Bumblebees and Blueberries

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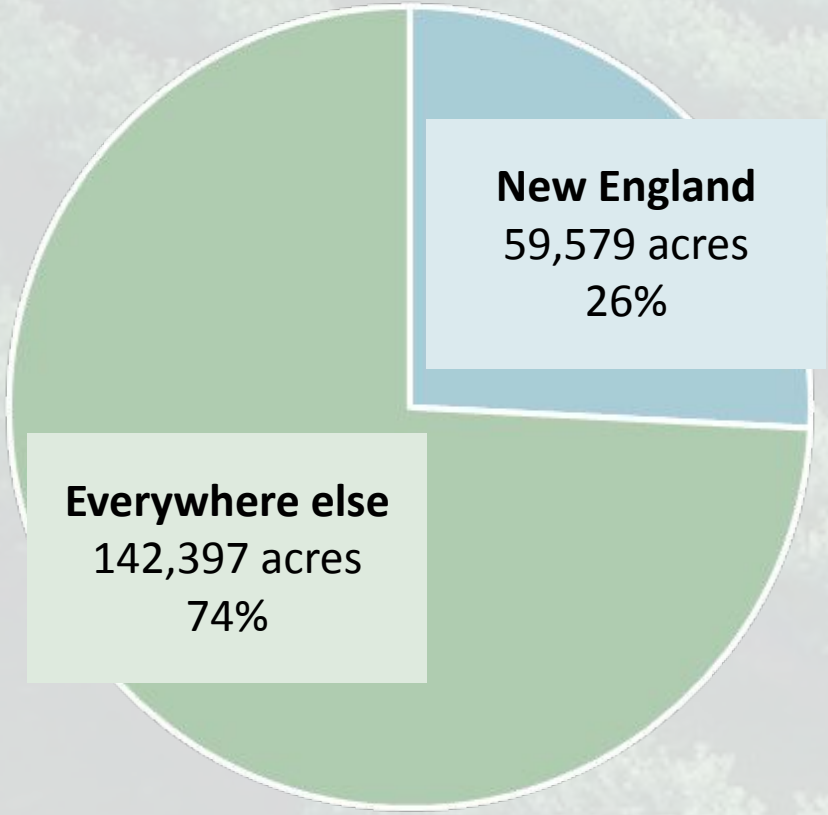
Blueberry Production

In 2022, there were **191,976 acres** of blueberry production in the United States



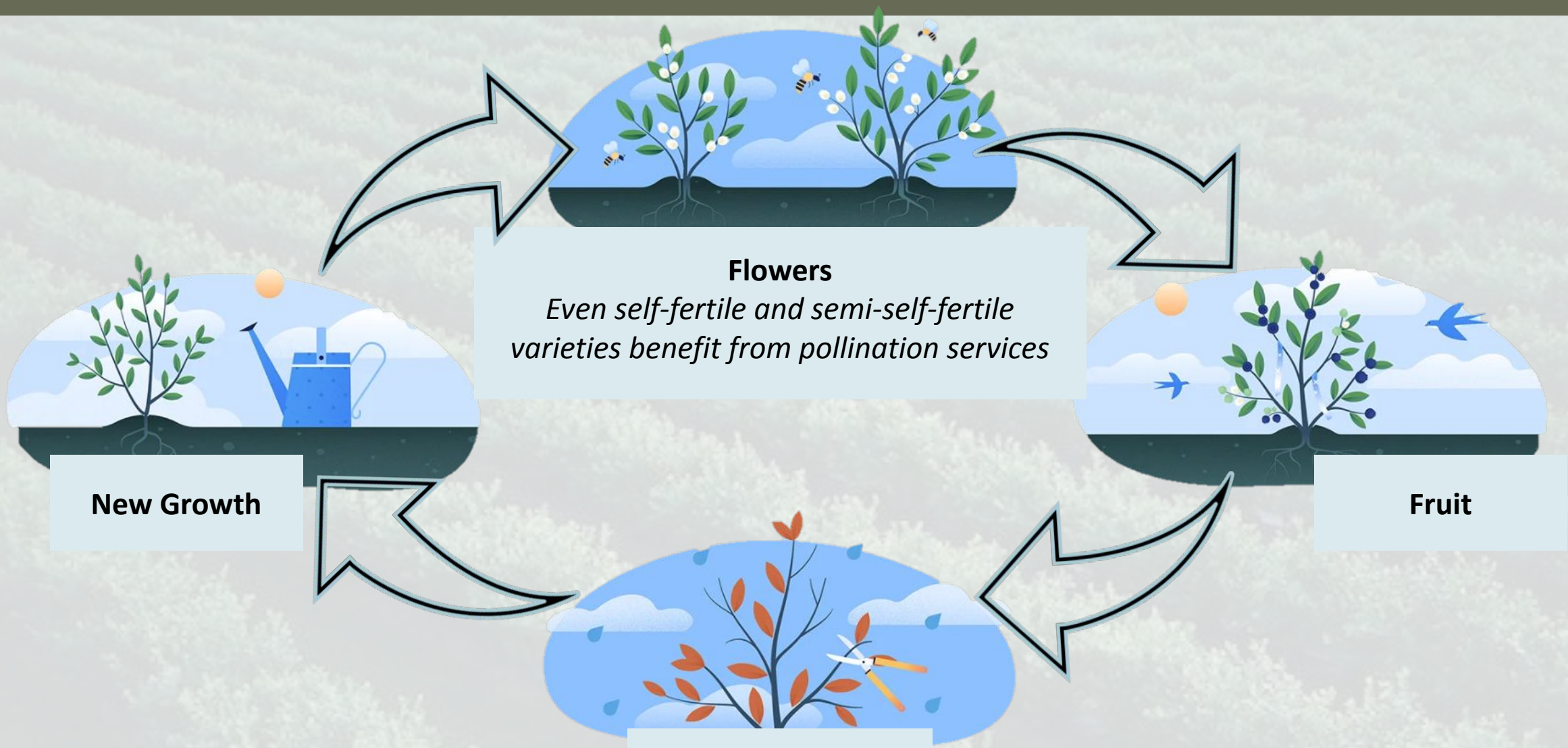
USDA National Agricultural Statistics Service

Blueberry Production

In 2022, there were **191,976 acres** of blueberry production in the United States

USDA National Agricultural Statistics Service

Growth Cycle for Mature Blueberry Bushes



Graphics Credit: blueberry.org

Who Pollinates Blueberries?

Graphics Credit: blueberry.org

Who Pollinates Blueberries?

Honeybees

1 species
Non-native; domesticated

Bumblebees

~ 17 species in New England
Native; wild or domesticated

Solitary Bees

~ 400 species in New England
Native; wild

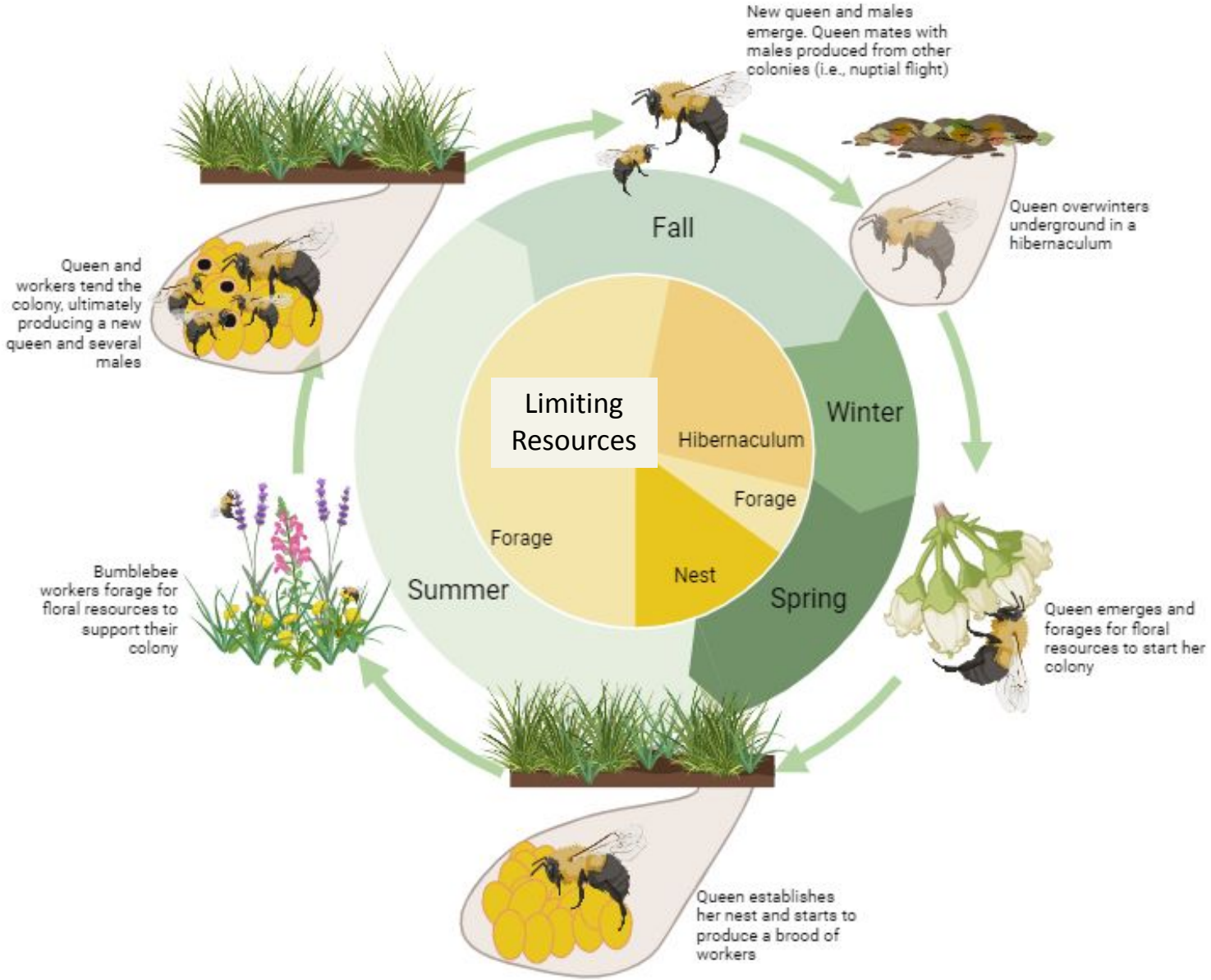
Photo Credit: USGS Bee Inventory and Monitoring Lab

