Floral resource availability and butterfly community characteristics in CP-42 Pollinator Habitat plantings

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Background

Prairies once covered approximately 85% of Iowa, but due to extensive habitat loss less than 0.1% of native prairies remain (Smith 1998). Habitat loss in Iowa has been driven by agricultural expansion and intensification, and has resulted in the decline of many native insect pollinators. To curb habitat loss and restore habitat for pollinators, USDA's Farm Service Agency (FSA) provides private landowners incentives to enroll agricultural land into the Conservation Reserve Program (CRP) Pollinator Habitat (CP-42) practice. The CP-42 conservation practice requires landowners to seed at least 9 species of pollinator friendly wildflowers, legumes, or shrubs on enrolled lands. CP-42 seed mixes must include least three species during each of three bloom periods (April-June 15, June 15-July, and August-October) (USDA 2011). About 50% of all CP-42 acres are seeded in Iowa (USDA 2018).

We have developed methods for evaluating floral resources and habitat quality for butterflies at CP-42 sites in central Iowa. Our study will produce data to assess the quality of habitat produced by the CP-42 program and to provide information about the effectiveness of the CP-42 program to Farm Service Agency.

Methods

Floral Resource Surveys: Floral resources were surveyed at 15 Conservation Reserve Program CP-42 sites in central Iowa. At each site, we established four 100 m transects. We recorded the abundance and diversity of flowers along the first 50 m of each transect per site. Twenty-five 1 m^2 quadrats were placed randomly on the right or left side of the transect every 2 m. We identified each species in bloom and counted all ramets and flowers in each quadrat. A total of 60 floral resource transects were surveyed between July 9-12, 2018 at the 15 sites. Floral resource surveys will be repeated in August 2018.

Pollinator Surveys: Butterfly communities were surveyed visually along four 50 m strip transects at each site. We walked the second 50 m of each transect at a pace of 10 m/min and recorded the species and behavior (searching, flushed, feeding, or courting) of each butterfly observed. For each sighting, we recorded whether the butterfly was within 3 m of the observer or >3 m away. For sightings, >3 m away, distance from the observer was estimated and recorded. Surveys took place on days with suitable weather conditions between 9 AM and 5 PM when butterflies were most active. We surveyed 15 CP-42 sites from July 9-12, 2018, and butterfly communities at the same sites will surveyed again in August.

Milkweed surveying: We recorded data on milkweeds at each site between June 11 and July 6, 2018. We established five 100 m transects at random points at each site and recorded milkweed plant and stem density within 1 m^2 quadrats placed every 7 m along the transects.

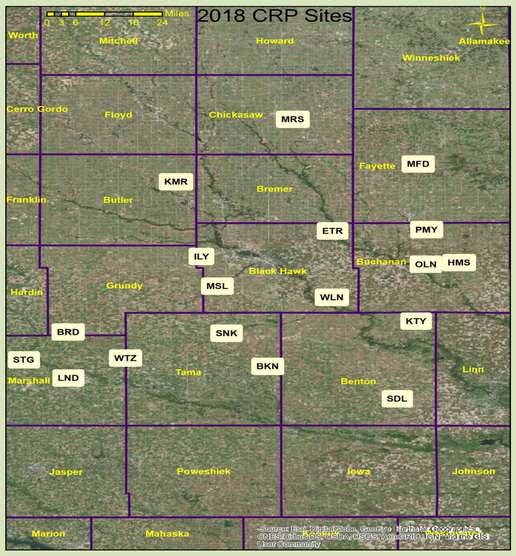


Figure 1. Map of CP-42 sites surveyed in 2018.

