

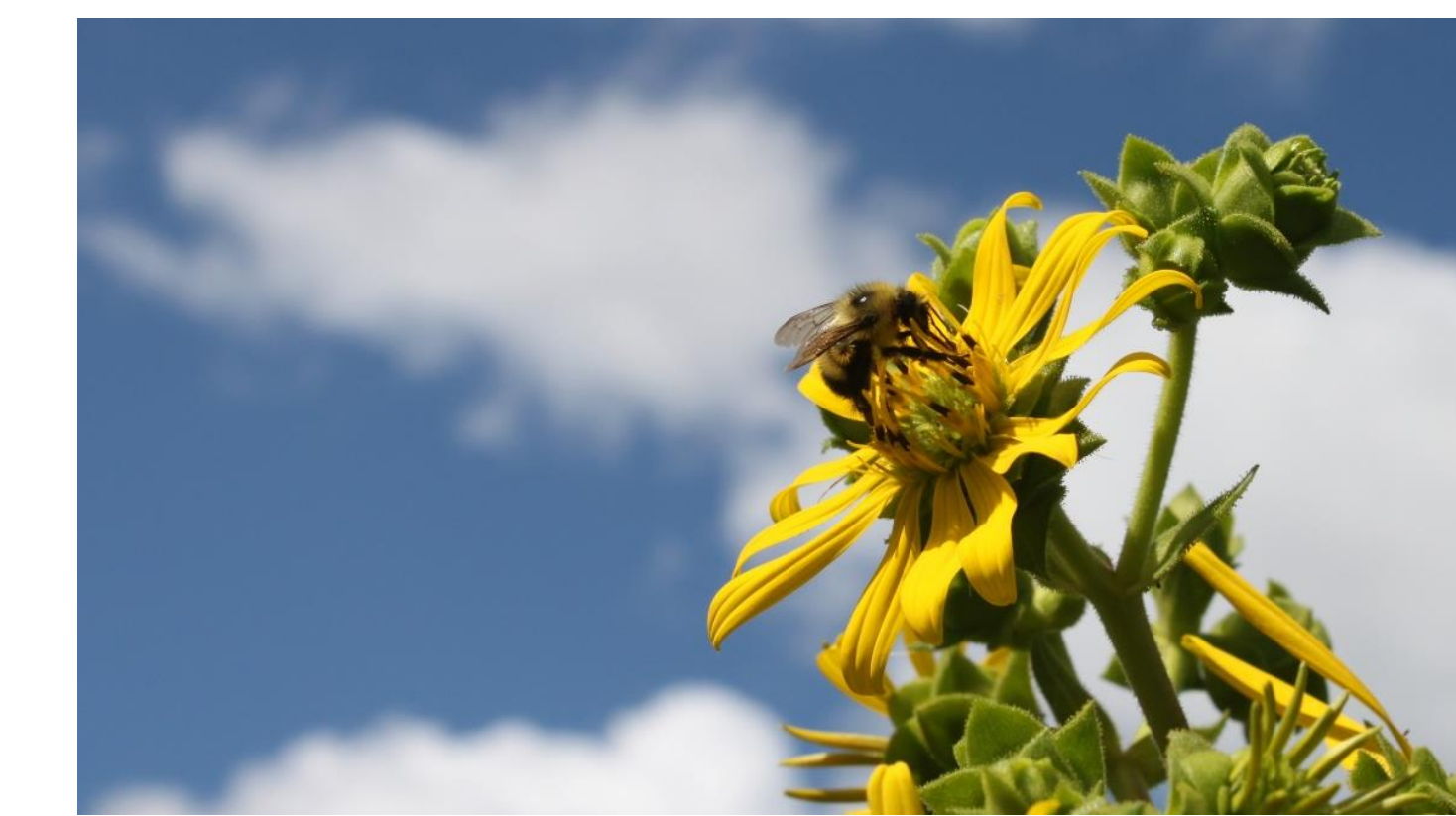


Pollinator response to harvesting and local resources in bioenergy grasslands

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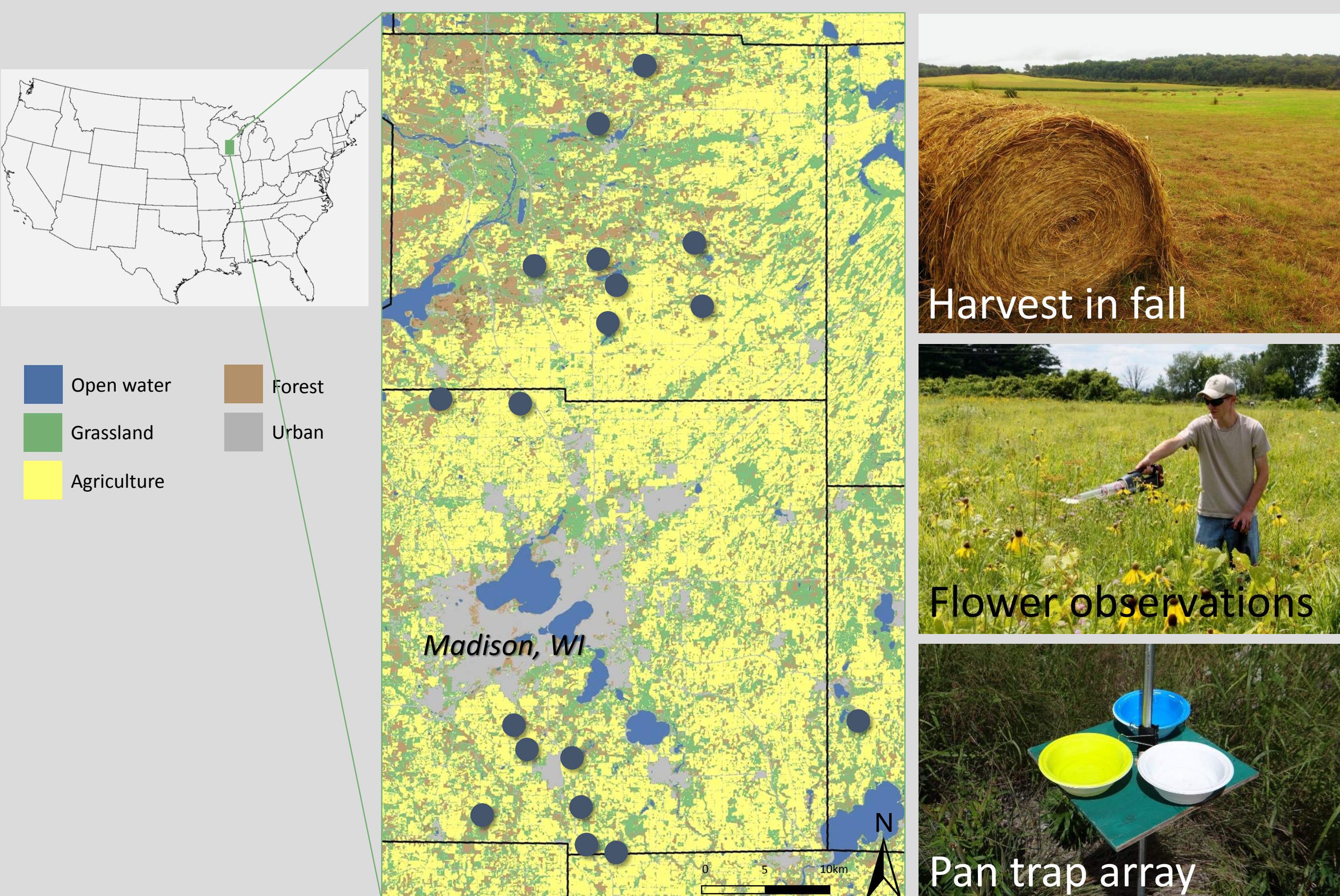
Background

Conversion of marginal agricultural lands to perennial grasslands for bioenergy production has the potential to help sustainably meet US energy needs without sacrificing food production. Perennial grasslands contain greater pollinator diversity than annual bioenergy crops, such as corn, and this diversity translates to superior pollination services.

However, we know little about how the disturbance caused by harvesting will affect pollinators and the services they provide.