Who Pollinates Blueberries?

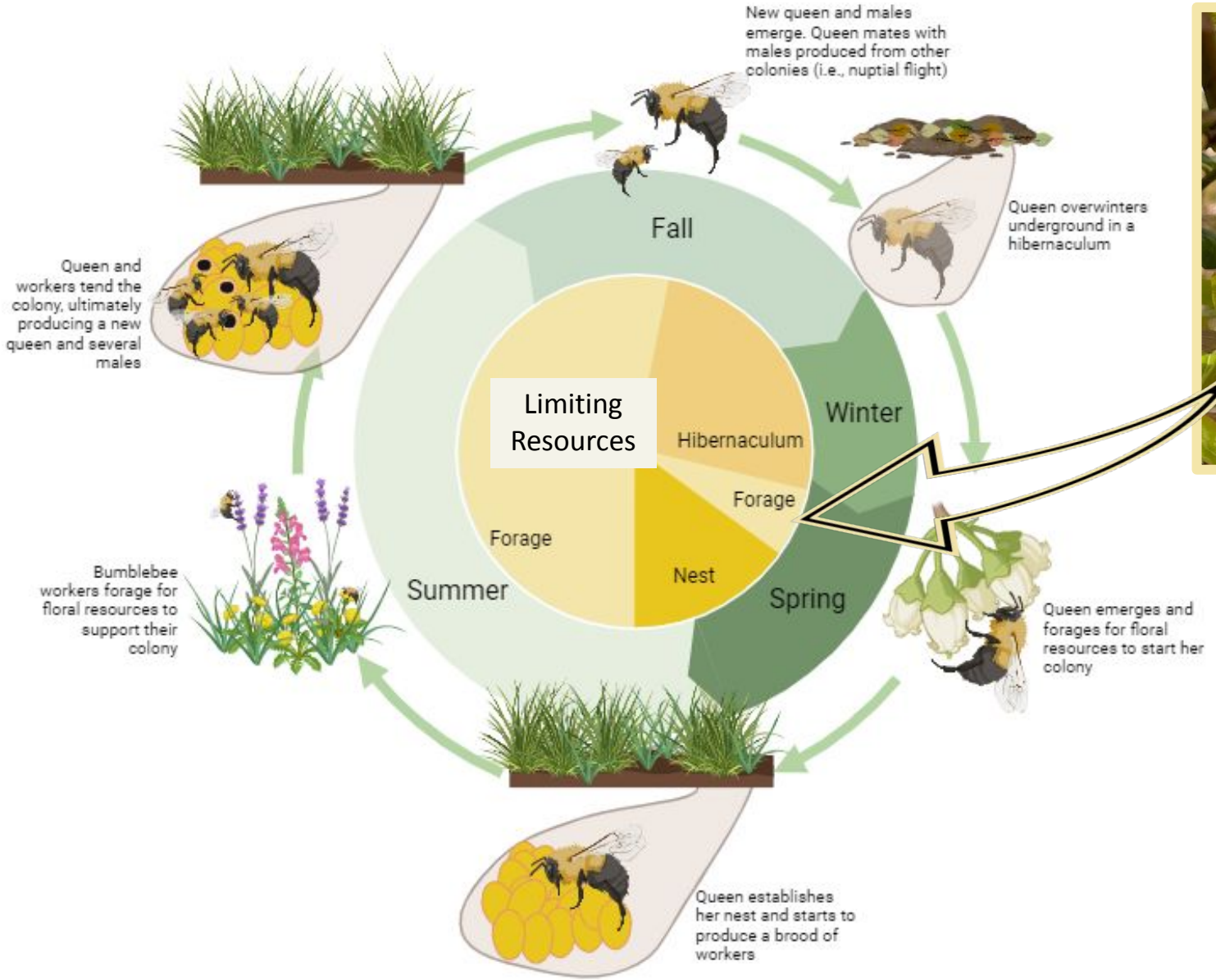
Native bee species are usually better pollinators for **native plant species** than non-natives because of coevolution.