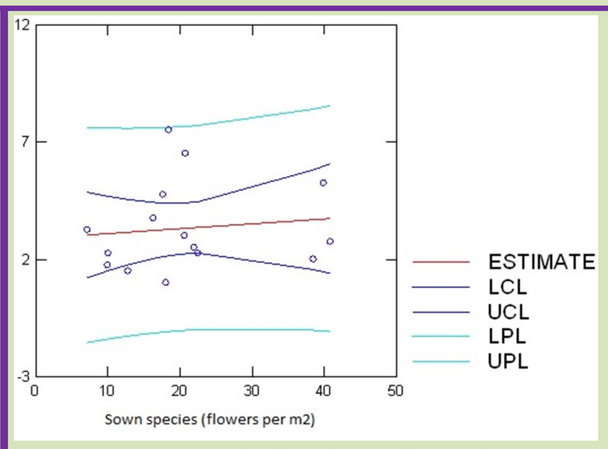


Figure 2. Graph of Total Butterflies and Planted Forbs in Bloom

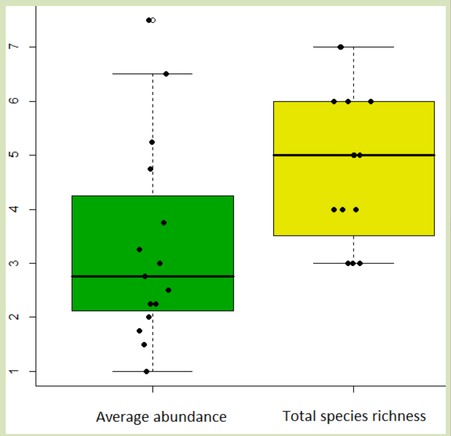
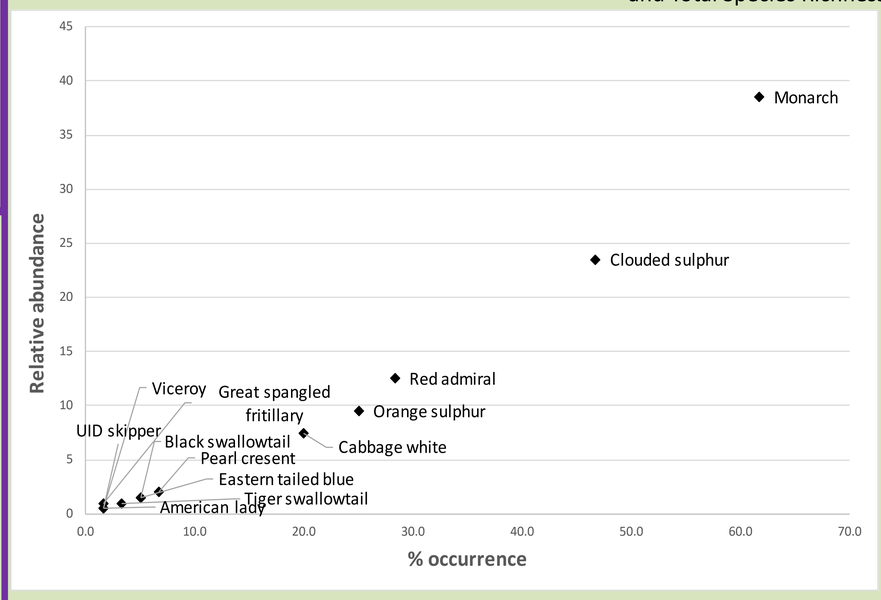


Figure 3. Box plot of Average Abundance and Total Species Richness



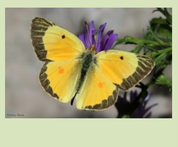
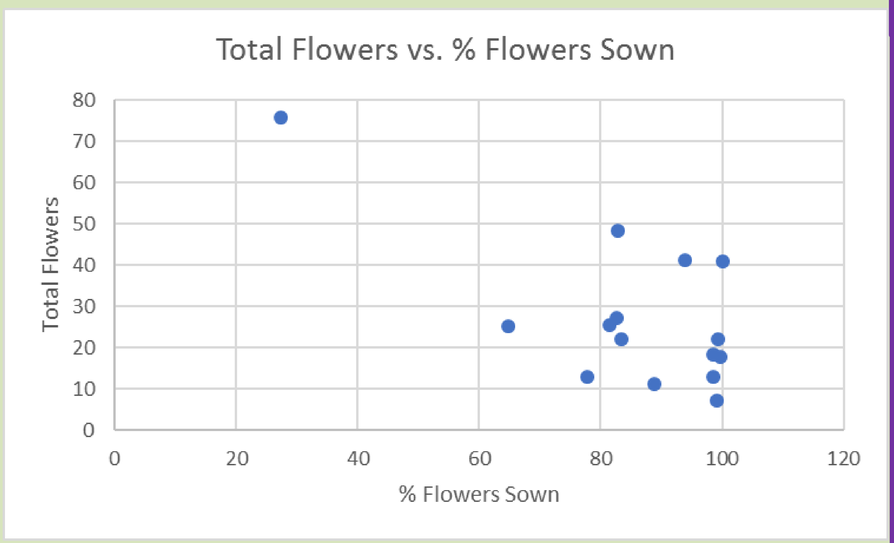


