

**Ecological Monitoring of *Diurna* and *Odonata*
in the valleys of Emmels and Rechterbach
within the AMICE project (4)**

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1 Introduction

The fourth report of the monitoring of *Diurna* and *Odonata* in the valleys of Emmels and Rechterbach within the AMICE project (part of the INTERREG IVB NWE programme, priority 2 "Environmental challenges") contains the results of the investigations of 2012. The 2nd chapter concerning the investigation areas includes only a short description of the different sites and their changes since 2009. More detailed descriptions of the sites can be found in the reports of 2009, 2010 and 2011. The results of the collection period of 2012 will be shown and discussed in chapter 4 and chapter 5 gives a conclusion of the development of the species ranges from 2009 to 2012. Collecting data and site maps can be found in the appendix.

2 Investigation Areas

Emmels 1

In the western subarea of the site, the small-sized hollows stayed, in contrary to 2011, temporary wet over the whole collection period in 2012. This is probably the result of the almost wet spring in 2012. Nevertheless, the rather dry grassland character still remains. The eastern subarea is still subject to a regular late mowing in August.

Emmels 2

There are no signified changes in comparison with the observations of the previous years (2009 till 2011) on this site. The eastern subarea is still subject to partially extensive grazing.

Emmels 3

This site has been a part of the collection also in 2012 (since 2010). The single trees (*Salix aurita*, *Betula pendula*) at the south-eastern part of this site has been cut in the beginning of the year 2012. This measure is designed to enhance the conditions for the whinchat (*Saxicola rubetra*), witch is present at this site.

Rechterbach

The plantation of *Picea abies* in the southern part is increased to a height of approximately 3 m. The Parts of the open areas with moist grasslands and moorlands are still subject to a regular mowing. Other parts are, specially in the north-eastern part, are still increasingly subjects to an encroachment with scrubs. Furthermore, there are no signified changes in comparison to the previous years.

3 Methods

The applied methods for the collection of the *Diurna* and *Odonata* fauna in the period of 2012 are the same as in the last year (see report of 2010).

4 Results

4.1 Emmels 1

Diurna

At this site, 15 different species of *Diurna* were captured in the collection period of 2012. By comparison to 2009, 2010 and 2011, *Ochlodes sylvanus* was found in addition. The habitats of this species contains semi natural (moist) grasslands in the edge of woods. Viewing the habitat conditions at this site, its presence is not surprisingly.

Not found by comparison to 2009, 2010 and 2011 are the migrant species *Colias crocea* and *Vanessa atalanta* as well as the species *Pieris brassicae*, *Pararge aegeria*, *Anthocharis cardamines*, *Brenthis ino*, *Lycaena hippothoe* and *Polyommatus icarus*.

Boloria selene, a mesophilic species of open land with tendencies to rather moist conditions was not found during the collection period of 2011 but in 2012. This fact confirms the supposition, their loss in 2011 was due to the very dry conditions in spring and summer 2011.

Polyommatus icarus was captured frequently till 2010 at this site but not in 2011 nor in 2012. Notwithstanding their capacity to populate many different habitats, its disappearance seems to correlate with the cut of the scrubs in 2011.

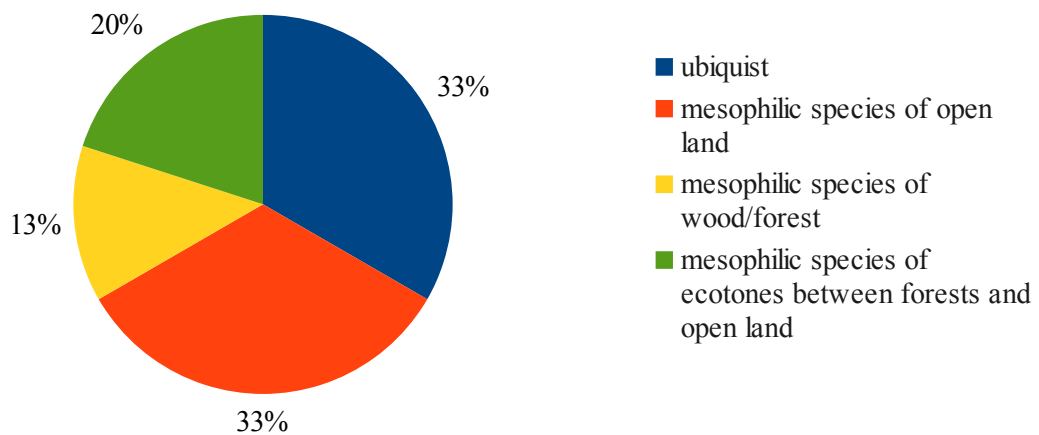


fig. 1: Ecological groups of *Diurna* and their percentage from the assemblage of species in “Emmels 1”

