Butterfly diversity and abundance in the prairies, disturbed grasslands, and forests of the Palouse

Acmon blue (Icaricia acmon)

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Presentation overview

• Resources important to butterflies

• Butterfly families and species found in this area

• Research project overview and preliminary results

• When and where to look for butterflies

Lorquin’s admiral
Why should we care about butterflies?

• Pollinators

• Threatened by loss of host plants and pesticide use

• Beautiful species, fascinating life cycle

Why study them?

• Short generations respond quickly to habitat changes

• Well described taxonomy & life histories
Butterfly life cycle

• As adults, most rely on flower nectar to maintain energy

• About 1% of eggs survive to maturity

• Larvae consume foliage from specific host plants

• Winter diapause

• A few well-known species (i.e. monarch, painted lady) migrate long distances

Photo: Mario Maier

Painted lady
What butterflies need:

1. Larval host plants
2. Hiding places for pupae
3. Nectar plants and sap for adults
4. Minerals and salts for adults
5. Protection from wind
6. Plenty of sun
7. Overwintering sites
8. No pesticides

From: The Xerces Society  www.xerces.org
Butterfly families

• Skippers (Hesperiidae)

• Swallowtails and Parnassians (Papilionidea)

• Whites and Sulfurs (Pieridae)

• Metalmarks (Riodinidae)

• Brush-foots (Nymphalidae)
  Fritillaries, checkerspots, crescents, satyrs, admirals, monarchs, angelwings, tortoiseshells, painted ladies

• Coppers, Hairstreaks, and Blues (Lycaenidae)
Skippers (Hesperiidae)

These two species and several others feed on grasses; some species feed on legumes.
Swallowtails (Papilionidea)

Anise swallowtail
Willow, aspen, alder, birch, others

Pale swallowtail
*Ceanothus*, other shrubs

Western tiger swallowtail
Apiaceae: Lomatium, cow parsnip, others
Whites and Sulfurs (Pieridae)

Whites host plants:
mustards (Brassicaceae/Cruciferae)

Sulfurs host plants:
Legumes (Fabaceae)

- Orange sulfur
- Stella’s orangetip
- Cabbage white
Brush-feet (Nymphalidae)

- Spend winter as adults
- Out in fall and early spring
- Nectar on tree sap in fall, spring

California tortoiseshell
Host plant: *Ceanothus*

Mourning cloak
Willow, aspen, other hardwoods

Milbert’s tortoiseshell
*Urtica* (stinging nettle)

Zephyr angelwing
*Ribes* (currants)
Satrys (Nymphalidae)

Common ringlet

Larvae feed on native and non-native grasses

Wood nymphs (mating)
Checkerspots and Fritillaries (Nymphalidae)

Northern checkerspot
Asters, other composites

Great spangled fritillary

Zerene fritillary

Chalcedon checkerspot
Penstemon wilcoxii

Photo: Peter J. Bryant

Viola adunca
Coppers and Hairstreaks (Lycaenidae)

**Edith’s copper**
*Rumex* (sorrel)

**Sylvan hairstreak**
*Salix* (willows)

**Western pine elfin**
*Pinus* (pines)

Photo: Jeffrey Glassberg
Blues (Lycaenidae)

Spring azure
Ocean-spray, ceanothus, spiraea, huckleberries

Males looking for minerals in the mud

Tailed blue
Legumes: Vicia, Trifolium, Lathyrus, Astragalus

Lathyrus sp.
Blues (Lycaenidae)

Acmon blue
Legumes and *Eriogonum*

Arrowhead blue
*Lupinus* and *Astragalus*

Silvery blue
*Lupinus* and other legumes
Boisduval’s blue

Only one *Lupinus* species used per population; appears to use *Lupinus sericeus* in our area

Sub-species *fenderi* in Oregon is federally endangered (Fender’s blue)

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Boisduval’s blue

*Icaricia icarioides* ssp. *pembina*

*Lupinus sericeus* (silky lupine)
Eriogonum feeders

Sheridan’s green hairstreak

These species feed exclusively on *Eriogonum* (buckwheat)

