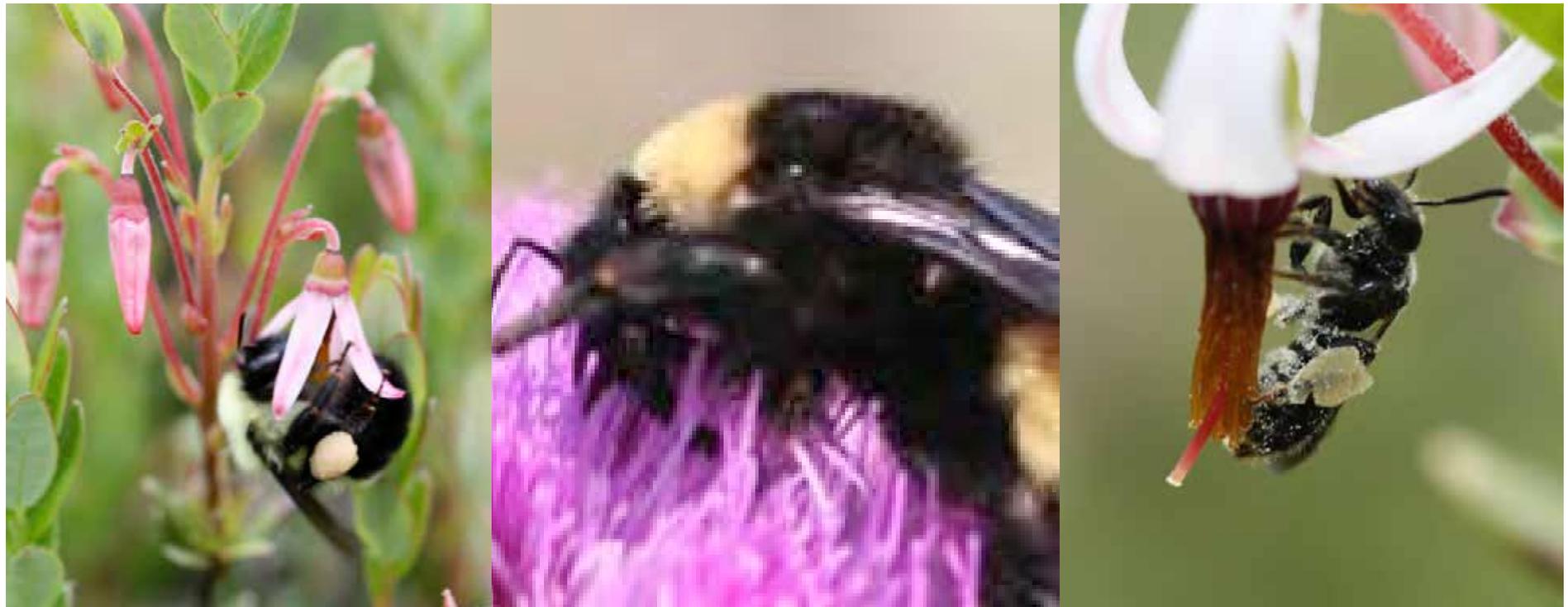
How much habitat is needed?

Where should new habitat be added?

Which plant species are most effective?

How might other management practices affect pollinators?

Thanks!



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