Compared to the data of the previous years, the percentage of species with a specialization in open land biotopes is increasing slightly (2009: 23 %; 2010: 21 %; 2011: 31 %; 2012: 33 %). The

reduced number of ubiquitous (2011: 46 %; 2012: 33 %) in the collection period in 2012 compared to the last year may be caused by the very dry conditions in 2011. Particularly the loss of specialised species in moist habitats (*Boloria selene*, *Brenthis ino*) causes the high percentage of ubiquitous in 2011. Nevertheless, this small site near beside a spruce forest shows a high number of species specialised in open land biotopes or ecotones between forests and open land such as *Aphantopus hyperantus*, *Thymelicus lineolus* (NT), *Melanargia galathea* (NT), *Boloria selene* (NT) or *Ochlodes sylvanus*.

table 1: Species List with conservation status, ecological classification and frequency for the site "Emmels 1"

Species	Conservation status Wallonian Red List 2006	Ecological classification	Frequency
<i>Pieridae</i>			
<i>Gonepteryx rhamni</i>	LC	IV	1
<i>Pieris rapae</i>	LC	I	5
<i>Pieris napi</i>	LC	I	15
<i>Satyridae</i>			
<i>Aphantopus hyperantus</i>	LC	II	9
<i>Melanargia galathea</i>	NT	II	1
<i>Maniola jurtina</i>	LC	II	1
<i>Nymphalidae</i>			
<i>Boloria selene</i>	NT	III	4
<i>Nymphalis urticae</i>	LC	I	4
<i>Nymphalis io</i>	LC	I	2
<i>Vanessa cardui</i>	NE (migrant)	I	1
<i>Araschnia levana</i>	LC	IV	1
<i>Lycaenidae</i>			
<i>Lycaena phlaes</i>	LC	II	2
<i>Hesperiidae</i>			
<i>Ochlodes sylvanus</i>	LC	III	1
<i>Thymelicus lineolus</i>	NT	II	9
<i>Thymelicus sylvestris</i>	LC	III	1

Odonata

No indigenous *Odonata*-species were observed at this site. It is due to not permanent existing open water areas.

4.2 Emmels 2

Diurna

During the collection period in 2012, only 13 different species of *Diurna* were captured. By comparison to the total species ranges of 2009, 2010 and 2011, no species were found in addition and several species such as *Boloria selene*, *Brenthis ino* and *Lycaena phlaeas* has not been observed. Specially the loss of *Brenthis ino* is remarkable because the feed plant of their larvae, *Filipendula ulmaria*, is frequently present at this site. Also, the loss of *Boloria selene* is noticeable. Considering the lower frequencies of, in particular *Boloria eunomia* (2011: 35; 2012: 10), but also *Lycaena helle* (2011: 11; 2012: 4) and *Aphantopus hyperantus* (2011: 19; 2012: 6), the reasons of this reduction are maybe worse conditions during the collection period in 2012 compared to 2011. This supposition is supported by the fact, only about half as much individuals were observed in 2012.

table 2: Species list with conservation status, ecological classification and frequency for the site "Emmels 2"

Species	Conservation status Wallonian Red List 2006	Ecological classification	Frequency
<i>Pieridae</i>			
<i>Anthocharis cardamines</i>	LC	III	1
<i>Gonepteryx rhamni</i>	LC	IV	2
<i>Pieris brassicae</i>	LC	I	3
<i>Pieris napi</i>	LC	I	19
<i>Satyridae</i>			
<i>Aphantopus hyperanthus</i>	LC	II	6
<i>Maniola jurtina</i>	LC	II	1
<i>Nymphalidae</i>			
<i>Boloria eunomia</i>	VU	VII	10
<i>Nymphalis urticae</i>	LC	I	4
<i>Lycaenidae</i>			
<i>Lycaena helle</i>	VU	VII	4
<i>Lycaena hippothoe</i>	VU	VII	2
<i>Hesperiidae</i>			
<i>Ochlodes sylvanus</i>	LC	III	5
<i>Thymelicus lineolus</i>	NT	II	16
<i>Thymelicus sylvestris</i>	LC	III	3

The percentages of the ecological groups are in spite of the reduced individuals and species observed in 2012 close to the values specially from 2010.

