

A wide-angle photograph of a lush field filled with numerous purple flowers, likely Monarda, in the foreground. The field extends towards a dense line of green trees. In the far background, rolling blue mountains are visible under a sky with scattered white clouds.

POLLINATOR PREFERENCE IN DIVERSIFIED PASTURES

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Field Day 2023



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WE'VE INCORPORATED WILDFLOWERS
TO CATTLE PASTURES...NOW WHAT?



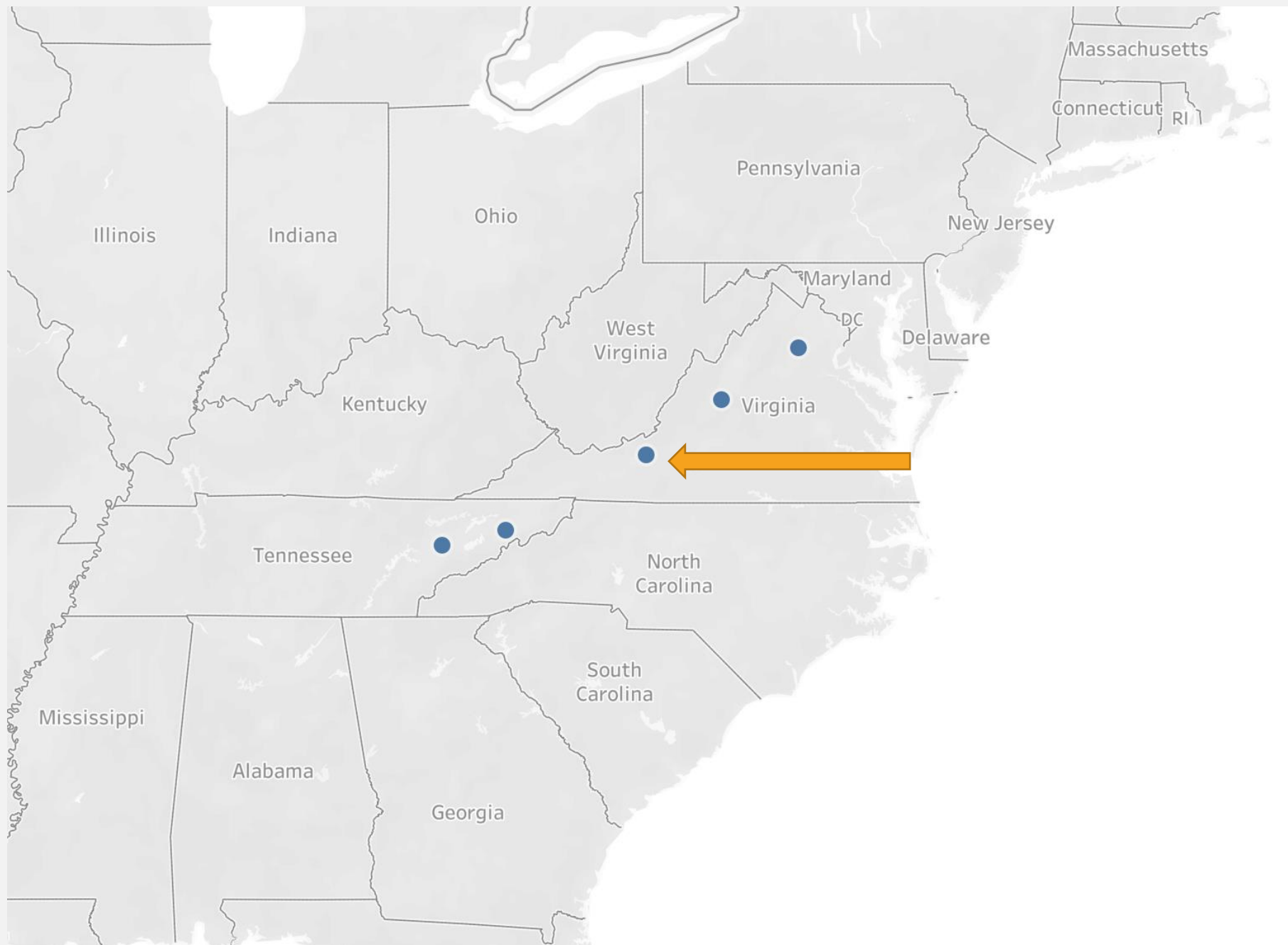
OBJECTIVES

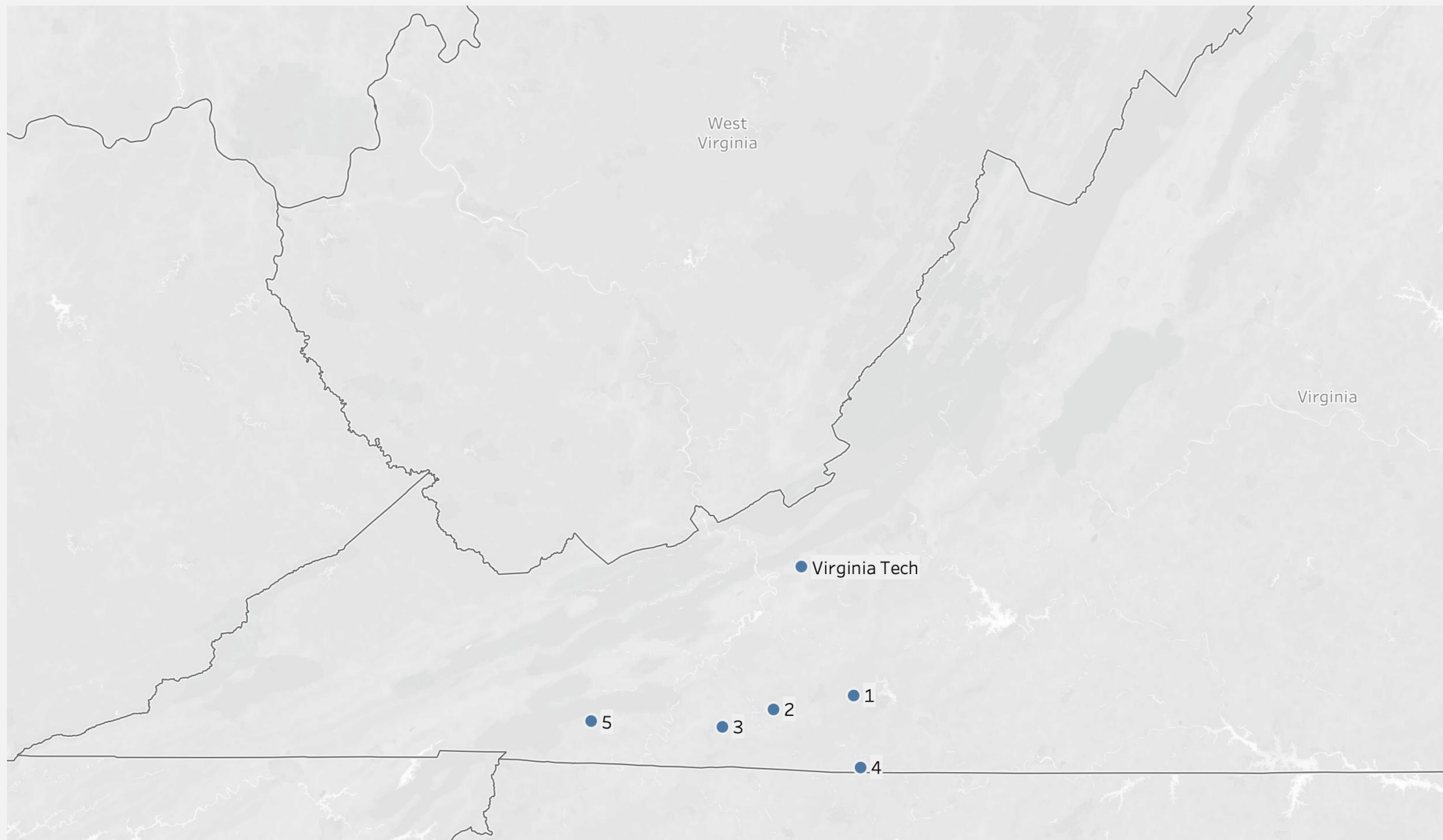
- **Objective 1: Pollinator preference**