Photo Credit: USGS Bee Inventory and Monitoring Lab

Bumblebee Life Cycle

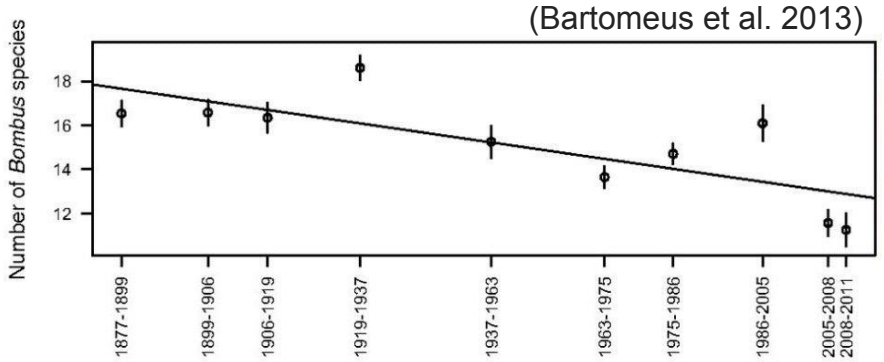


Bumblebee Life Cycle



Queen spring foraging overlaps temporally with blueberry flowering period in CT

Bumblebees are in decline

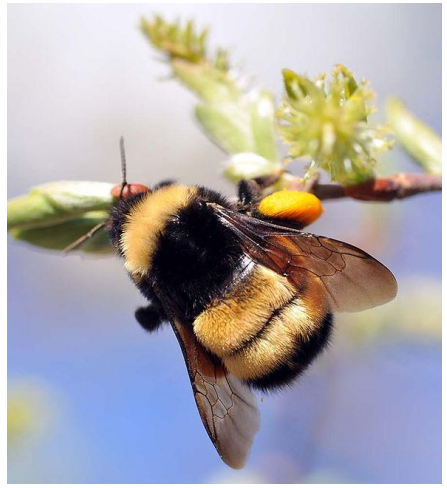


Species of Conservation Concern

Rusty Patched Bumblebee
Bombus affinis

Federally Endangered
Last seen in CT in 1997

Yellow-banded Bumblebee
Bombus terricola

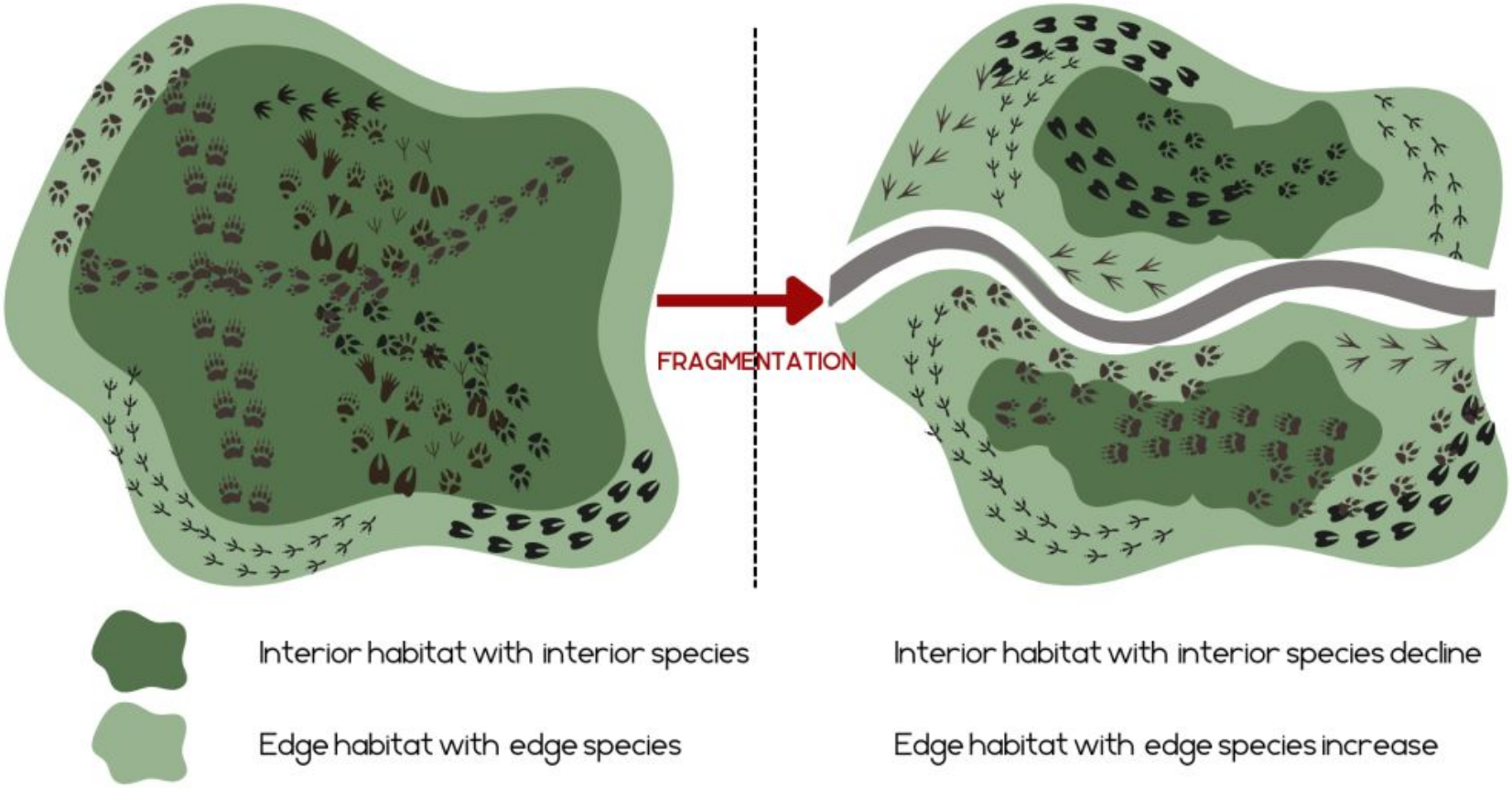


CT State Listed as Threatened

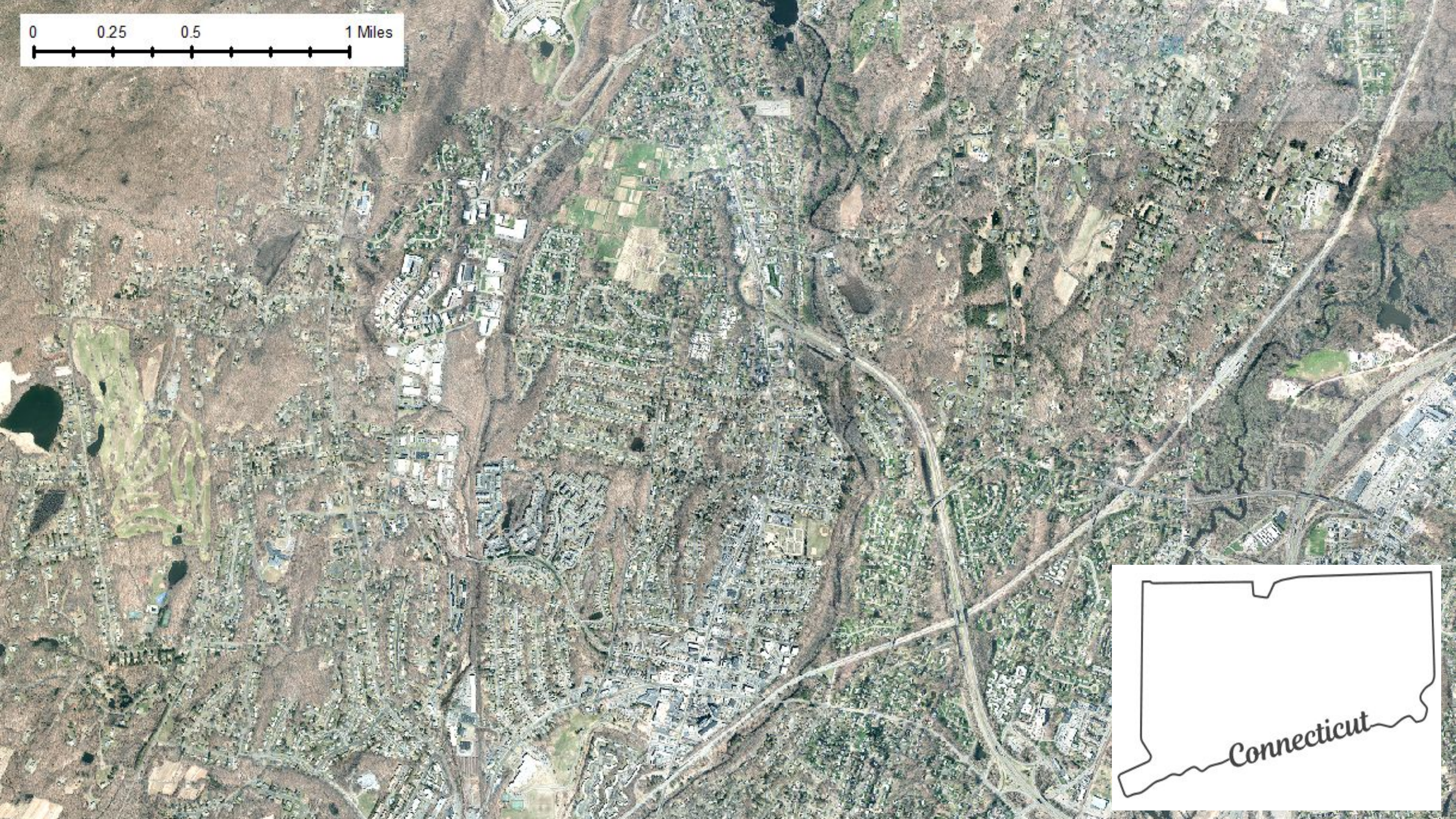
American Bumblebee
Bombus pensylvanicus

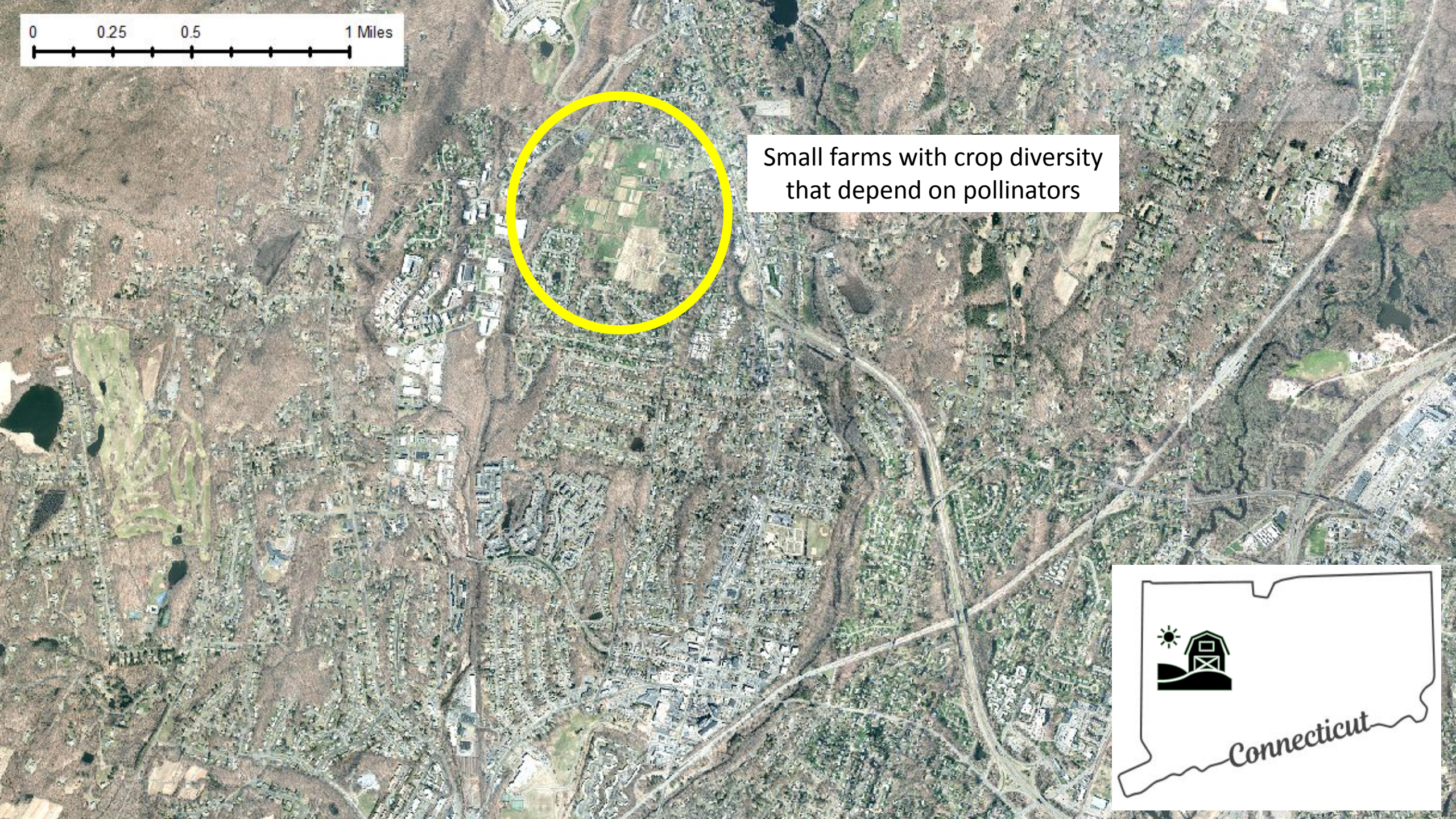
Under Federal Evaluation
Last seen in CT in 2006