We conducted an experiment to determine how the production-scale harvesting of grasslands and local floral resource diversity affects pollinator biodiversity and pollination services.

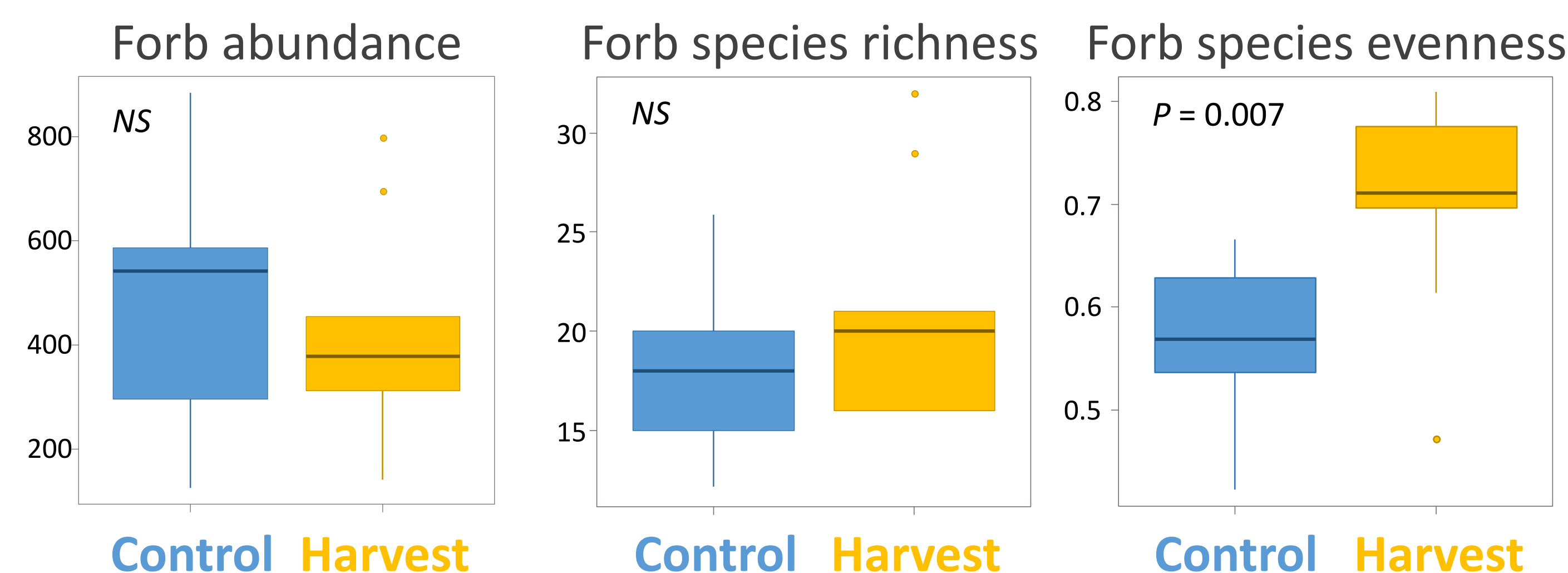
Predictions: We expect harvesting and the removal of plant biomass to have a positive effect on plant abundance and diversity (similar to the effects of fire), and thus a positive effect on pollinators. Stem-nesting species, however, may be negatively affected by the removal of nesting habitat.