- *Do some plant species attract more pollinators than others?*
- Goal: determine the attractiveness of each species of wildflower to pollinators
- Observations of pollinators on each wildflower species
- Record the number and type of pollinators on each

- **Objective 2: Pollinator communities**

- *Are pollinators more abundant in wildflower-enhanced areas?*
- Goal: assess the number and diversity of pollinators in areas with and without added wildflowers.
- Survey of pollinators present in wildflower-enhanced pastures and non-enhanced areas





METHODS



- In Summer 2020, mix of native warm season grasses and wildflowers was overseeded in 5 tall fescue pastures
- Pastures first sprayed with Roundup to suppress existing vegetation
- Landowners advised to use the fields in their regular rotations
 - Cattle sometimes present during data collection

METHODS

- Each site sampled for one day each month in June-July 2021 and June-August 2022
- Sites sampled using a modified version of the “snapshot method” (Garbuzov and Ratnieks 2014)
 - Quickly and nondestructively count the number of pollinators visiting a plant
 - Snapshotted 10 plants of each species in bloom every hour from 9:00-3:00





Honey bees



Bumble bees

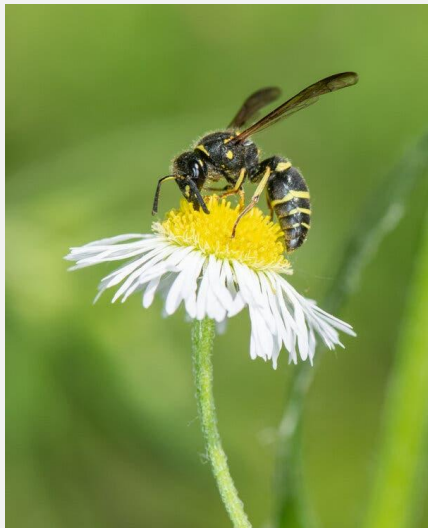


Small
native
bees



Large native
bees

Wasps



Lepidoptera (butterflies
and moths)