Fragmentation and Habitat Loss



Bumblebees need **overwintering, foraging, & nesting** habitats


0
0.25
0.5
1 Miles
Connecticut


0
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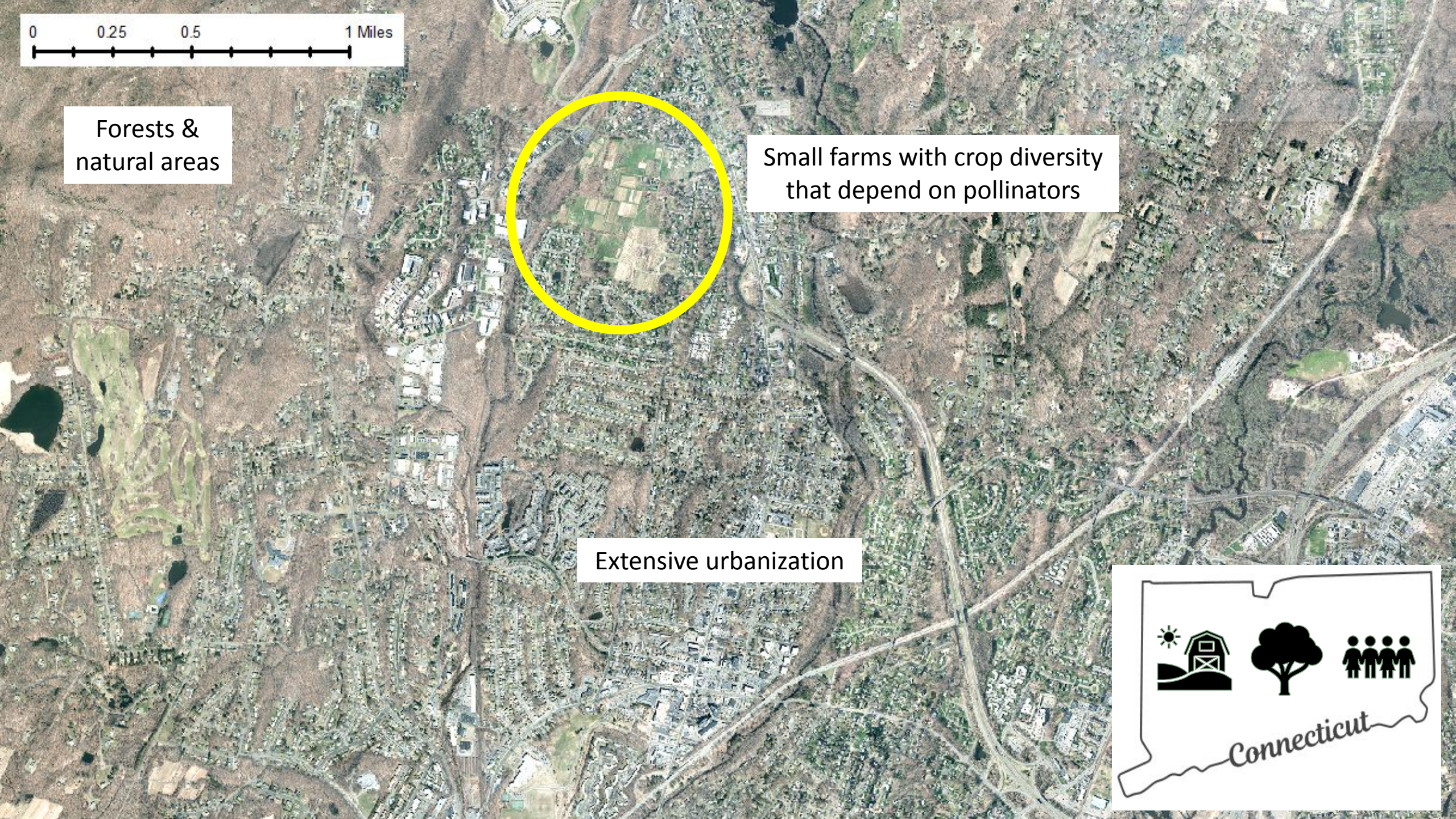
1 Miles
Small farms with crop diversity that depend on pollinators
Connecticut


0
0.25
0.5
1 Miles
Forests & natural areas
Small farms with crop diversity that depend on pollinators
Extensive urbanization
Connecticut

“Support our pollinators: Plant pollinator gardens”