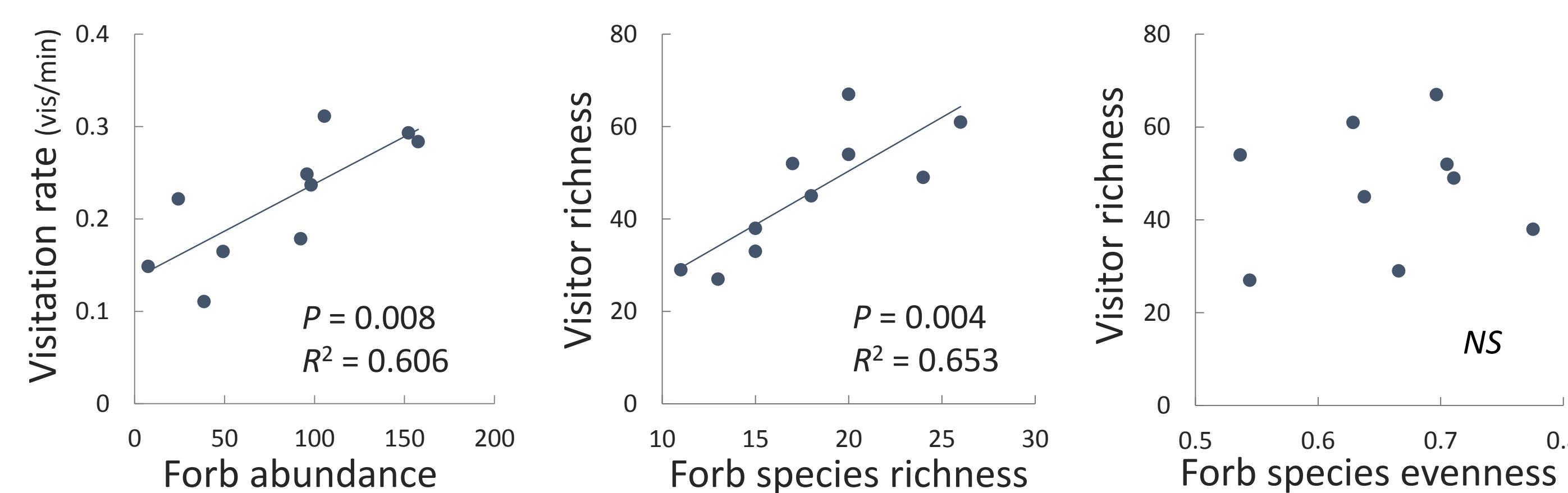
Methods

- In 2013 we sampled 18 grassland sites in southern Wisconsin USA
 - 9 harvested and 9 unharvested control sites
 - 50 x 100 m area sampled within each ~90 ha grasslands
 - Study is being replicated in Michigan
- Floral resource composition was sampled at each site along two 100 m belt transects
- Pollinator species composition and visitation rates were estimated using pan traps and timed observations of each plant species in flower (observations taken at subset of sites: 5 harvest, 5 control)
- Stem-nesting pollinator survivorship was estimated based on emergence from bamboo nest boxes

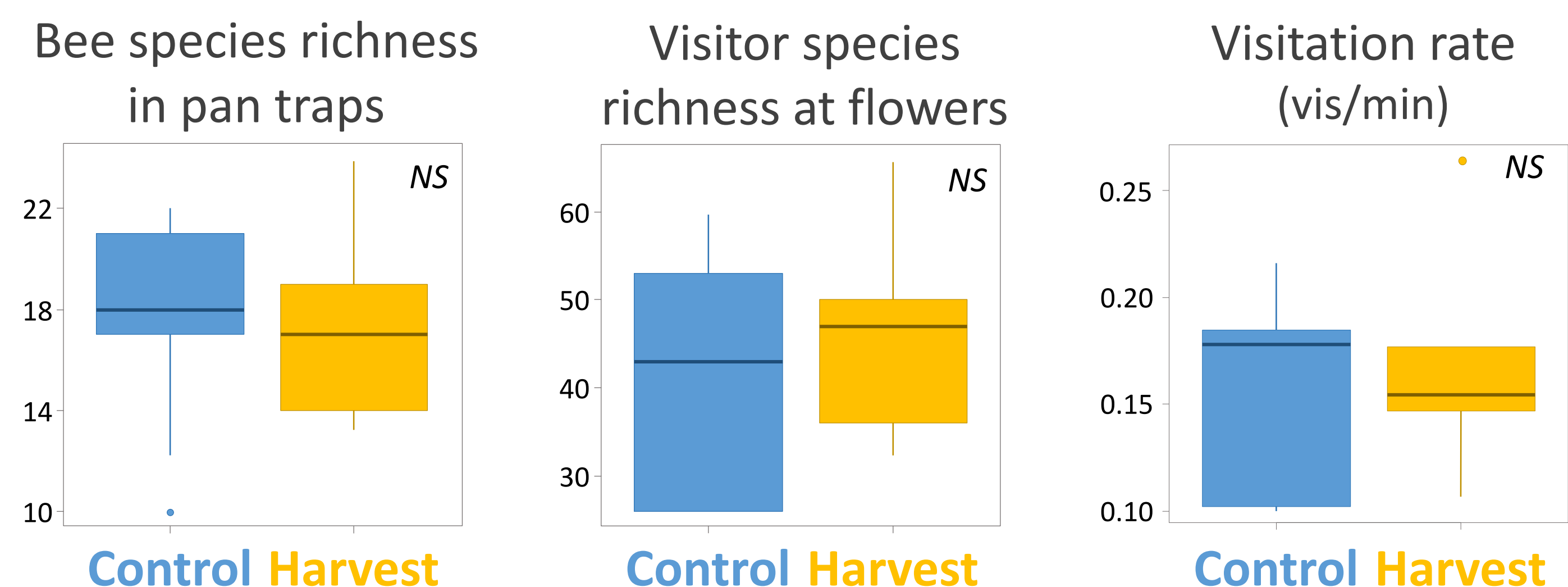
Harvesting increased forb evenness but did not affect forb abundance or richness