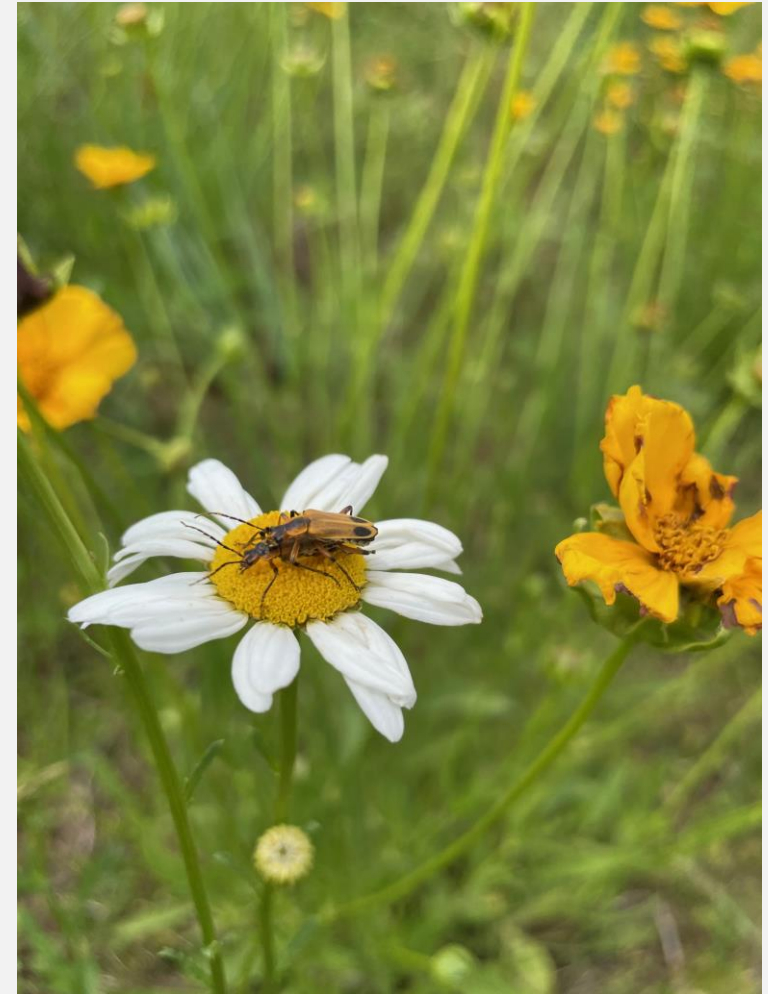


Flies

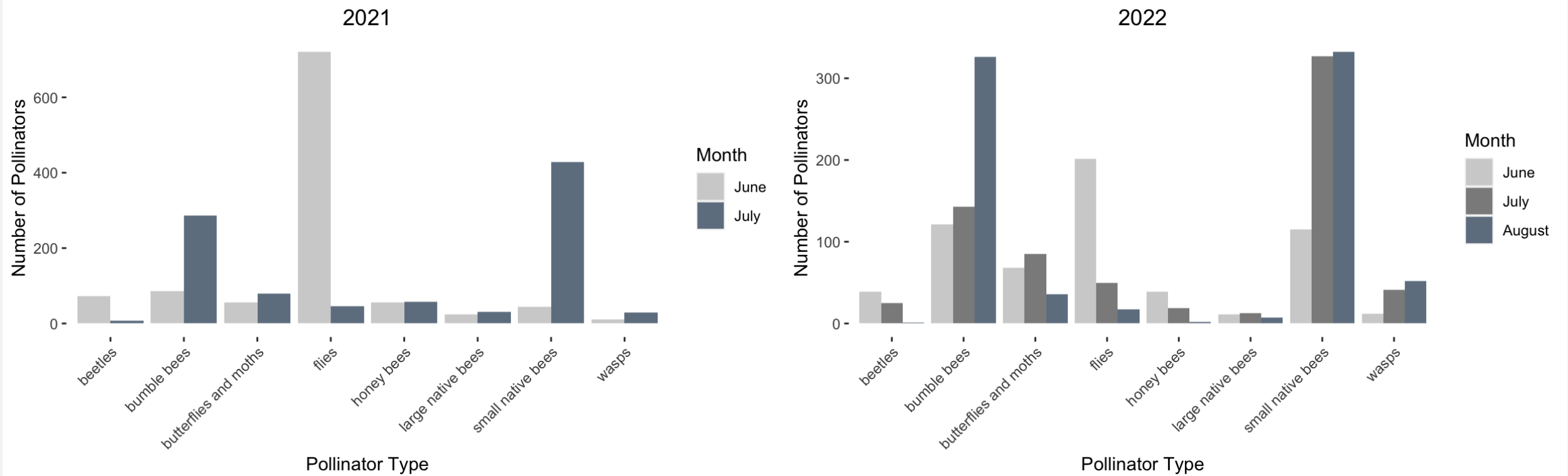


Beetles

1. Do more biodiverse pastures attract more pollinators?
2. Are native, sown species more attractive than unsown, weedy species?
3. Which plant species attract the most pollinators?