The number of specialized species in open land biotopes (46 %) is still high and compared to the site “Emmels 1”, these values demonstrate the higher level of specialisation in the species range and correlates with the higher diversification of this habitat.

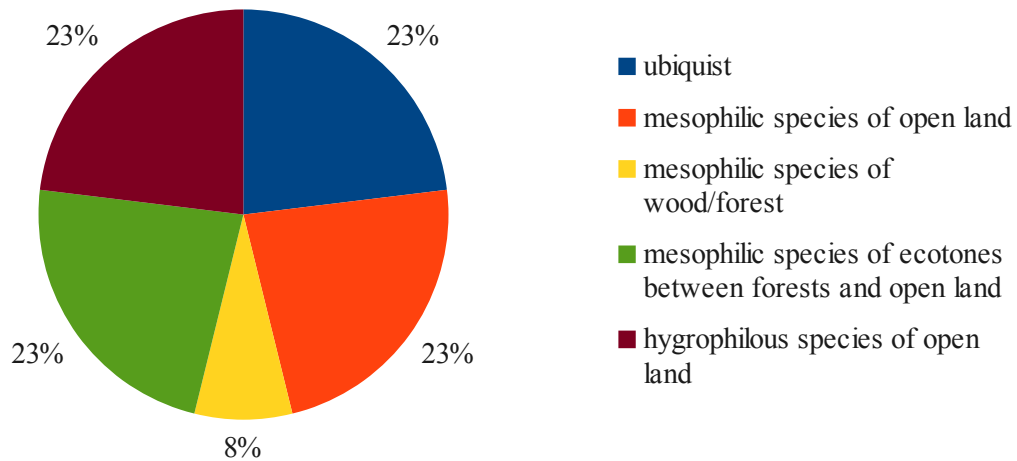


fig. 2: Ecological groups of Diurna and their percentage from the assemblage of species in “Emmels 2”

Odonata

In 2012, *Calopteryx virgo* has not been observed at this site for the first time. Differently than expected, the conditions for this species at this site are maybe not sufficient. The major part along the stream is vegetated by a riverside forest so that the sunny parts of the stream are probably not big enough. In addition, no proofs (exuviaes) or references (mating habits, ovipositions) for the indigenous appearance of this species have been observed at this site between 2009 and 2011.

Pyrrosoma nymphula has still been observed near the drainage channel during the collection period in 2012.

4.3 Emmels 3

Diurna

There are 13 different species captured at this site during the collection period in 2012. Two species, captured in 2012, has not been observed during the period from 2010 to 2011: *Brenthis ino* and *Polyommatus icarus*. *Brenthis ino* is a hygrophilous species of open land, classified in the Red List of Wallonia as “Near Threatened” (NC) due to the decline of their natural habitats. *Polyommatus icarus* is a ubiquist, but also prefers open land biotops.

The loss of the open land species *Maniola jurtina* (last time observed in 2010) and *Lycaena hippothoe* (2011) is remarkable, but in regard of their low frequency (2010 respectively 2011), may be just a result of the chosen days (and its conditions) of collection. Even more remarkable is the high reduced frequency of *Lycaena helle* relative to the other species frequencies in 2012. This species, referred to as an indicator species for wet grasslands, needs the forage plant of their caterpillars in a high number. *Persicaria bistorta* is quite present at this site. The cut of the single trees at this site is probably unfavourable. The imagines of this species needs the woods in its function as wind breakers. The woods also creates a balanced climate which is important for the overwintering survival of the imagines.

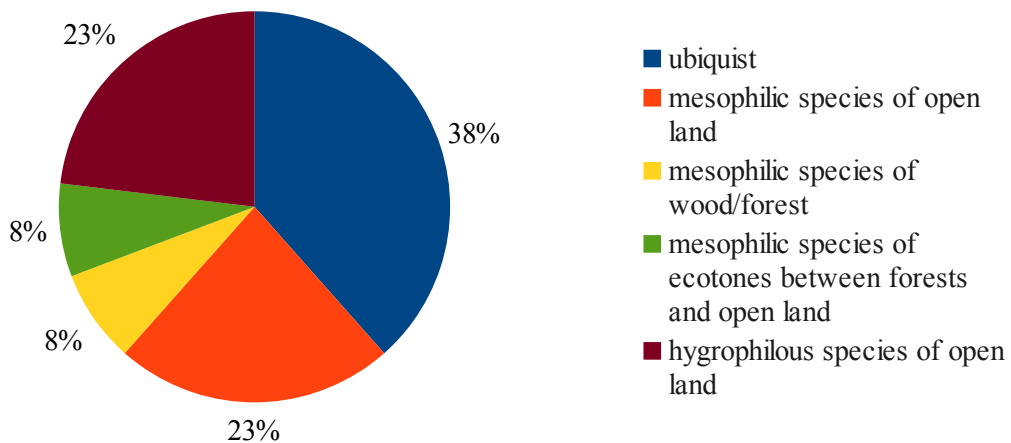


fig. 3: Ecological groups of Diurna and their percentage from the assemblage of species in “Emmels 3”

