The ecology and conservation of grassland butterflies in the central U.S.

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Outline of the Presentation, Part I

- Basic butterfly biology
- Butterflies as pollinators
- Rare butterflies of Kansas
Outline of the Presentation, Part 2

- Effects of fire and grazing on grassland butterflies
- Resources to learn more about butterflies
- 15 common KS butterflies
Life Cycle of a Painted Lady, *Vanessa cardui*

- **Egg**
- **Larva**
- **Chrysalis**
- **Adult**
Some butterflies migrate

The Monarch is the best-known migratory butterfly

Knife River Indian Villages National Historic Site, North Dakota
Fall migratory pathways of the Monarch
The Painted Lady is another migrant

Kirtland Air Force Base, New Mexico
Other butterflies are non-migratory

Such as this regal fritillary, seen in Anderson County, Kansas
Implications of migratory status

- migratory butterflies aren’t vulnerable to prescribed burns in winter and early spring (they haven’t arrived yet)
- full-year resident butterflies ARE vulnerable to winter and spring fires
- migratory butterflies may need lots of nectar sources on their flyway to fuel their flight
Most butterfly caterpillars are host plant specialists.
Implications of host plant specialization

• If you have the host plant, you probably have the butterfly

• If you plant their host, the butterfly may follow

• If you and your neighbors lack the host plants, you are unlikely to see the butterflies except during migration
Butterflies as pollinators

• Bees pollinate more plant species than butterflies
• But some plants species depend on butterflies for pollination

• For example, in southern Africa, 14 plant species depend on the Mountain beauty butterfly for pollination
Butterflies as pollinators

• In the U.S., the role of butterflies in pollinating our plants has seldom been studied

• Most butterflies probably carry pollen only 100 feet or less

• However, migratory butterflies may carry pollen for thousands of miles!!!!
Butterflies can go extinct

The Xerces Blue was wiped out in California in 1943
Butterflies can become federally-listed (to help prevent extinction)

For example, the Schaus’ Swallowtail is an endangered species in southern Florida
<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
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<tbody>
<tr>
<td>Bell’s roadside skipper</td>
<td><em>Amblyscirtes belli</em></td>
</tr>
<tr>
<td>Linda’s roadside skipper</td>
<td><em>Amblyscirtes linda</em></td>
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<tr>
<td>Arogos skipper</td>
<td><em>Atrytone arogos</em></td>
</tr>
<tr>
<td>Monarch</td>
<td><em>Danaus plexippus</em></td>
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<tr>
<td>Mottled duskywing</td>
<td><em>Erynnis martialis</em></td>
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<tr>
<td>Two-spotted skipper</td>
<td><em>Euphyes bimacula</em></td>
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<tr>
<td>Dotted skipper</td>
<td><em>Hesperia attalus</em></td>
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<tr>
<td>Ottoe skipper</td>
<td><em>Hesperia ottoe</em></td>
</tr>
<tr>
<td>Byssus skipper</td>
<td><em>Problema byssus</em></td>
</tr>
<tr>
<td>Regal fritillary</td>
<td><em>Speyeria idalia</em></td>
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</tbody>
</table>
Regal fritillary

Recorded from almost every county in the state, but vulnerable to some land management practices

R. Woodward
Two- spotted skipper

Only sighting of this species in Kansas is from far northwest corner of state

(by Bill Benner)

- (The spots are hidden by the hindwing in this photo)
Monarch? It is imperiled?? But I see them every year!!

Yes, there are still millions, but they are declining, and their migration is endangered
In fall, almost every monarch from eastern North America flies to one small area in Mexico!!

And that area gets smaller every year due to logging.
The effects of fire and cattle grazing on butterflies in tallgrass prairie

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“the regal fritillary is an icon of the American prairie”

-Harvard ecologist E.O. Wilson, January 18, 2007 in Stillwater, OK

© KC Wildshots
• Historic range of the regal fritillary
The Prairie Butterfly Paradox

• For thousands of years, fire occurred frequently on North American prairies
• Prairie without fire becomes woodland
• Numerous butterfly species need prairie
• Yet many prairie butterflies are believed to be vulnerable to fire!
• How do we keep our prairie…and our butterflies?
Causes for Decline

• Conversion of native prairie to row crops

• Urban development

• Too much/too little grazing disturbance??

• Woody plant encroachment (not enough fire???)

• Too much fire??
Tallgrass prairie
(great habitat for regal fritillaries)
Viola sororia  Viola sagittata
Regal fritillary caterpillar
Regal fritillary chrysalis

Photo by Jim Rathert
In September, each regal fritillary female can lay up to 3,000 eggs in prairie!
If the prairie gets burned in winter or spring… the regal fritillary larvae get incinerated!
Because most grasslands are burned and/or grazed.

