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Tallgrass Prairie Center: A Floral Resource Index to Assess Pollinator Habitat Quality in Eastern Iowa Prairies

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A Floral Resource Index to Assess Pollinator Habitat Quality in Eastern Iowa Prairies

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Background

- Native pollinators and colonies of European honey bees have experienced widespread declines in recent years. These insects play a significant role in the ecosystem, and also in food crop pollination.

- The Farm Service Agency (FSA) has developed a planting practice of CP42-Pollinator Habitat, to help strengthen and restore pollinator habitat for ecologically and economically important species [2].

- The goals of the CP42-Pollinator plantings are to have a diverse mix of at least nine species of pollinator-friendly wildflowers with a minimum of three species blooming in each of the following periods: April-June 15 , June 15-July, and August-October.

- There has been little to no monitoring of these plantings to see if they are meeting the program's goals.

Methods

Plant Density Sampling:
- We surveyed six CRP Pollinator habitat sites in summer 2017 for this analysis
- At each site, five random 100m transects were established using QGIS
- All plants >20 cm were counted within 75-0.5x2.0 m quadrats, at seven meter intervals along the length of each transect
- Density was recorded as the total number of plants/m^2 with a plant being classified as a series of stems connected at a base or prior knowledge of stems being connected underground.

Calculating Floral Resource Index (FRI) Score:
- Species were assigned bloom times based on [1] if available and [3] if not
- Data for a species was included in all bloom periods the species spanned.
- Sites were scored on a 100 point scale based on:
    - Goals (40 points) - Meeting the program goal of three species blooming in each period. Sites were scored (A) out of 9, which was then multiplied by 40.
    - Diversity (10 points) – The total number of species in bloom. (B) = the # of species blooming out of 20, which was then multiplied by 10.
    - Density (50 points) – The total number of plants per m^2 in (C) early, (D) middle, and (E) late bloom periods. Each bloom period was scored out of 10 based on Table 1. Density was scored as the sum total (out of 30), which was then multiplied by 50.

Score	Sum of plant densities (plants/m^2)
0	< 0.001
1	0.001 − 0.0099
2	0.010 − 0.999
3	0.100−0.500
4	0.500 - 0.999
5	1.000-1.99
6	2.000 −2.499
7	2.500 −2.999
8	3.000−3.499
9	3.500 − 3.999
10	>4.0

Table 1: Site density scores.

$$FRI = \left(\frac{A}{9} \times 40\right) + \left(\frac{B}{20} \times 10\right) + \left(\frac{C+D+E}{30} \times 50\right)$$

Goals   Diversity   Density

Results
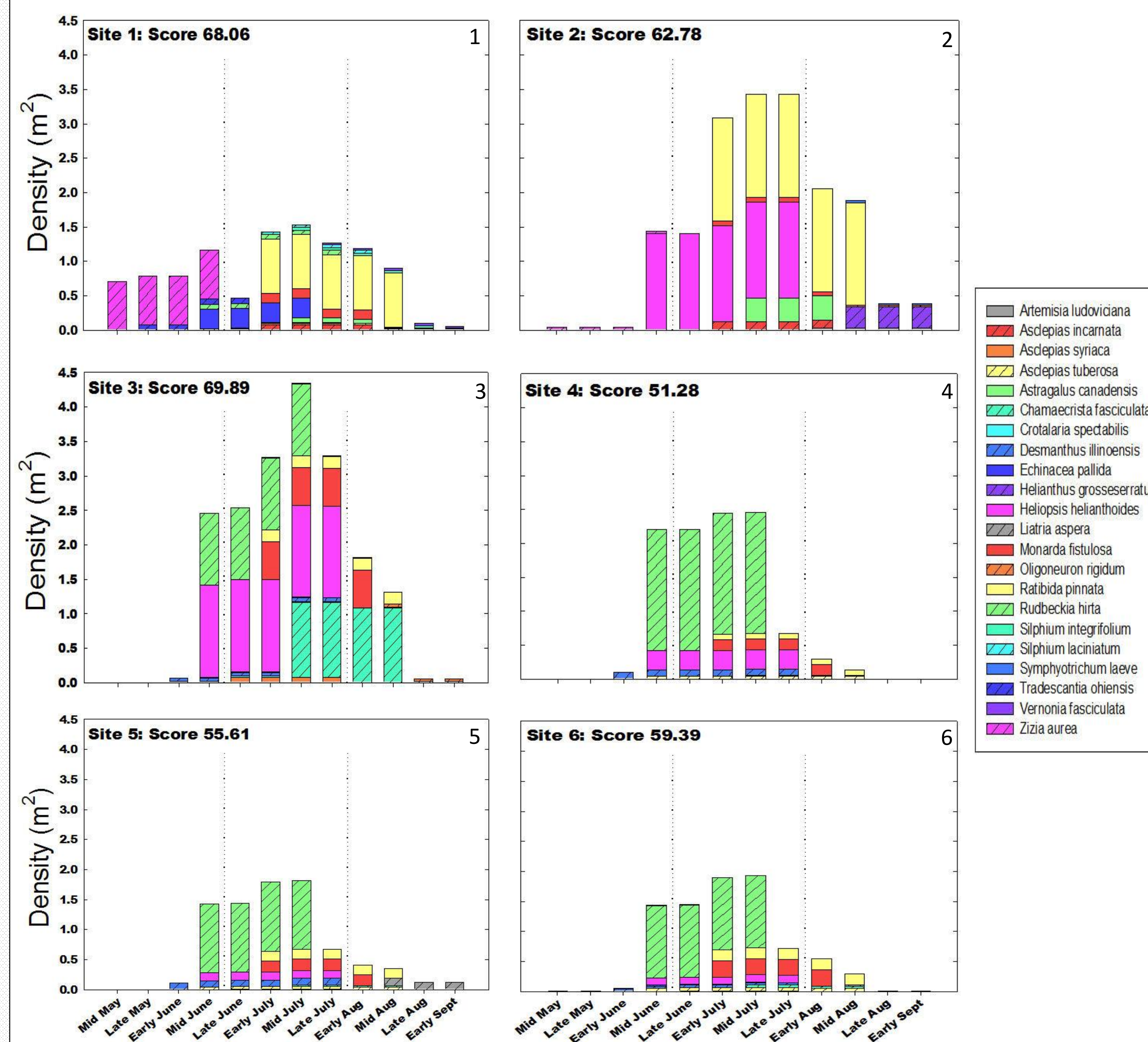
Figures 1-6: Total plant densities (plants/m^2) of blooming species at six CRP pollinator habitat sites. Colors represent different species of sown plants. The three bloom periods are represented by dividing lines. FRI scores are indicated.