0 0.25 0.5 1 Miles

Forests & natural areas

Small farms with crop diversity that depend on pollinators

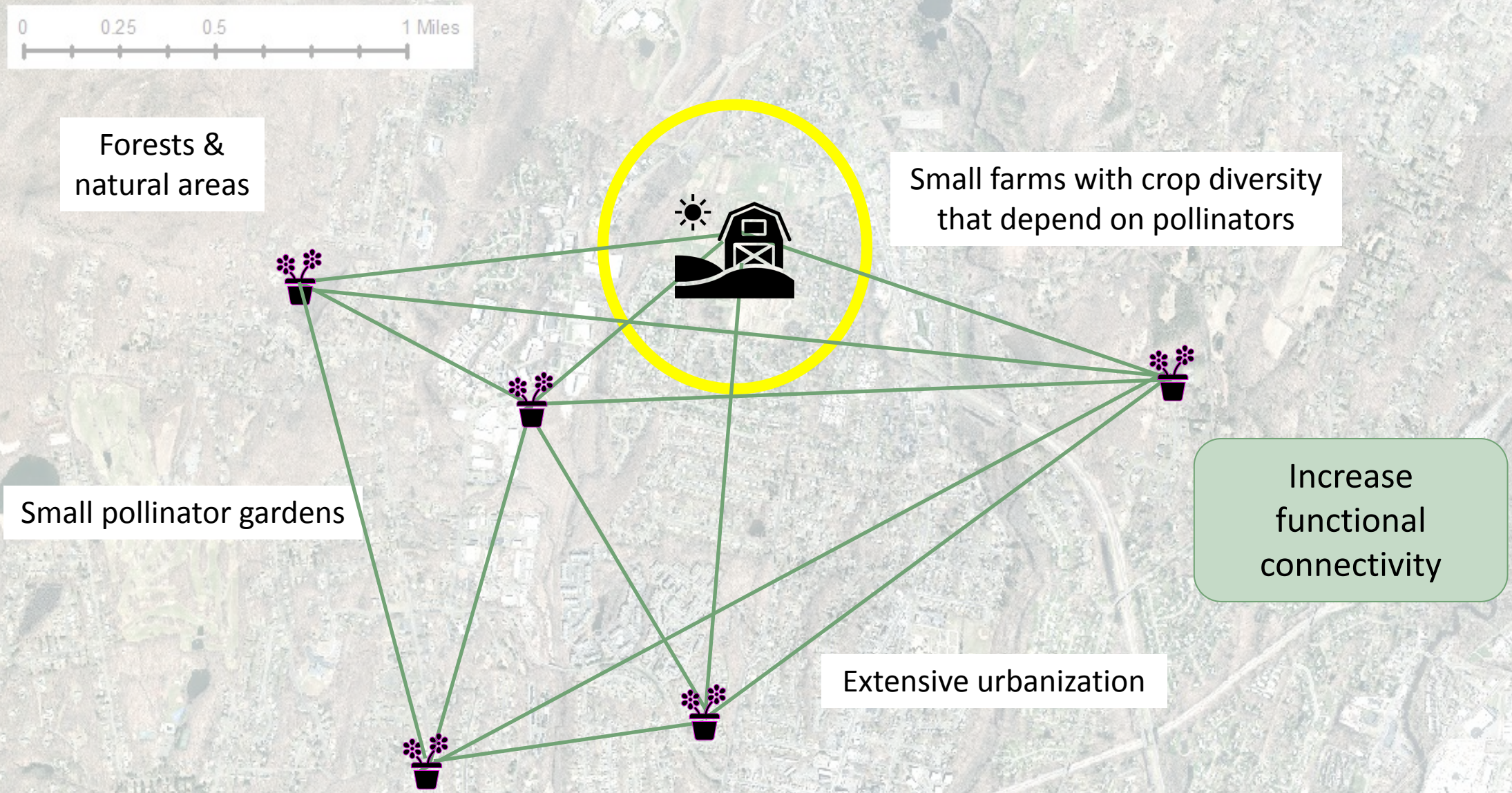
Extensive urbanization

Forests & natural areas

Small farms with crop diversity that depend on pollinators

Small pollinator gardens

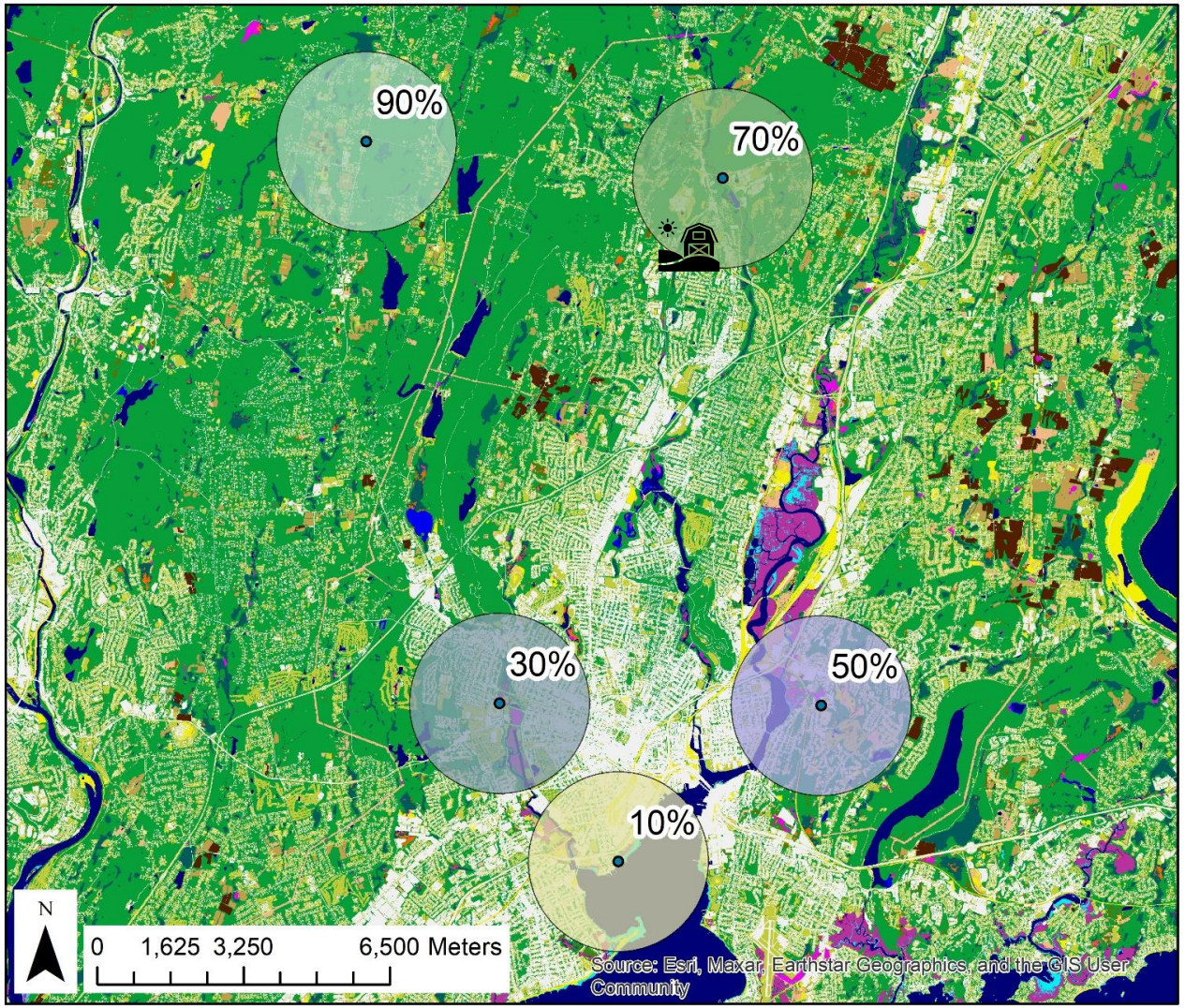
Extensive urbanization


0
0.25
0.5
1 Miles
Forests & natural areas
Small farms with crop diversity that depend on pollinators
Small pollinator gardens
Increase functional connectivity
Extensive urbanization

Are small, manicured gardens helping with bumblebee conservation?

Are these efforts helping with blueberry production?

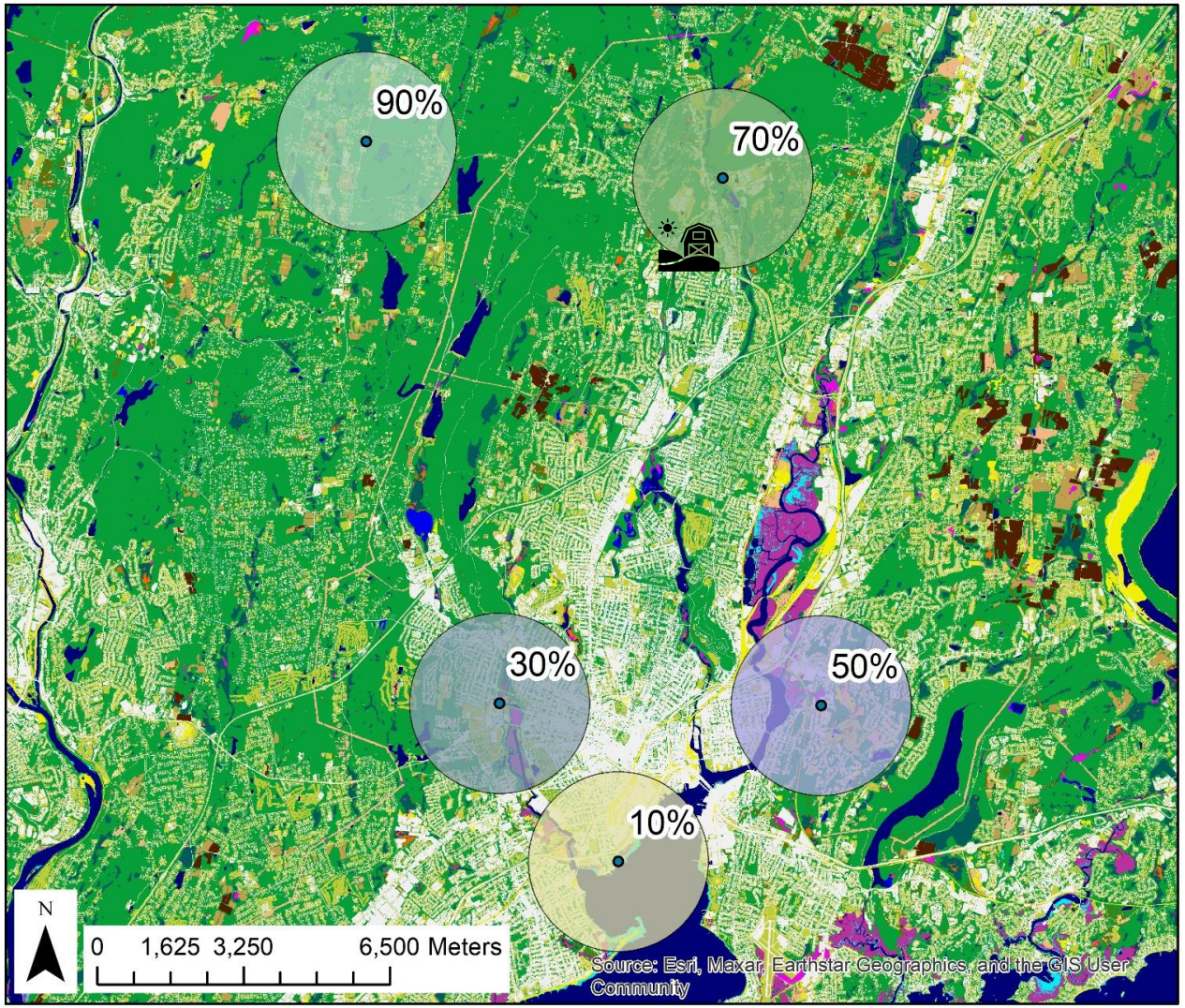
Does surrounding landcover impact connectivity?