Nevertheless, the distribution of the percentages of the ecological groups shows similar values compared to 2010 and 2011. There is still a high number of species of open land (46 %) but also

38 % of ubiquists. In comparison to 2011, there are less specialized species of ecotones (2011: 20 %; 2012: 8 %) probably due to the cutting of single trees.

table 3: Species list with conservation status, ecological classification and frequency for the site "Emmels 3"

Species	Conservation status Wallonian Red List 2006	Ecological classification	Frequency
<i>Pieridae</i>			
<i>Pieris napi</i>	LC	I	7
<i>Satyridae</i>			
<i>Aphantopus hyperanthus</i>	LC	II	12
<i>Nymphalidae</i>			
<i>Araschnia levana</i>	LC	IV	1
<i>Boloria eunomia</i>	VU	VII	12
<i>Brenthis ino</i>	NT	VII	1
<i>Nymphalis io</i>	LC	I	1
<i>Nymphalis urticae</i>	LC	I	2
<i>Vanessa cardui</i>	NE (migrant)	I	1
<i>Lycaenidae</i>			
<i>Lycaena helle</i>	VU	VII	1
<i>Lycaena phlaeas</i>	LC	II	7
<i>Polyommatus icarus</i>	LC	I	1
<i>Hesperiidae</i>			
<i>Ochlodes sylvanus</i>	LC	III	4
<i>Thymelicus lineolus</i>	NT	II	6

Odonata

In 2012, *Calopteryx virgo* has been observed again. The frequency was indeed lower but many references (specially mating habits) has been observed, so that their indigenous appearance at this site is highly probable. For more informations about this species and its habitat conditions see the report of 2010.

Cordulegaster boltonii, that was captured in 2010, has not been captured in 2011 nor in 2012. Maybe, it has been overlooked, because this species is patrolling a lot. Nevertheless, the indigenous appearance of this species has not been proved at this site.

4.3 Rechterbach

Diurna

The *Diurna*-fauna at the study area of Rechterbach is represented by 12 species in the collection period of 2012. By comparison to the total species ranges of 2009, 2010 and 2011, *Nymphalis C-album* was found in addition. This species is quite common but more demanding than, by example, *Nymphalis urticae*. Its habitats are often nearby woods / forests and rarely in completely open land biotops.

The open land species *Maniola jurtina*, *Pieris rapae* and *Lycaena phlaeas* were not captured during the collection periods of 2011 and 2012. The loss of these species is maybe due to the increasingly encroachment of scrubs and, in consequence, the reduction of open land biotops.

Not observed in 2012 were the migrant species *Vanessa atalanta* and *Vanessa cardui*. The caterpillars of *Vanessa atalanta* are able, only with favourable local climate conditions, to survive the winter. *Vanessa cardui* dies in autumn. The present of both species depends on the immigration of the imagines. For this reason, it is difficult to say, if the habitat conditions at this site are sufficient for those species.

Lycaena helle, collected in 2011, was not observed in 2012 again.

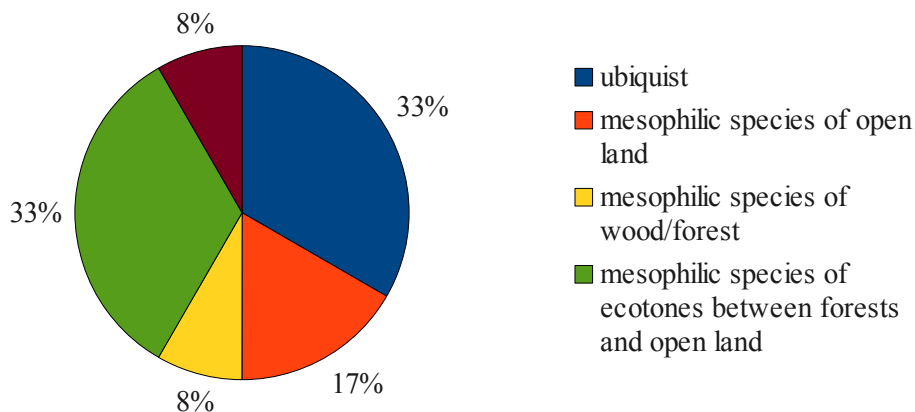


fig. 4: Ecological groups of Diurna and their percentage from the assemblage of species in "Rechterbach"