Conclusions

- FRI scores ranged from 51.26 to 69.89 and none of the six CRP Pollinator Habitat sites fully met the goals of the CP-42 Pollinator program
    - Many sites had either 7 or 8 species (out of 9) with either 1 or 2 species missing from at least one bloom period

- Meeting the minimum goals of the program also does not guarantee that a large number of floral resources are available to pollinators
    - Floral resource density values were highest in the middle bloom period and lower in the early and late bloom period across sites

- Some factors to consider for these FRI scores include:
    - Species do not provide equivalent nectar resources across their entire bloom period
    - Absence of site management can lead to a reduction in FRI score with site age
    - Young sites may have lower FRI scores than older sites because of the time it takes for CRP pollinator habitat to establish.
    - Species differ in pollinator reward
    - Natural ecological succession can cause changes in FRI with time

Future Direction

- In the summer of 2018, there will be a continued sampling of Conservation Reserve Program and CP-42 Pollinator sites in Eastern Iowa.

- A closer look into the phenology of certain species to see which exhibit wanted traits such as longevity, most nectar resources, and a higher percent establishment

- A continuation of this method with a greater number of sites evaluated will allow for revision to be made if seen fit. Eventually, this method could be standardized and accepted by the ecological community as an evaluation tool for prairies

Acknowledgements
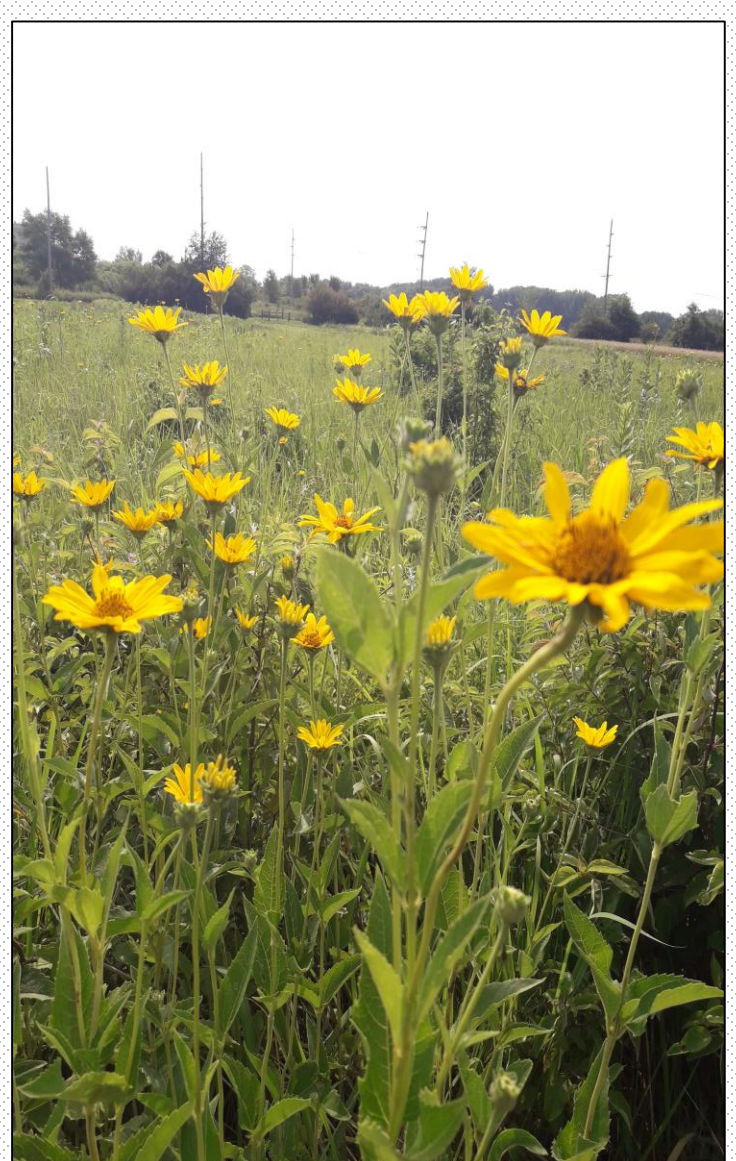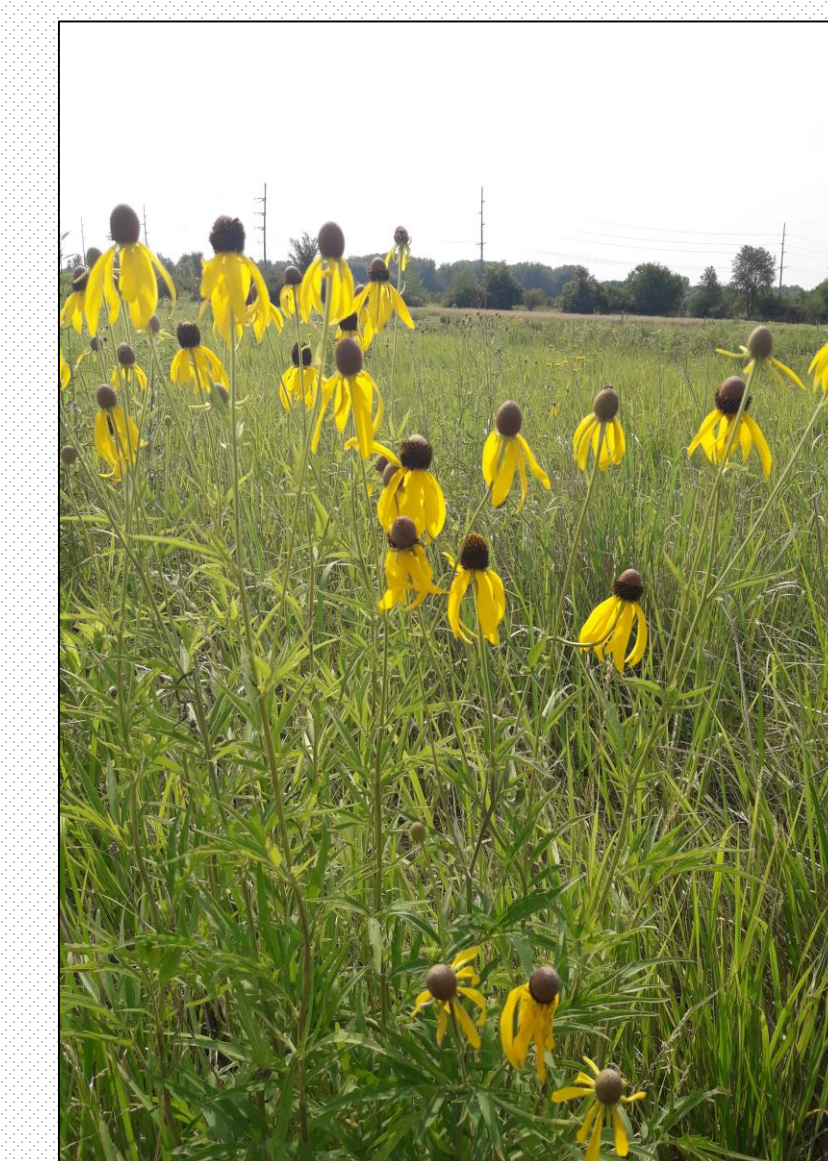
References

[1] Christiansen, Paul, and Mark Müller. *An illustrated guide to Iowa prairie plants*. Iowa City: U of Iowa Press, 1999. Print.
[2] CP42 Pollinator Habitat. (2013). [ebook] United States Department of Agriculture Farm Service Agency, pp.1-2. Available at : https://www.fsa.usda.gov/Internet/FSA_File/cp42_habitat.pdf [Accessed 15 Jul. 2017].
[3] "Minnesota Wildflowers in Bloom." *Minnesota Wildflowers*. N.p., n.d. Web