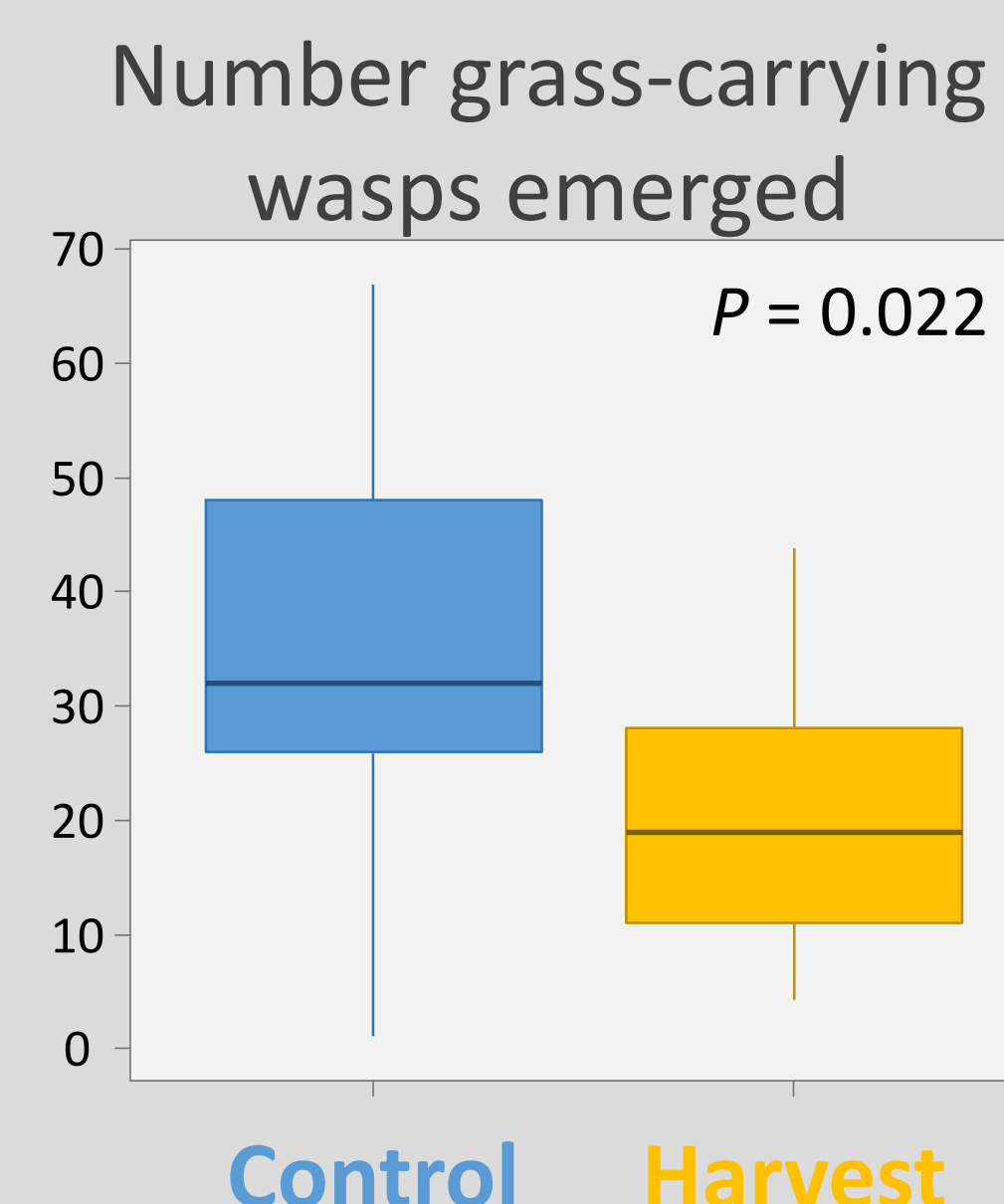
Pollinators dependent on local forb abundance and species richness but not evenness