Figure 4. Relative Abundance vs. % Occurrence

Figure 5. Total Flowers vs. % Flowers Sown



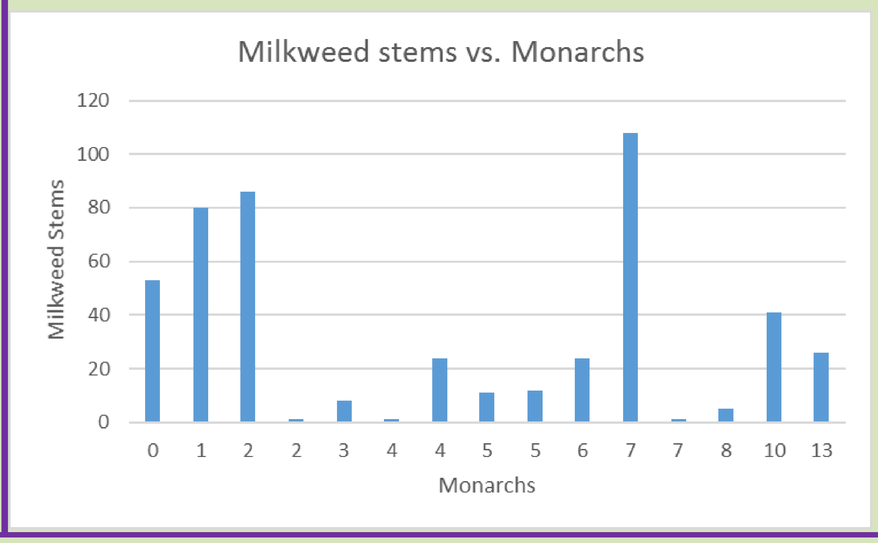


Figure 6. Milkweed Stems vs. Monarchs

Research Questions

1) What is the correlation between the floral resources and butterfly communities at CP-42 sites?
2) What percentage of blooming flowers at CP-42 sites are planted species versus opportunistic weeds?
3) Is there a correlation between milkweed density and the number of monarchs observed at CP-42 sites?

Results

- There was virtually no correlation between the amount of butterflies and forbs in bloom. (p=0.68) (figure 2)
- Average Abundance of butterflies recorded and Total Species Richness (figure 3)
- We recorded 200 butterflies representing 13 different species The Monarch Butterfly (*Danaus plexippus*) was most frequently observed with a overall relative abundance of 38.5 and an occurrence of 61.7% (figure 4)
- Top 4 most abundant butterflies recorded were *Danaus plexippus, Colias philodice, Vanessa atalanta*, and *Colias eurytheme*
- 35 different species of flowering forbs were recorded mid July. Out of the 35 species, 18 of them were weeds.
- The most abundant sown species was *Monarda fistulosa*, averaging 12.9 flowers per quadrat for every site. Other abundant sown species are *Heliopsis helianthoides, Ratibida pinnata,* and *Dalea purpurea.*
- The most abundant unsown species was *Erigeron strigosus,* averaging 0.882 flowers per quadrat for every site. Other abundant unsown species were *Cirsium arvense, Melilotus albus,* and *Trifolium repens.*
- *Medicago sativa* was an extremely abundant unsown species but was only found at four sites averaging 15.67 flowers per quadrat.
- The percentage of sown species in bloom for each site is approximately is between 77-100%. Two sites were at 27 and 65 percent for sown flowers in bloom. Both of these sites have presence of unsown *Medicago sativa*, one of them being extremely abundant. (figure 5)
- There was no correlation between the amount of Milkweed stems and Monarchs present. (figure 6)

Conclusion

Floral recourses and butterfly communities:

- We found that there was no significance between the amount of floral resources available and the number of butterflies.

Blooming Planted Versus Opportunistic Weeds

- Surveyed CP-42 sites in their third year have a good percentage of planted species in bloom. Fields with aggressive weeds have lower percentages of plants in bloom.

Milkweeds and Monarchs

- Our data showed no correlation between number of Milkweed stems and the number of Monarchs present

Future direction is to analyze data at the transect level. Resample every site and look for discrepancies in the data. Sample sites with more differences, CP-42 sites were all similar.

Acknowledgements

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