

Floral resource availability on native vs. reconstructed prairie for the federally endangered Karner Blue butterfly (*Lycaeides melissa samuelis*)

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Introduction

The Karner blue butterfly is a federally endangered species and is classified as a Species of Special Concern in Wisconsin. The butterfly is found in barrens and dry sand prairies where its larval host plant, wild lupine (*Lupinus perennis*) grows—along with various wildflower nectar sources. In the past 20 years, Karner blues have lost 90% of their habitat and Wisconsin has the largest remnant populations (Fig.1). With the goal of increasing populations, the KBB State Acres for Wildlife Enhancement (SAFE) Conservation Reserve Program has established nearly 2000 ac of habitat (2009-2012) on private land (Fig. 2), which have been planted with a USDA-approved seed mix containing wild lupine and 10 other native forb and 5 grass species. **The objective of our research was to evaluate whether the nectar species established on the CRP SAFE sites resembled native dry sand prairie species available to Karner adults during both their first and second brood flights.**

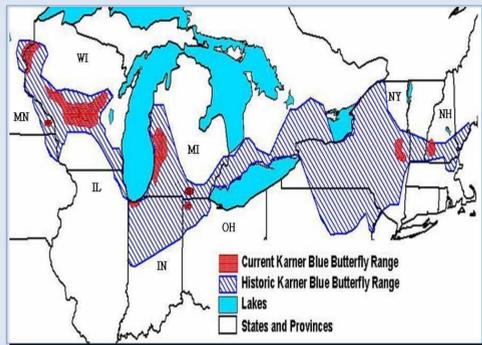


Fig. 1. Map of current and past Karner blue butterfly ranges throughout the Midwest and Northeast United States (map from USFWS).

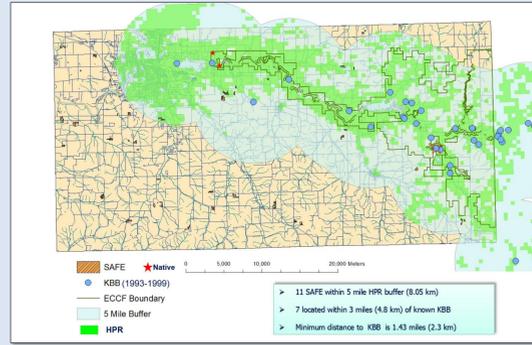


Fig. 2. Established habitats (SAFE CRP farms) for the Karner blue butterfly through the USDA Conservation Reserve Program. Map indicates proximity of farms to known KBB populations in the High Potential Recovery area (map D. Hon & PK Neff 2011).

Methods

We assessed floral resource availability for pollinators on native prairies and reconstructed prairies in the KBB State Acres for Wildlife Enhancement (SAFE) Conservation Reserve Program, Eau Claire County (Fig.3). During two generation flight periods (June and July, 2013) we sampled 5 randomized 2-m circular plots along each of 5 transects/site (n=25) and identified the closest available blooming forb, if present (Figs.4,5). We then calculated the proportion of each species in bloom versus all blooming resources available. We categorized species as a native nectar species, non-native species or none available to compare availability between native (n=2 or 3) and CRP sites (n=4) for each flight period (2x3 contingency table). We used individual species data to compare the mean proportion of the blooming nectar species available during second flight for the native sites (n=2) and again for all CRP SAFE study sites (n=8)(One-way ANOVA for each site type).



Fig. 3. One of the 8 KBB CRP SAFE sites surveyed. This 14.40 acre parcel was seeded in 2009 (Aerial photo USDA).



Fig. 4. John Eaton conducting blooming forb surveys

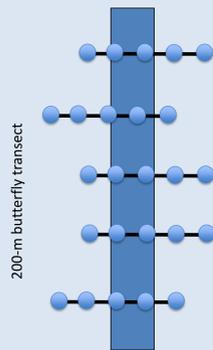


Fig. 5. Sampling area/site (5 transects/site, five 2-m circular quads/25-m transect)

Acknowledgments

We thank the Xerces Society, the USDA Farm Service Agency and Natural Resource Conservation Altoona Service Center and staff, the CRP Safe landowners and UWEC ORSP for cooperation and support. References are available in Kleintjes Neff and Mader (2013), CRP Safe for Karner Blue Butterflies, Xerces Society Publications. <http://www.xerces.org/pollinator-conservation/agriculture/pollinator-habitat-installation-guides/> All photos by PK Neff unless referenced.