No effect of harvesting on pollinators & flower visitation



Emergence of the stem-nesting species *Isodontia mexicana* (grass-carrying wasp) was lower at harvested sites

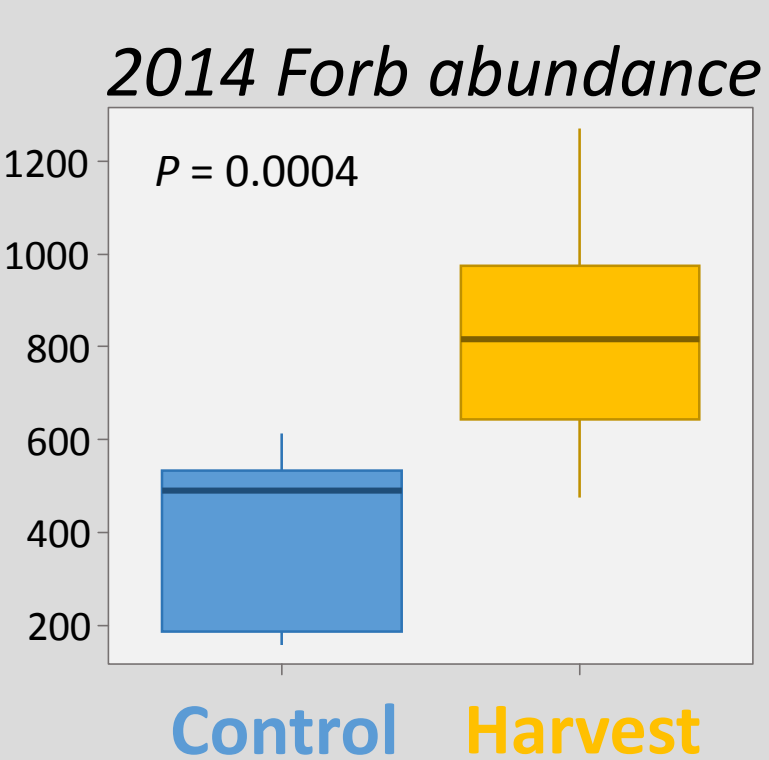


Conclusions after 1 year (2013)

- Harvesting increased forb species evenness, potentially knocking back dominant forbs
- However, harvesting had no effect on the abundance or richness of forbs: the components of the plant community important for pollinators
- Harvesting had little effect on pollinators in general, however particular stem-nesting specialists may be negatively affected

Ongoing research (2014 and beyond)

- Year 2 sampling was completed in 2014 and specimens are being processed
- In 2014 we deployed two bumblebee colonies (*Bombus impatiens*) at each site to investigate the effects of grassland harvesting and local resources on colony growth
- Preliminary 2014 results show that forbs are more abundant at harvested sites, thus harvesting may have a positive indirect effect on pollinators after 2 years of harvesting
- Wisconsin and Michigan data will be combined for final analysis



Acknowledgments

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