Assessing pollinator and vegetation response to the USDA State Acres for Wildlife Enhancement (SAFE) program in Eau Claire County, WI

Brianna Schmidt and Otto Renner
Faculty: Dr. Paula Kleintjes Neff and Dr. Evan Weiher
Department of Biology, University of Wisconsin–Eau Claire

United States Department of Agriculture
Natural Resources Conservation Service

ABSTRACT

In 2009, we began a 10-year study of the effectiveness of State Acres for Wildlife Enhancement (SAFE), a new program managed by the United States Department of Agriculture's Natural Resource Conservation Service (USDA-NRCS). In Eau Claire County, SAFE was created to provide suitable habitat for the federally endangered Karner Blue butterfly (*Lycaeides melissa samuelis*). In July-August, 2009 and 2010, we conducted surveys of the butterflies and vegetation along a 200-m transect on each of eight CRP-SAFE sites and two native prairie sites. Bees were additionally collected along transects in 2010. We observed a total of 502 butterflies belonging to 27 species, the majority of which were Cabbage Whites (*Pieris rapae*) and Monarchs (*Danaus plexippus*) in 2009 and clouded sulphur (*Colias philodice*) and Red Admirals (*Vanessa atalanta*) in 2010. Gorgon Checkerspots (*Chlosyne gorgone*) and Karner Blues were unique to native sites. We counted a total of 78 forbs, 20 of which were restricted to native sites. On CRP-SAFE sites we observed 9 of 11 species planted as part of the SAFE program (e.g. *Lupinus perennis*). NMDS ordination of forb species community composition separated SAFE sites from native sites. SAFE sites were dominated by "weedy species and influenced by pre cropping history.

OBJECTIVE AND METHODS

WHAT? Our objective is to assess the response of pollinators and vegetation to the USDA FSA & NRCS's CRP-SAFE program to enhance former agricultural fields for the Karner Blue butterfly

WHERE? Eight experimental sites on private farms (planted with 11 species of native forbs and six grasses in June 2009) and two native control sites in Eau Claire County, WI.

WHEN? June - August, 2009 and 2010 (will continue until August 2009)

HOW? We surveyed butterflies within a 5-m radius semi-circle while walking along a 200-m transect. We ranked the abundance of each plant species observed within a 1-m quadrant along a parallel 200-m transect. Species abundance were ranked on a scale of 1-3 with 1 being low in percent cover and 3 being high in percent cover (>75%). Bees were collected with sweep nets along each 200-m transect after a butterfly survey.

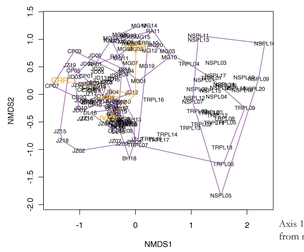
Fig. 2

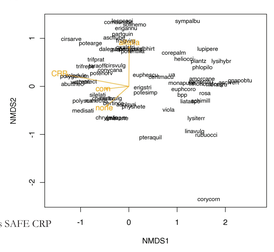
Variables Measured:

- Butterfly and bees species richness and abundance
- Percent cover of forb species by rank
- Environmental variables (temperature, wind speed, cloudiness, cropping history
- Excel and R used for data analysis

Vegetation Results

2009

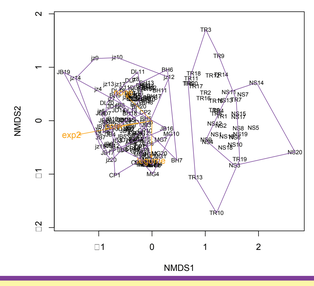




Axis 1 of NMDS ordination separates SAFE CRP from native sites in both years

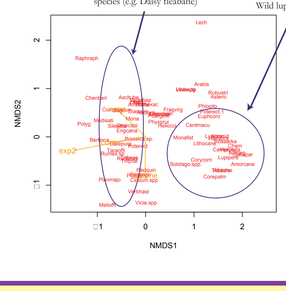
Axis 2 for SAFE sites suggests separation of species composition according to cropping history in 2008 (corn, alfalfa, or old field)

2010



Generalist native and invasive old field species (e.g. Daisy fleabane)

Native dry sand prairie species (e.g. Wild lupine)



Butterfly Results

Table 1 Pooled abundance of butterfly species observed per year on SAFE CRP sites (n=8) and native "control" sites (n=2). SAFE sites were planted in 2009 so sampling occurred 2x, 10 days apart (mid-July-August). In 2010, sites were sampled 3x, 10 days apart (late June-early August).