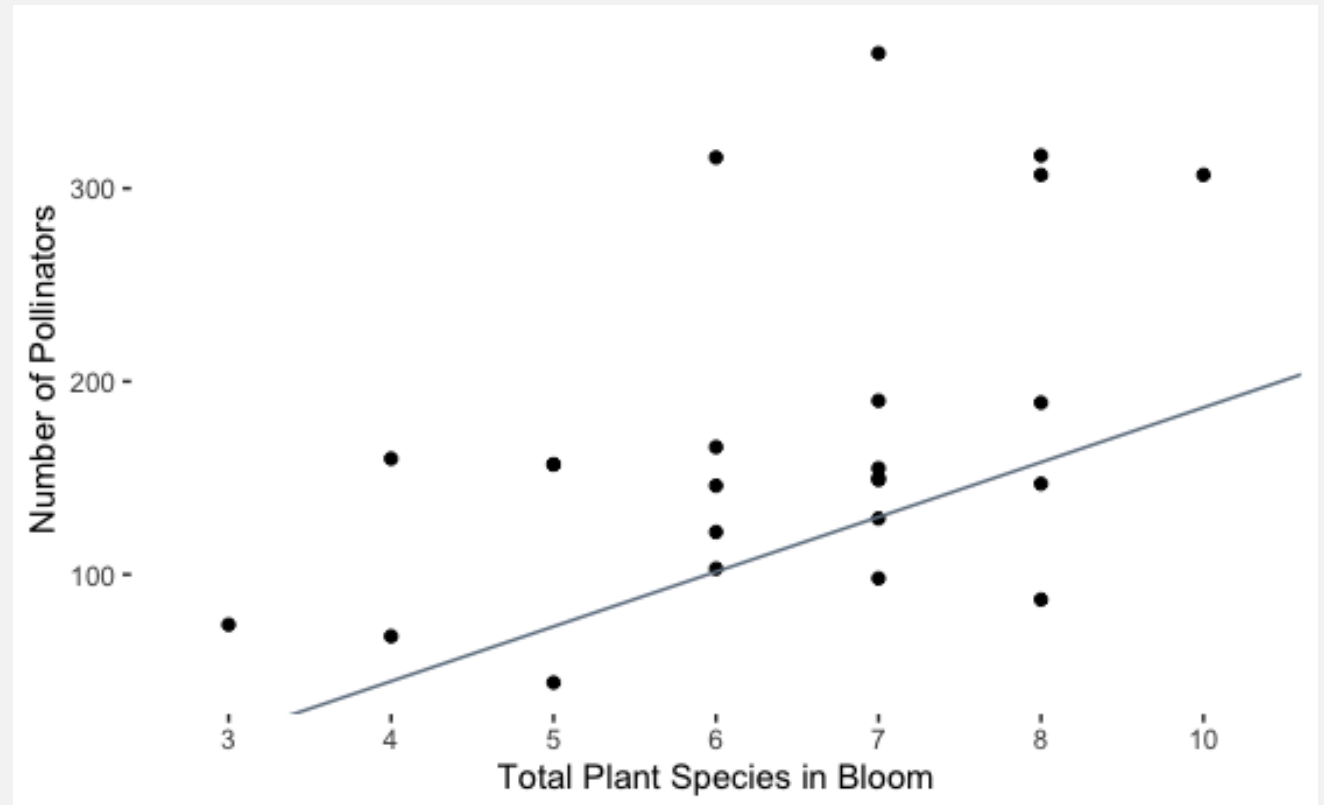
RESULTS



(Kietzman *et al.*, IN PREP)