Results and Discussion

Early Season KBB first flight-Native sites had significantly more native blooming nectar plants than SAFE CRP planted sites ($\chi^2=7.42$, $df=2$, $p<0.05$)(Fig.6a). During first flight, blooming Hoary Puccoon (52%) was most available on the Northshore site (Fig.7a), wild lupine (68%) on the Coon Fork Barrens site (Fig.7c), and Downy Phlox (36%) and Flowering Spurge (28%) on the Tower site (Fig.7b). CRP Safe sites had few native planted nectar species available (Wild lupine 6% and Wild alexanders 13%) with 45% of rapid assessment plots empty of any blooming forb. This indicates that blooming nectar sources were fewer in number and widely distributed (Fig.8). CRP Safe sites are poor providers of nectar availability early in the season compared with native sites.



Fig. 6a. Availability of blooming forbs first flight

Fig. 6b. Availability of blooming forbs second flight



Native site Northshore, Hoary Puccoon (*Lithospermum canescens*)



Native site Coon Fork Barrens, Wild Lupine (*Lupinus perennis*)



SAFE CRP planted field; grass dominated, few forbs

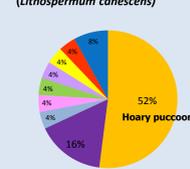


Fig. 7a. North Shore 100% native, 9 spp.

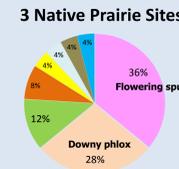


Fig. 7b. Tower 90% native, 8 spp.

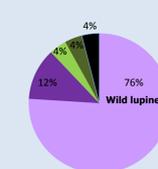


Fig. 7c. Coon Fork SNA 100% native, 4 spp.

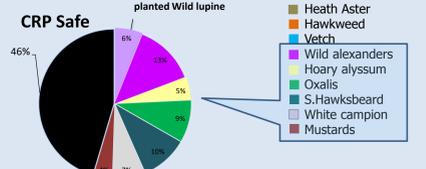
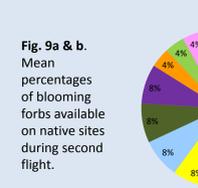
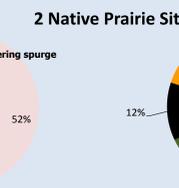


Fig. 8. KBB CRP SAFE Sites (n=4), 28% native, 7 spp.

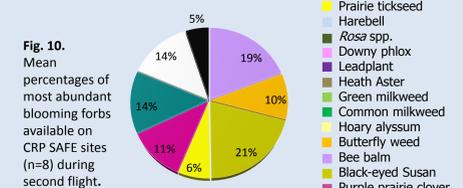
Late season KBB second flight- Of the same four planted SAFE CRP sites, there was no significant difference in availability of blooming native nectar plants, non-native nectar plants, and absence of blooming forbs in comparison with native sites ($\chi^2=0.89$, $df=2$, $p>0.05$)(Fig.6b). Essentially, both planted and native sites had 90% availability of some nectar species. Six of nine planted species were most available on the SAFE CRP sites (Bee Balm 20%, Black-eyed Susan 31%, and Purple Prairie Clover 16%). The mean proportion of most abundant blooming nectar species available during second flight significantly differed between native sites (ANOVA $F=10.2$, $df=4$, $p<0.05$) with flowering spurge the most available on both sites (52% NS and 36% Tower), followed by Prairie tickseed (8% NS and 20% Tower)(Fig.9a&b). Northshore had greater availability of more species (9 spp.) than Tower (7 spp.). On CRP Safe sites there was no significant difference in proportion of blooming forbs available (ANOVA $F=0.98$, $df=7$, $p>0.05$). Blooming Bee balm (19%) and Black-eyed Susan (21%) were the most available on the majority of sites (Fig.10). CRP Safe sites provided available nectar resources comparable to native sites later in the season, although they were predominantly planted native species and volunteer weedy non-native species. **We conclude that CRP sites provide nectar resources yet are limited in availability of native forbs across both flights of the Karner blue butterfly.**



a. Northshore 100% native, 9 spp.



b. Tower 71% native, 7 spp.



KBB CRP Safe (n=8) 72% native, 11 spp.



Native site Northshore Prairie, July 2012



Great Spangled Fritillary (*Speyeria cybele*) nectaring on Bee balm (*Monarda fistulosa*)



SAFE CRP field, July 2012