	2009		2010	
Species Observed	SAFE	NATIVE	SAFE	NATIVE
Black swallowtail	0	0	1	0
Cabbage white	42	0	33	0
Orange sulphur	0	0	4	1
Clouded sulphur	3	2	175	52
American copper	0	1	7	0
Coral hairstreak	0	0	5	4
Eastern tailed blue	0	1	1	0
Karner blue	0	0	0	1
Gorgone checkerspot	0	1	0	0
Great spangled fritillary	0	0	0	8
Aphrodite fritillary	2	6	7	8
Meadow fritillary	0	0	1	3
Varigated fritillary	1	0	0	0
Pearl/Northern crescent	0	0	9	0
Milbert's tortoiseshell	0	0	12	0
Red admiral	0	0	56	1
Painted lady	0	0	3	0
American lady	0	0	2	0
Red spotted purple	0	0	1	0
Monarch	12	0	26	1
Buckeye	0	0	0	1
Little wood satyr	0	0	1	1
Common ringlet	0	0	0	1
Common wood nymph	0	0	3	0
European skipper	1	0	2	2
Delaware skipper	0	0	1	0
Dun white	2	0	0	0
Total abundance	63	11	344	84
Species richness	7	5	19	13

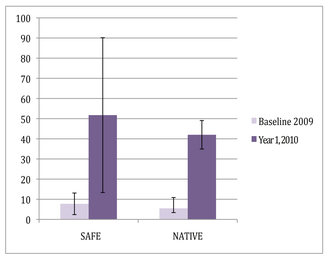


Fig. 5 Mean number of butterflies/transect pooled across sampling periods for each habitat (SAFE or native) between years (SAFE t-test, t=-3.2, df=14, p<0.05 and native t-test, t=-6.9, df=3, p<0.05).

Bee Results

Table 2 Pooled abundance of bee species observed per year on SAFE CRP sites (n=8) and native "control" sites (n=2). Sampling occured three times, at least 10 days apart (July - August, 2010).

	SAFE (n=8)	Native (n=2)
Species observed		
terricola	1	0
vagans	14	38
fervidus	7	0
auricomus	7	0
ternarius	4	0
rufocinctus	2	2
bimaculatus	12	6
griseocollis	8	4
impatiens	4	18
A. mellifera	74	0
Total abundance	68	133
Species richness	5	10

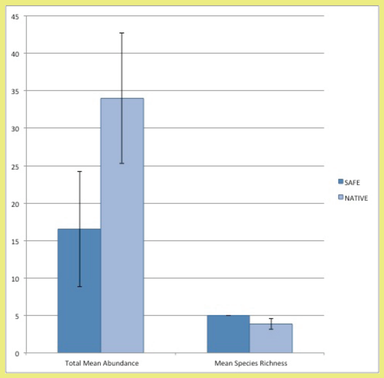


Fig. 7 Total mean abundance for SAFE and Native sites (16.5 ± 7.70 and 34 ± 8.70 respectively, p>0.05) and mean species richness for SAFE and Native sites (5 ± 0.0 and 3.86 ± 0.69 respectively, p>0.05).

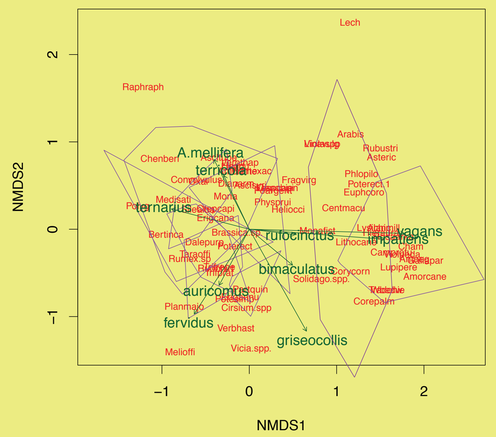


Fig. 8 NMDS showing the distribution of native pollinator species observed on native sites (polygons on the right side) and SAFE sites (polygons on the left side).