Understanding effects of fire and grazing is essential.
Our Research Questions

• 1) Does early spring burning of prairie patches impact butterfly populations?
• 2) Does grazing impacts butterfly populations?
• 3) What are the effects of the fire-grazing interaction on butterfly populations?
• Though the regal fritillary was our focal species, we also studied dozens of other butterfly species.
Disturbance-tolerant butterflies

American Lady

Eastern Tailed Blue

Black Swallowtail

Checkered White

All photos on this page by Ken Williams
Our 4 study sites in Missouri

- Kansas City
- St Louis
- Taberville
- Wah’Kon-Tah
- Niawathe
- Bethel
Experimental Design

Each site had 2 tallgrass prairie pastures

Each pasture had 3 burn patches
Butterfly Sampling in 2006 and 2007

- 4 sampling sessions: early June, late June, mid-July, and September

- Walked fixed transects
Speyeria idalia population density:
early June 2007

- **Time Since Fire (years)**
- **individuals/ha**

- **Ungrazed**
- **Grazed**
What caused the differences in butterfly abundance among fire and grazing treatments?
Was it due to the effects of fire and grazing on nectar sources that butterflies prefer?

pale purple coneflower  butterfly milkweed  blazing star
recently burned and grazed patch
recently burned and UNgrazed patch
Another recently burned and ungrazed patch
(this one was in northern Missouri)
Note the similarity between this graph (of the regal fritillary) and the next graph.

*Speyeria idalia* population density:
early June 2007

![Graph showing population density over time since fire](image)
Echinacea pallida = pale purple coneflower (a wonderful nectar source)
Still another recently burned, UNgrazed patch (chock full of blazing star)
pale purple coneflower, with the flowers bitten off by cattle (I found hundreds of plants like this)
Do cattle commonly eat nectar plants? Probably. I’ll show you an example with butterfly milkweed, an awesome nectar plant.
Somewhere in the Flint Hills of Kansas…
Notice something different about the prairie on the near side of the fence?
recently burned but not grazed  recently burned and grazed
recently burned and grazed (left of the fence)
recently burned but not grazed (right of the fence)
Conclusions

- Fire may be less of a threat than previously thought: (habitat-sensitive butterflies quickly recolonized burned patches)

- Very recent fire appeared to increase abundance of high-quality nectar plants

- Nectar plant abundance may help explain high abundance of habitat-sensitive butterflies
More Conclusions

• In addition to maintaining the natural tree-less quality of prairie, prescribed fire (when applied to one third or less of a prairie) may enhance butterfly abundance.

• Cattle grazing at light or moderate stocking rates appears to be compatible with prairie butterfly conservation.

• Heavy stocking across large areas and large time periods appears to harm rare prairie butterflies.
If you want to learn more about butterflies, I recommend:

- Close-focus binoculars
  - Eagle Optics Ranger class 8 x 32
  - Pentax Papilio
Collecting Equipment

- Butterfly net
- Glassine envelopes
- Forceps (for field handling)
- Fanny pack
- Specimen box
- Pinning boards
Butterfly Books

- Butterflies of Oklahoma, Kansas, and North Texas (by John Dole, Walter Gerard, and John Nelson)
- Butterflies through Binoculars (The EAST edition) by Jeffrey Glasberg
- Kaufman’s Butterflies of North America, by Jim Brock and Kenn Kaufman
- Butterflies and Moths of Missouri, by Richard and Joan Heitzman
- Basic Techniques for Observing and Studying Moths and Butterflies, by William Winter
Web Sites

Butterflies of the World Foundation
http://www.botwf.org/

Butterflies and Moths of North America
http://www.butterfliesandmoths.org/

North American Butterfly Association
http://www.naba.org/
Places to see butterflies:
Kansas

• Tallgrass Prairie National Preserve (Strong City)

• Konza Prairie (Manhattan)

• Rockefeller Prairie (near Lawrence)

• Any of the national wildlife refuges
Places to see butterflies: U.S.

- International Butterfly Festival at Mountain Magazine, Arkansas (late June)
  http://www.butterflyfestival.com/

- Texas Butterfly Festival (October)
  http://www.texasbutterfly.com/
15 of the most commonly seen butterflies of Kansas
Black swallowtail

Photo by Ken Williams
Orange sulphur
(alfalfa butterfly)
Cabbage White
Gray Hairstreak

Pontotoc Ridge Preserve, Oklahoma
Easted Tailed Blue
Common buckeye
Painted lady
Viceroy
Red admiral
red-spotted purple
Common checkered skipper
Sachem skipper