Square-spotted blue

Sub-species of square-spotted blue in California is federally endangered (El Segundo blue)

*Eriogonum heracleoides*
Role of non-native thistles

• Mylitta crescent host plant

• Late summer nectar source; Fritillaries prefer thistles for nectaring

• California study: 34% of butterfly species oviposit or feed on non-native plants
Butterfly density and diversity across contrasting forest-grassland boundaries: identifying scales of response to resource availability

Research questions

1. Are there differences in butterfly diversity and density between land cover types?

2. How well are forest butterfly diversity and density explained by forest canopy cover and host plants?

3. Does butterfly abundance across forest edges differ between edge types?
Study area

Butterfly sampling sites

Land cover
- Agriculture
- Forest
- Grassland
- Water
- Wetlands
- Urban
- Barren Land, Clouds

Latah County, Idaho

Idaho GAP analysis land cover data,
Scott et al. 2002
Sampling design

• 16 sampling sites

• Forests dominated by ponderosa pine and/or Douglas-fir

• Forest sites share edges with different types of land uses (4 sites/type):
  
  Agriculture
  Disturbed grasslands (i.e. CRP)
  Palouse prairie & Forest meadows
  Clearcuts
3 sampling transects per site

- April – July 2004, 2005
- Each site surveyed 5 times per year
- Temperatures at least 60°F, sunny
Other measurements

Measured systematically within each sampling transect:

• Forest canopy cover
• Forest stand density
• Shrub cover, by species
• Understory plant cover, by species
No. butterfly species by land cover type

<table>
<thead>
<tr>
<th>Land cover type</th>
<th>No. butterfly species</th>
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<tbody>
<tr>
<td>Agriculture</td>
<td>2</td>
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<tr>
<td>Clearcut</td>
<td>6</td>
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<tr>
<td>Forest</td>
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<td>Grassland</td>
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<tr>
<td>Meadow</td>
<td>15</td>
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<tr>
<td>Prairie</td>
<td>7</td>
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</table>
2. How well are forest butterfly diversity and density explained by canopy cover and host plants?

Forest canopy closure effect on butterfly observations

Forest canopy cover (%) vs. No. butterfly observations

The graph shows a negative correlation between forest canopy closure and the number of butterfly observations. As the forest canopy cover increases, the number of butterfly observations decreases.
Forest observations: Mylitta crescent (thistle feeder)

Non-forest observations: Mylitta crescent (thistle feeder)

Forest observations: Common ringlet (grass feeder)

Non-forest observations: Common ringlet (grass feeder)
**Forest observations: Spring azure (shrub feeder)**

- Clearcut: 10
- Grassland: 8
- Prairie/meadow: 6

**Non-forest observations: Spring azure (shrub feeder)**

- Clearcut: 2
- Grassland: 4
- Prairie/meadow: 6

**Forest observations: Silvery blue & Boisduval’s (lupine)**

- Clearcut: 8
- Grassland: 4
- Prairie/meadow: 2

**Non-forest observations: Silvery blue & Boisduval’s (lupine)**

- Clearcut: 10
- Grassland: 8
- Prairie/meadow: 6
Summary

• Largest number of species in forest meadows; fewest in agricultural fields

• More observations in prairies/meadows than disturbed grasslands

• Butterflies show response to land cover types that reflect their host plants

• Almost twice as many observations outside of forests as within forests

• Forest canopy cover is important: Number of observations and species decrease with canopy closure
When and where to find butterflies

• Most abundant May-August
• When weather is warm, sunny
• Prairies, grasslands, forest openings
• In areas with lots of flowers
• On or near their host plants
• Along creeks and old roads

Arrowhead blue
Lorquin’s admiral
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Where to find more information

Books:

Butterflies of Cascadia (field guide)
Robert Michael Pyle, 2002

Butterflies of British Columbia (reference book)
Crispin S. Guppy & Jon H. Shepard, 2001

Websites:

North American Butterfly Association
www.naba.org

Butterflies of North America (online field guide)
www.npwrc.usgs.gov/resource/distr/lepid/bflyusa/bflyusa.htm