Five small, manicured pollinator gardens

Independent variable:
Percentage of green-space in the surrounding 2 km buffer (approximate bumblebee foraging distance)

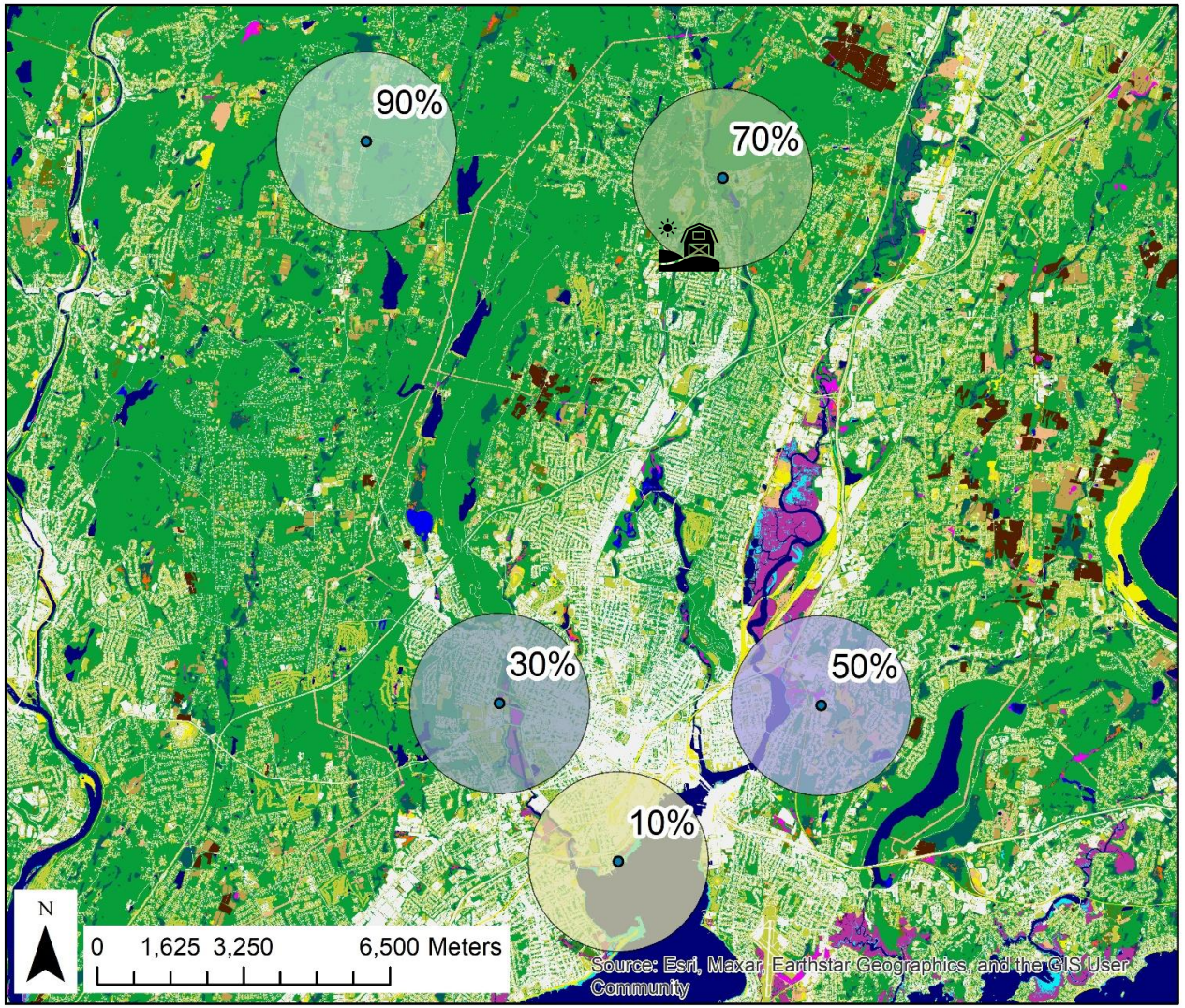
Does surrounding landcover impact connectivity?



Research Questions:

- *How many total bumblebees?*
- *What species are present?*
- *How big are the workers?*
- *How many bumblebee colonies?*

Does surrounding landcover impact connectivity?



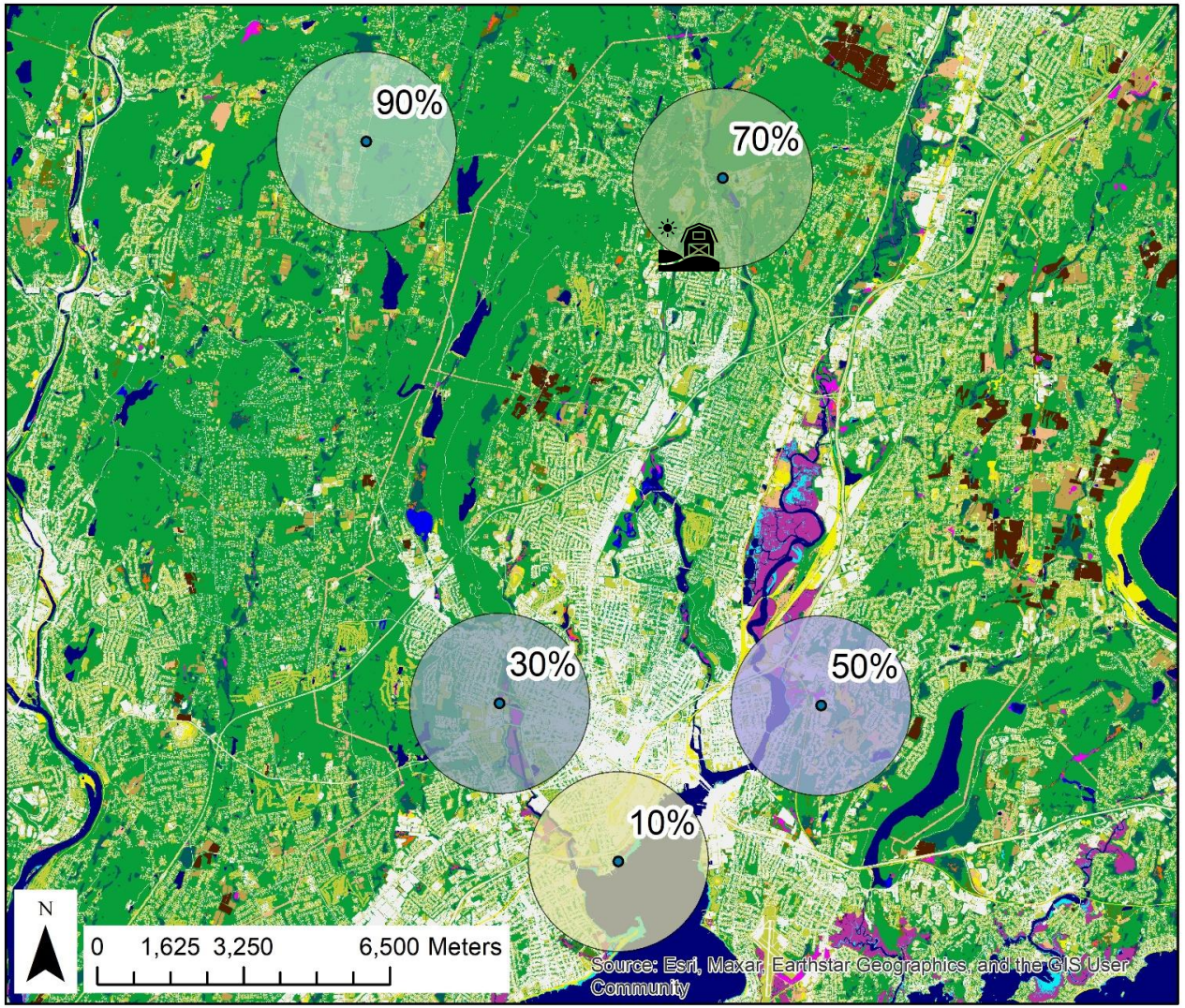
Research Questions:

- *How many total bumblebees?*
- *What species are present?*
- *How big are the workers?*
- *How many bumblebee colonies?*

Hypotheses:

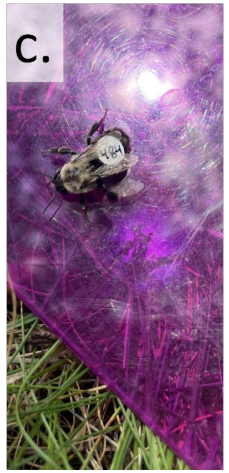
- *With more green space there will be*
  - *Greater abundance and diversity*
  - *Larger worker*
  - *More colonies*

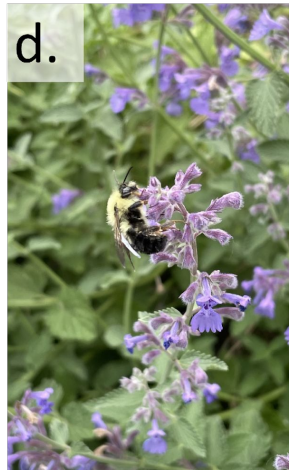
Does surrounding landcover impact connectivity?