SUMMARY

We counted a total 78 species of forbs, 20 of which were restricted to native sites. On SAFE sites we observed 9 of 11 species planted as part of the CRP program.

SAFE sites and native sites differed in forb species composition in 2009 and 2010 with greater separation of treatment in 2010 (Fig. 6).

Cropping history in 2008 (corn, alfalfa or old field) influenced SAFE forb species establishment and composition (Fig. 6).

We observed 502 butterflies belonging to 27 species, the majority of which were *Pieris rapae* and *Danaus plexxipus* in 2009 and *Colias philodice* and *Vanessa atalanta* in 2010. *Chlosyne gorgone* and *Lycaeides melissa samuelis* were unique to native sites. Thus far, species composition between SAFE and native sites is not similar, with SAFE sites dominated by common, "weedy" species (Table 1).

Bees (~250 individuals) were collected across all sites three times during summer 2010 and represented 5 families (Andrenidae, Apidae, Colletidae, Halictidae and Megachilidae). Greatest abundance and species richness per transect were found on native sites. Honeybees (*Apis mellifera*) were observed on CRP SAFE sites only.

We observed a total of 68 *Apinae* species (x=34.0/transect) on native sites (n=2), the majority of which were *B. ragans* and *B. impatiens*, and to a lesser extent *B. bimaculatus*, *B. griseocollis*, and *B. rufocinctus*.

We observed a total of 133 *Apinae* species (x=16.5/transect) on CRP SAFE (n=8) sites. No species was dominate but included *B. fervidus*, *B. rufocinctus*, *B.ternarius*, *B. griseocollis*, *B. bimaculatus*, *B.ragans*, *B. impatiens*, *B.auricomus*, and *B. terriola*. Four species were only found on CRP SAFE sites and for all observations, final species verification is pending.

SAFE sites and native sites differed in *Apinae* species composition and abundance (Fig. 8). *B. impatiens* and *B. ragans* were highly associated with the vegetation at native sites, where *B. fervidus*, *B. auricomus*, *B. terriola*, *B. ternarius*, and *A. mellifera* were highly associated with the vegetation at SAFE sites.

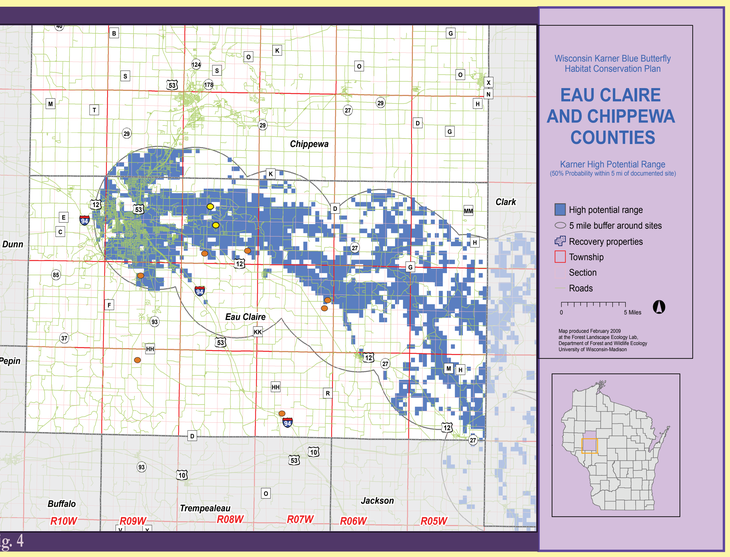


Fig. 4

● Indicates an experimental site

○ Indicates a control site

Wild Lupine (*Lupinus perennis*)

Native (control) site

Planted (experimental) site

Fig. 3

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