There distribution of ecological groups shows a development from 2009 to 2012 concerning the percentages of species adapted to ecotones between forests and open land. In 2009, there were only

8 % of those species. This value increased to 23 % in 2010, to 27 % in 2011 and finally to 33 % in 2012. This evolution correlates with the encroachment of scrubs in parts of the site. Nevertheless, the balanced distribution of ecological groups in the species range still represents the mixed structure of biotopes.

table 4: Species list with conservation status, ecological classification and frequency for the site "Rechterbach"

Species	Conservation status Wallonian Red List 2006	Ecological classification	Frequency
<i>Pieridae</i>			
<i>Anthocharis cardamines</i>	LC	III	5
<i>Gonepteryx rhamni</i>	LC	IV	6
<i>Pieris brassicae</i>	LC	I	9
<i>Pieris napi</i>	LC	I	12
<i>Satyridae</i>			
<i>Aphantopus hyperantus</i>	LC	II	29
<i>Nymphalidae</i>			
<i>Boloria selene</i>	NT	III	8
<i>Brenthis ino</i>	NT	VII	3
<i>Nymphalis C-album</i>	LC	III	1
<i>Nymphalis io</i>	LC	I	2
<i>Nymphalis urticae</i>	LC	I	4
<i>Hesperiidae</i>			
<i>Ochlodes sylvanus</i>	LC	III	17
<i>Thymelicus lineolus</i>	NT	II	2

Odonata

At this site, only the common ubiquist *Enallagma cyathigerum* was captured in 2012 again. There are no proves nor references for their indigenous appearance at this site.

7 Conclusion

The collection of the *Diurna* and *Odonata* fauna at three sites in the Emmels valley and one site in the Rechterbach valley has been realised from 2009 till 2012. The differences of the species range of each year and site has been discussed and analysed in the annual reports (2009 – 2012). Moreover, after consideration of the high potential of the site “Rechterbach”, proved by interesting (specialised on open wetland habitats) and protected species such as *Lycaena helle*, *Thymelicus lineolus*, *Boloria selene*, *Brenthis ino* and *Cordulagaster boltonii*, suggestions for wetlands renaturation measures in the “Rechterbach Valley” were done in the report of 2011. These measures could cause a positive evolution of those species populations. Furthermore, the climate change risk for several species by climate change scenarios has been presented in the report of 2011 and will be discussed more detailed in the global report (January 2013).

In a more global view, the evaluation of the species ranges may be caused by natural annual variations of the populations of each species. Also, the weather conditions during the monitoring are certainly jointly responsible for the annual differences in the species ranges. For this reason, it is necessary to demonstrate and discuss the merged species ranges from 2009 to 2012 of each site (see final report, 2013). These methodical inaccuracies demonstrate also the necessity of realising a monitoring over a period of several years to get a more global and complete view to the species populations.

Nevertheless, there are some tendencies in the development of the species ranges that correlates with alterations of the habitat structures:

The increasing of in ecotones specialised species correlates with the encroachment of scrubs at the not restored site of Rechterbach. These changes in the habitat structure due to the natural succession are reflected in the species range by the loss of *Maniola jurtina*, *Pieris rapae* and *Lycaena phlaeas* and the upcoming species such as *Boloria selene*, *Ochlodes sylvanus* or *Nymphalis C-album* (with habitat preferences close to the forest and clearings).

The sites Emmel 2 and Emmels 3 are restored (by clear cutting and grazing) wet grassland habitats. Consequentially, there are more hygrophilous species specialised in open land biotopes (*Lycaena helle*, *Lycaena hippothoe* and *Boloria eunomia*). The population of *Lycaena helle* seems to react very sensitive to the restoration measures designed to enhance the conditions for the whinchat (*Saxicola rubetra*).