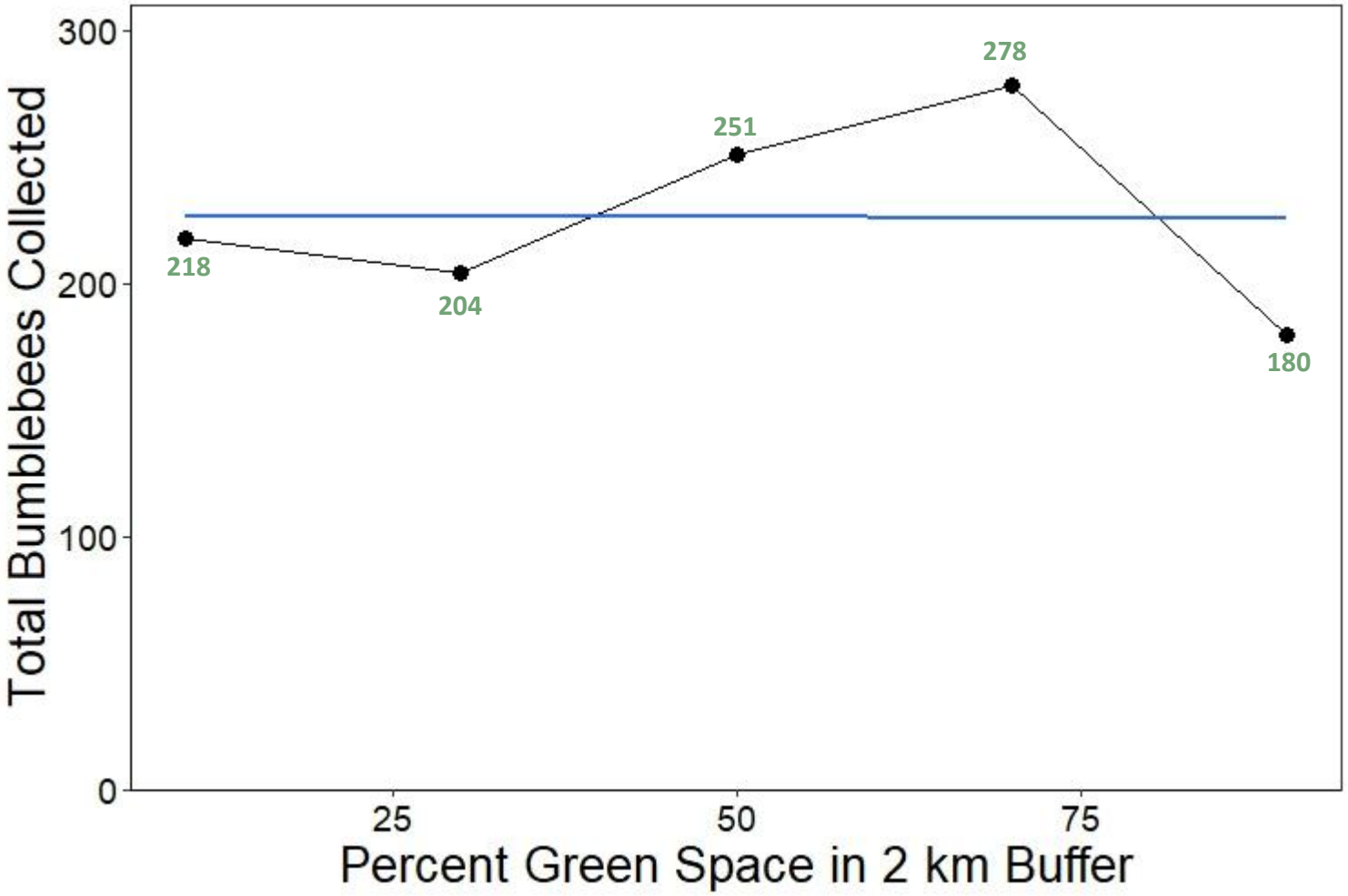
Weekly from June-August:

- 30 minutes to collect bumblebees
- Cool on ice
- Species ID and weigh
- Take tarsal sample and release for genetic mark-recapture (siblingship)





How many bumblebees at each garden?

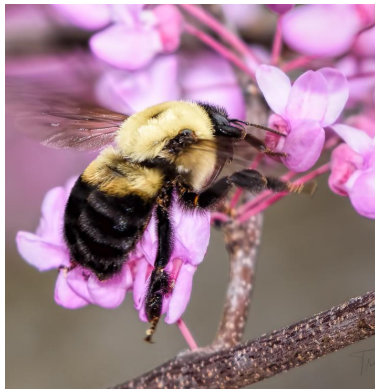


$R^2 = 0.00007$

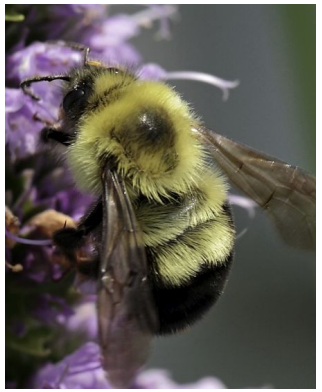
What species are present?

Common Eastern Bumblebee
Bombus impatiens

Brown-belted Bumblebee
Bombus griseocollis



Two-spotted Bumblebee
Bombus bimaculatus

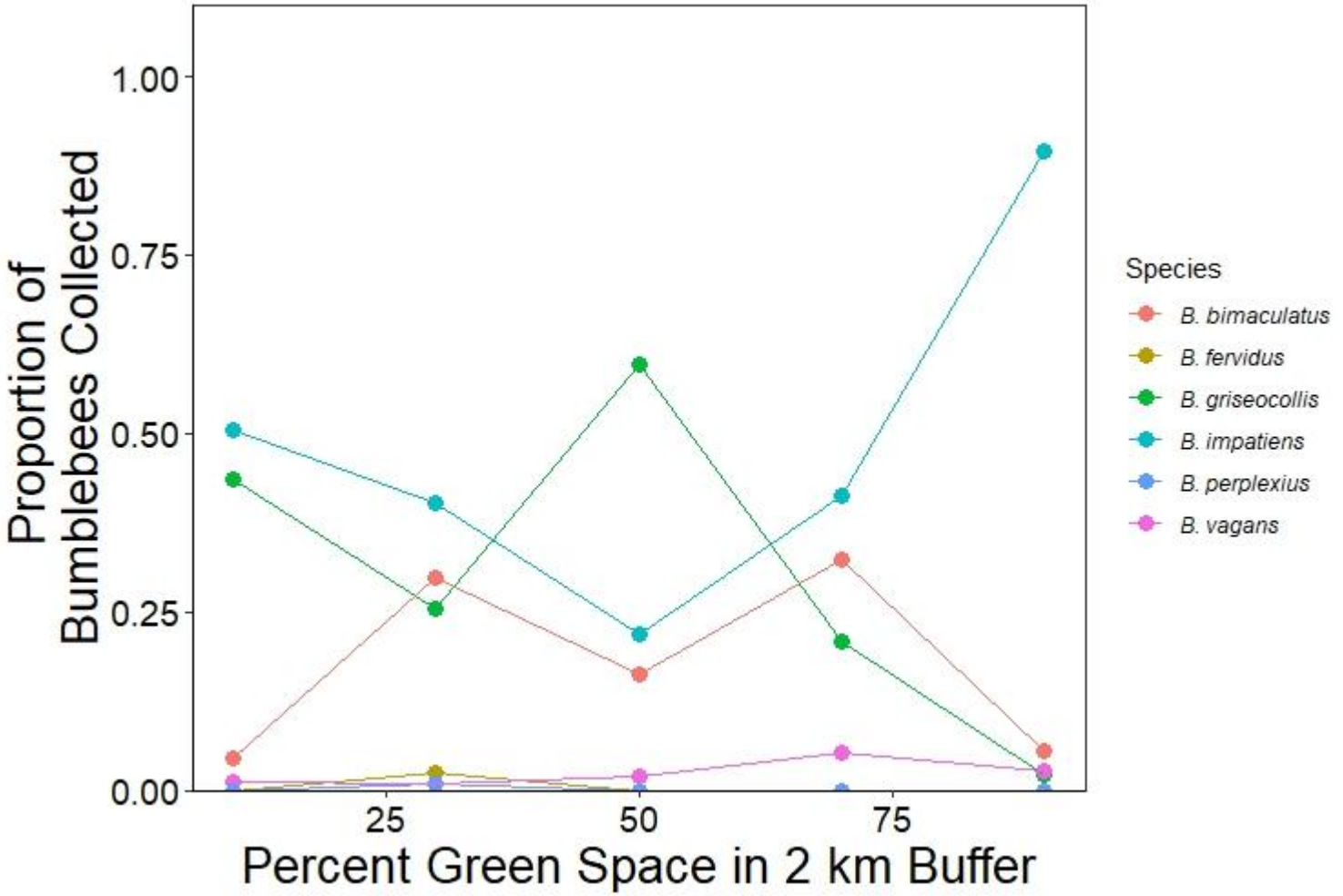


Golden Northern Bumblebee
Bombus fervidus

Half Black Bumblebee
Bombus vagans

Confusing Bumblebee
Bombus perplexus

How many of each species?