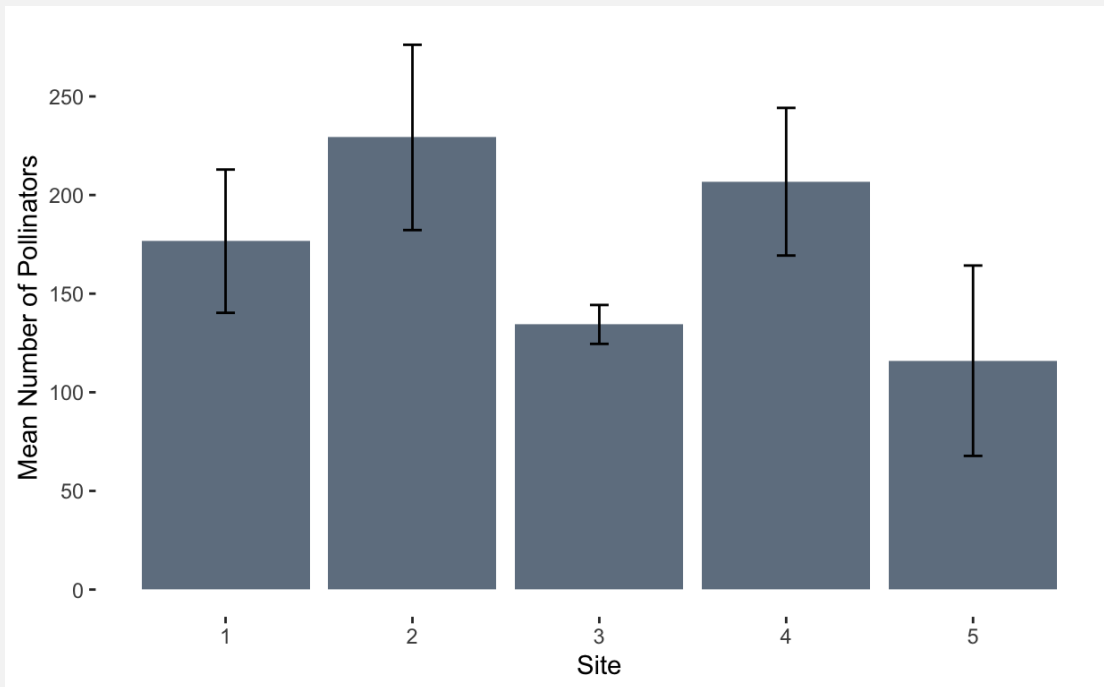
DO MORE BIODIVERSE PASTURES ATTRACT MORE POLLINATORS?

- Regression on the number of pollinators present and the number of species in bloom
- Significant positive correlation
 - $F = 7.703$, $p\text{-value} = 0.01104$, $R^2 = 0.2257$



(Kietzman *et al.*, IN PREP)

DO MORE BIODIVERSE PASTURES ATTRACT MORE POLLINATORS?



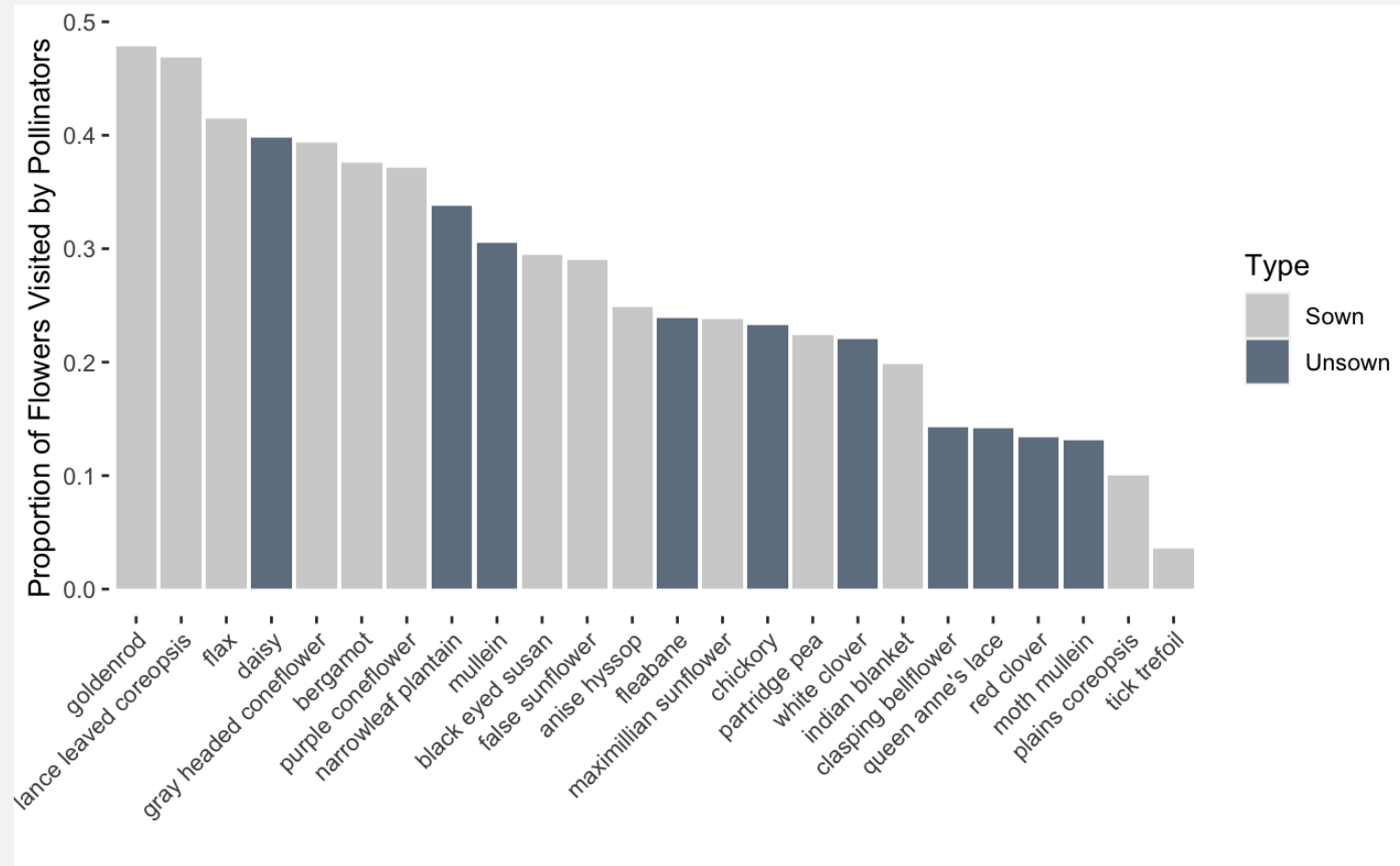
- Sites 2 and 4 had the most pollinators present and also the most floral diversity
- Two-way ANOVA: log-transformed number of pollinators at each site per day of observation varied significantly by site (F-value = 5.088, p -value = 0.03545) and based on the total number of flower species (sown and unsown) present in bloom (F-value = 10.208, p -value = 0.00455)