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Appendix

Site maps

Emmels 1



fig. 5: location of the site "Emmels 1"

The site is located at the following UTM-coordinates:

western extreme	50°18'40.19" N	6°08'28.80" E
eastern extreme	50°18'40.92" N	6°08'39.37" E
northern extreme	50°18'40.19" N	6°08'28.80" E
southern extreme	50°18'39.45" N	6°08'29.16" E
altitudes	480 - 485 m AMSL	

Emmels 2

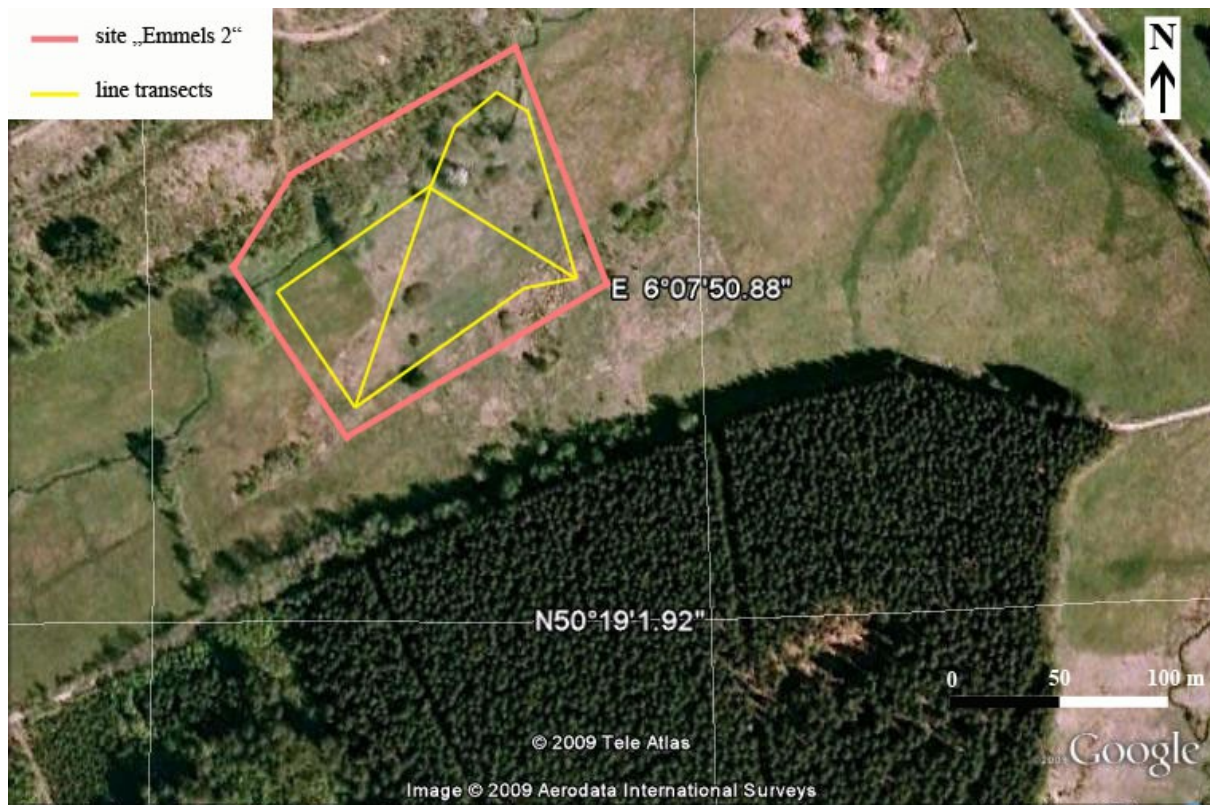


fig. 6: location of the site "Emmels 2"

The site is located at the following UTM-coordinates:

western extreme	56°19'07.04" N	6°07'39.80" E
eastern extreme	56°19'06.98" N	6°07'48.80" E
northern extreme	56°19'10.46" N	6°07'46.75" E
southern extreme	56°19'04.60" N	6°07'42.45" E
altitudes	467 - 472 m AMSL	

Emmels 3



fig. 7: location of the site "Emmels 3"

The site is located at the following UTM-coordinates:

western extreme	50°18'58.06" N	6°08'14.21" E
eastern extreme	50°18'52.55" N	6°08'37.44" E
northern extreme	50°18'58.69" N	6°08'27.67" E
southern extreme	50°18'51.45" N	6°08'35.20" E
altitudes	474- 480 m AMSL	