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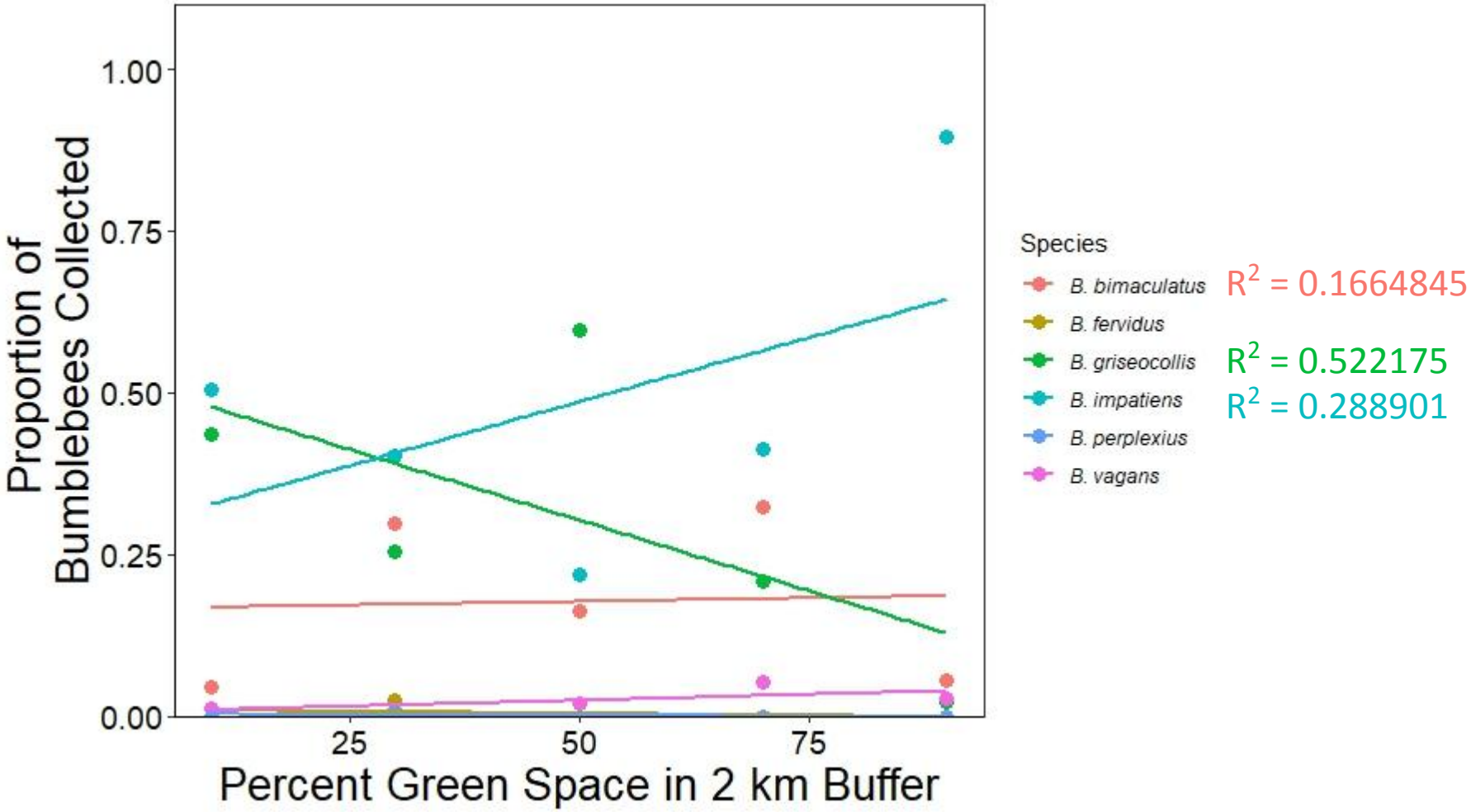
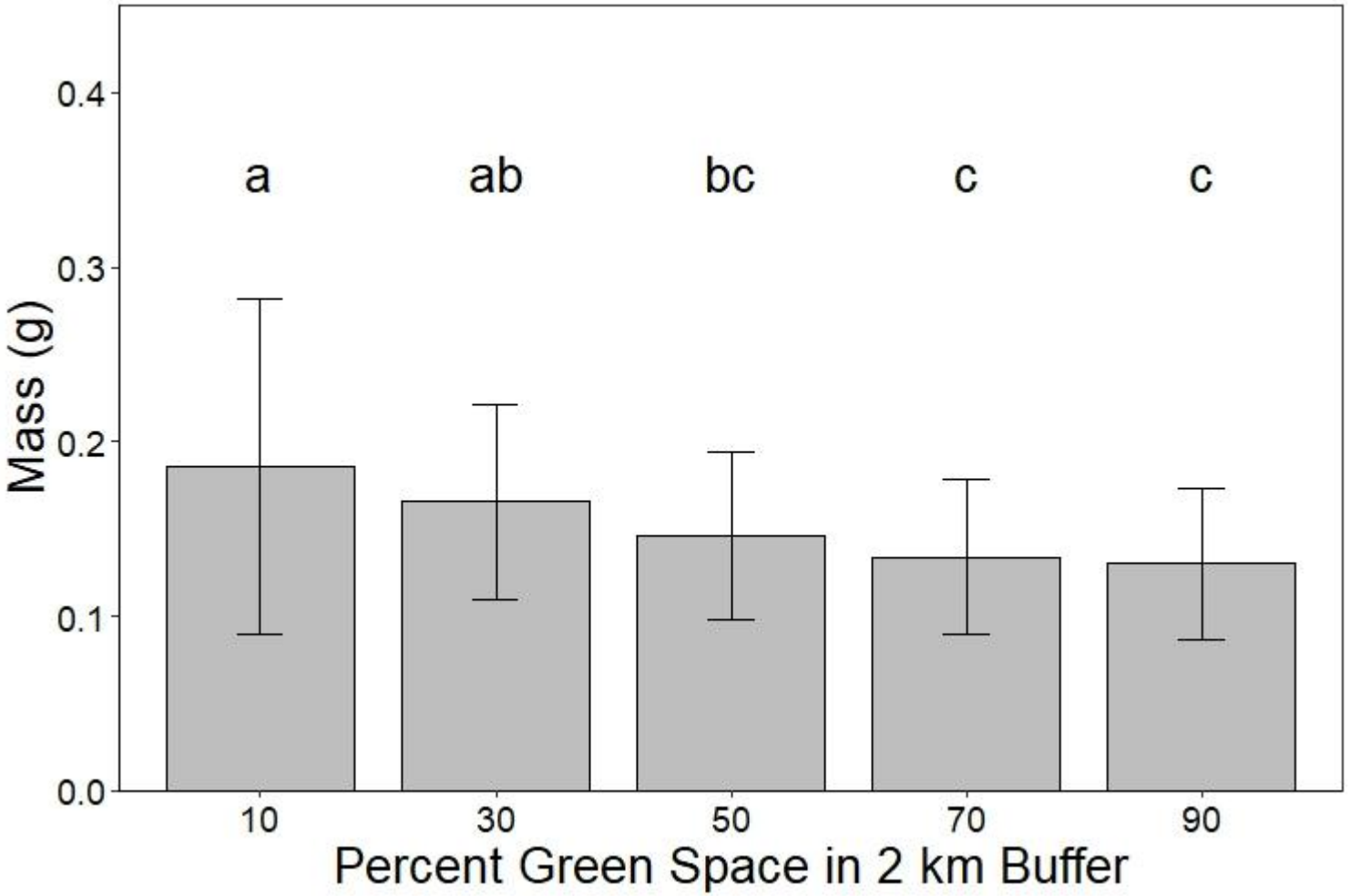


How big are the workers?

Common Eastern Bumblebee

Bombus impatiens



Summary

- There was no difference in the number of bumble bees in each garden
- Six bumblebee species were collected
  - All are fairly common in CT records
- *B. grisicolis, B. impatiens, and B. bimaculatus* were commonly observed
  - *B. grisicolis* decreased with green space
  - *B. impatiens* increased with green space
  - *B. bimaculatus* collected consistently
- *B. fervidus, B. vagans, and B. perplexus* were rarely observed
- *B. impatiens* workers were smaller at sites with more green space

Next Steps

- Just because there's more green space doesn't mean there's more habitat (nesting, foraging, overwintering)
  - Analyze habitat characteristics of garden buffers
  - Analyze bumblebees collected with the garden buffers
- Genetic analyses to determine the number of colonies supported by each garden, within each buffer, and characterize connectivity
- VHF radio telemetry to locate nesting and overwinter sites
- Survey, map, & analyze blueberry farms in CT to determine if there is adequate overwintering, foraging, and nesting habitat in surrounding buffers

Thank you!

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