



## SPECIAL ANALYSIS

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# Butterfly Species Standing for High Species Diversity

Both systematic and standardized, BDM surveys ensure representative monitoring of the country as a whole, permitting observations that are impossible to make using datasets supported by a less wide-ranging basis.

This special analysis was conducted to find the butterfly species that, by their presence, indicate high butterfly species diversity.

## Questions

Which butterfly species stand for high butterfly species diversity? And which butterfly species represent species-poor areas?

## Results



*Zygaena carniolica* (photo by Walter Schön)

It is rather easy to verify which butterfly species typically occur in species-poor sampling areas, and which species are almost invariably found in very species-rich habitats. Of all butterfly species, it is the Six-spot Burnet *Zygaena carniolica* that stands for the highest species diversity: Wherever the Six-spot Burnet was observed, BDM field workers recorded at least 37 other butterfly species, with an average as high as 57! As listed by the table below, there are a few other species that indicate species-rich butterfly habitats. All of these indicator species share a preference for poor grassland habitats, some primarily occurring at low altitudes, while others reach up as high as the alpine level.

**Tab. 1: Butterfly species representing areas with high butterfly species diversity**

Common name	Scientific name	Mean species numbers in sampling areas	SD* species number	n*
«Six-spot Burnet»	<i>Zygaena carniolica</i>	57.7	12.4	10
Dusky Meadow Brown	<i>Hyponephele lycaon</i>	56.8	12.7	12
Damon Blue	<i>Polyommatus damon</i>	56.1	9.2	30
Auspicious Burnet	<i>Zygaena fausta</i>	55.6	11.2	5
Knapweed Fritillary	<i>Melitaea phoebe</i>	55.4	11.4	34
Burnet moth sp.	<i>Zygaena osterodensis</i>	55.3	6.2	6
Amanda's Blue	<i>Polyommatus amandus</i>	55.2	6.8	5
Common Brassy Ringlet	<i>Erebia cassioides</i>	55.2	4.4	5

© BDM (Z7 indicator). Status: 2010

\* SD: standard deviation; n: number of BDM sampling areas in which the species was observed. Species observed on less than 5 occasions were disregarded.

### Butterfly species representing species-poor areas



Sooty Ringlet (photo by Heiner Ziegler)

As was to be expected, many species representing species-poor habitats are found in high-altitude sampling areas in the Alps. The four top positions in the list below are all held by high-mountain dwellers. On average, the lowest numbers of butterfly species are recorded where the Sooty Ringlet (*Erebia pluto*) occurs, a species typical of scarcely vegetated alpine scree. Other well-known typical high-mountain dwellers include Cynthia's Fritillary (*Euphydryas cynthia*) and the Lofty Bath White (*Pontia callidice*). However, habitats poor in butterfly species are also indicated by forest dwellers such as the Map (*Araschnia levana*), since forests commonly harbor much lower numbers of species than open grassland.

**Tab. 2: Butterfly species representing species-poor areas**

Common name	Scientific name	Mean species numbers in sampling areas	SD* species number	n*
Sooty Ringlet	<i>Erebia pluto</i>	18.7	10.5	32
Lofty Bath White	<i>Pontia callidice</i>	24.5	14.2	59
Silky Ringlet	<i>Erebia gorge</i>	24.6	16.2	78
Cynthia's Fritillary	<i>Euphydryas cynthia</i>	26.4	13.4	35
Mallow Skipper	<i>Carcharodus alceae</i>	28.4	12.3	27
Map	<i>Araschnia levana</i>	29.0	12.0	122
Great Banded Grayling	<i>Brintesia circe</i>	29.7	7.9	28
Dewy Ringlet	<i>Erebia pandrose</i>	29.8	16.3	84

© BDM (Z7 indicator). Status: 2010

\* SD: standard deviation; n: number of BDM sampling areas in which the species was observed. Species observed on less than 5 occasions were disregarded.

### Record-prone butterfly species diversity in the Alps

In the Alps, BDM field workers found 23 sampling areas harboring at least 60 species, with the record of 79 (!) species held by an area near Aquila in the Valle Santa Maria. Looking at individual regions, the Northern Alps stand out for their surprisingly high species diversity. Mean species diversity there is almost as high as it is in the Central Alps, even though the latter are supposed to be richer in species. Butterflies in the Northern Alps benefit from a mosaic of dry and humid habitats: On a small scale, poor grassland facing South is within flitting distance of slopes moistened by seepage water and still vast expanses of fenland.

Compared to the rest of Europe, butterfly species richness found in the Swiss Alps is exceptional. Even in southern European countries otherwise richer in species, regions characterized by comparable butterfly species diversity at higher altitudes can only be found in isolated locations, e.g. in the Pyrenees or the Balkan mountains. Among the few countries supplying transect data, only the Catalan Pyrenees present similarly high species numbers. Consequently, Switzerland takes major responsibility for helping to maintain butterfly species diversity in Europe (Van Swaay & Warren, 2003).

### High-degree coverage and representativity

Of the roughly 200 butterfly species BDM takes into consideration, 188 were recorded at least once along BDM transects - despite the sampling network covering a mere 0.3 per mil of Switzerland's expanse. This outcome is both surprising and encouraging: Apparently, most species are still widespread enough to be detected using non-species-specific surveying methods. As a result of the uniform sampling of Switzerland, even remote areas rarely visited by volunteer observers have been mapped for the first time as part of BDM surveys. The rigid sampling grid forces field workers to look for butterflies in areas presumed to be species-poor as well, discovering species that seem to have slipped through monitoring grids quite frequently before, such as Thor's Fritillary (*Boloria thore*). Formerly considered to be rare and critically endangered, this species was found in 7% of all alpine sampling areas. Because of representative sampling, BDM data are very well suited to determine current frequencies of species and to make objective evaluations of changes in frequency over time. Accordingly, BDM butterfly data provide an essential basis for assessing Red List endangerment levels.