Rechterbach

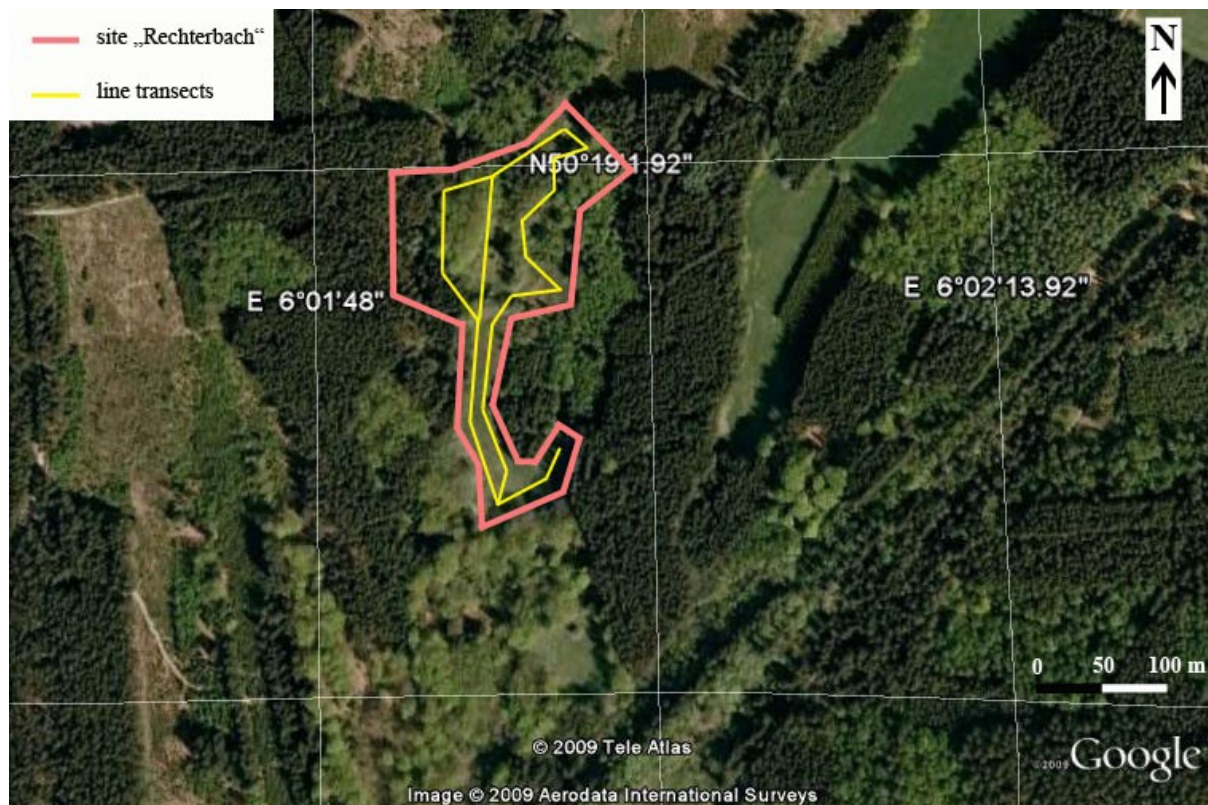


fig. 8: location of the site "Rechterbach"

The is located at the following UTM-coordinates:

western extreme	50°19'01.92" N	6°01'51.49" E
eastern extreme	50°19'01.96" N	6°02'00.76" E
northern extreme	50°19'03.54" N	6°01'57.94" E
southern extreme	50°18'53.39" N	6°01'54.23" E
altitudes	442 - 451 m AMSL	

Collection data

Emmels 1

28.04.12	
temperature (°C)	19
level of cloud covering (%)	95
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Gonepteryx rhamni</i>	1
<u>Odonata</u>	
no species	

17.06.12	
temperature (°C)	21
level of cloud covering (%)	20
wind force (Beaufort)	0-2
species	frequency
<u>Diurna</u>	
<i>Boloria selene</i>	4
<i>Ochlodes sylvanus</i>	1
<u>Odonata</u>	
no species	

24.07.12	
temperature (°C)	24
level of cloud covering (%)	20
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	3
<i>Maniola jurtina</i>	1
<i>Nymphalis urticae</i>	2
<i>Pieris napi</i>	4
<i>Thymelicus lineola</i>	6
<u>Odonata</u>	
no species	

30.05.12	
temperature (°C)	18
level of cloud covering (%)	50
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Anthocharis cardamines</i>	1
<i>Thymelicus sylvestris</i>	1
<u>Odonata</u>	
no species	

09.07.12	
temperature (°C)	19
level of cloud covering (%)	70
wind force (Beaufort)	1-3
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	5
<i>Melanargia galathea</i>	1
<i>Nymphalis urticae</i>	2
<i>Pieris napi</i>	3
<i>Pieris rapae</i>	2
<i>Thymelicus lineola</i>	3
<u>Odonata</u>	
no species	