ARE NATIVE, SOWN SPECIES MORE ATTRACTIVE THAN UNSOWN, WEEDY SPECIES?



- Significantly more pollinators were attracted to sown versus unsown plant species
 - Paired t-test, $t = 5.1912$, $df = 23$, $p\text{-value} \ll 0.001$

WHICH PLANT SPECIES ATTRACT THE MOST POLLINATORS?



(Kietzman *et al.*, IN PREP)

WHICH PLANT SPECIES ATTRACT THE MOST POLLINATORS?

- Visitation to different plant species varied by type of pollinator



- Honey bees – white clover, black eyed susan
- Bumble bees – bergamot, grey headed coneflower, purple coneflower
- Small native bees – black eyed susan, grey headed coneflower
- Large native bees – grey headed coneflower, lance leaved coreopsis
- Flies – blue flax, lance leaved coreopsis
- Butterflies and moths – purple coneflower, lance leaved coreopsis
- Beetles – black eyed susan, lance leaved coreopsis
- Wasps – grey headed coneflower, early goldenrod

(Kietzman *et al.*, IN PREP)

DISCUSSION

- All plants that established and bloomed attracted at least some visits from pollinators
 - Some species were more attractive than others
- Many of the species in the seed mix did not establish and bloom
- Native wildflowers were more attractive than unsown weedy species, many of which are non-native
 - Exception to this was the honey bee, which visited white clover most commonly
 - Both species are introduced from Europe



DISCUSSION

- Recommended species to plant should be highly attractive to pollinators but also establish well in pastures
- Early goldenrod, lance leaved coreopsis, and blue flax received the greatest proportion of visits
- Other species were more attractive to specific groups of pollinators



“IDEAL” MIX BASED ON ATTRACTIVENESS AND ESTABLISHMENT

- Purple coneflower
- Lance leaved coreopsis
- Grey headed coneflower
- Black eyed susan
- Bergamot
- Blue flax
- Early goldenrod



QUESTIONS?

- Beesandbeef.spes.vt.edu
- Facebook and Instagram: Bee-friendly Beef