12.08.12	
temperature (°C)	23
level of cloud covering (%)	15
wind force (Beaufort)	1-3
species	frequency
<u>Diurna</u>	
<i>Lycaena phlaes</i>	2
<i>Pieris napi</i>	4
<u>Odonata</u>	
no species	

Emmels 1 (2)

18.08.12	
temperature (°C)	32
level of cloud covering (%)	0
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Araschnia levana</i>	1
<i>Pieris napi</i>	4
<i>Nymphalis io</i>	2
<i>Vanessa cardui</i>	1
<u>Odonata</u>	
no species	

09.09.12	
temperature (°C)	25
level of cloud covering (%)	0
wind force (Beaufort)	0-3
species	frequency
<u>Diurna</u>	
<i>Pieris rapae</i>	3
<u>Odonata</u>	
no species	

Emmels 2

28.04.12	
temperature (°C)	22
level of cloud covering (%)	75
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Anthocharis cardamines</i>	1
<i>Gynoptheryx rhamni</i>	1
<i>Pieris napi</i>	3
<u>Odonata</u>	
no species	

17.06.12	
temperature (°C)	20
level of cloud covering (%)	20
wind force (Beaufort)	0-2
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	1
<i>Boloria eunomia</i>	4
<i>Thymelicus lineola</i>	5
<u>Odonata</u>	
no species	

24.07.12	
temperature (°C)	24
level of cloud covering (%)	10
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	4
<i>Nymphalis urticae</i>	1
<i>Pieris brassicae</i>	2
<i>Pieris napi</i>	3
<i>Thymelicus lineola</i>	8
<u>Odonata</u>	
no species	

30.05.12	
temperature (°C)	19
level of cloud covering (%)	50
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Boloria eunomia</i>	6
<i>Lycaena helle</i>	4
<i>Lycaena hippothoe</i>	2
<u>Odonata</u>	
<i>Pyrrhosoma nymphula</i>	1

09.07.12	
temperature (°C)	20
level of cloud covering (%)	60
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	1
<i>Maniola jurtina</i>	1
<i>Pieris napi</i>	3
<i>Ochlodes sylvanus</i>	5
<i>Thymelicus lineola</i>	3
<i>Thymelicus sylvestris</i>	3
<u>Odonata</u>	
no species	

12.08.12	
temperature (°C)	23
level of cloud covering (%)	20
wind force (Beaufort)	2-3
species	frequency
<u>Diurna</u>	
<i>Pieris brassicae</i>	1
<i>Pieris napi</i>	3
<u>Odonata</u>	
no species	

Emmels 2 (2)

18.08.12	
temperature (°C)	33
level of cloud covering (%)	0
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Gynoptheryx rhamni</i>	1
<i>Pieris napi</i>	5
<i>Nymphalis urticae</i>	3
<u>Odonata</u>	
no species	

09.09.12	
temperature (°C)	25
level of cloud covering (%)	0
wind force (Beaufort)	2
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	2
<u>Odonata</u>	
no species	

Emmels 3

28.04.12	
temperature (°C)	20
level of cloud covering (%)	95
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
no species	
<u>Odonata</u>	
no species	

17.06.12	
temperature (°C)	20
level of cloud covering (%)	30
wind force (Beaufort)	1-3
species	frequency
<u>Diurna</u>	
<i>Boloria eunomia</i>	8
<i>Polyommatus icarus</i>	1
<u>Odonata</u>	
<i>Calopteryx virgo</i>	6

24.07.12	
temperature (°C)	24
level of cloud covering (%)	10
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	10
<i>Brenthis ino</i>	1
<i>Thymelicus lineola</i>	3
<u>Odonata</u>	
<i>Calopteryx virgo</i>	1

30.05.12	
temperature (°C)	19
level of cloud covering (%)	50
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Boloria eunomia</i>	2
<i>Lycaena helle</i>	1
<i>Lycaena phlaeas</i>	4
<u>Odonata</u>	
<i>Calopteryx virgo</i>	1

09.07.12	
temperature (°C)	20
level of cloud covering (%)	60
wind force (Beaufort)	2
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	2
<i>Boloria eunomia</i>	2
<i>Pieris napi</i>	1
<i>Ochlodes sylvanus</i>	4
<i>Thymelicus lineola</i>	3
<u>Odonata</u>	
<i>Calopteryx virgo</i>	3

12.08.12	
temperature (°C)	23
level of cloud covering (%)	20
wind force (Beaufort)	2-3
species	frequency
<u>Diurna</u>	
<i>Lycaena phlaeas</i>	3
<i>Pieris napi</i>	1
<u>Odonata</u>	
no species	

Emmels 3 (2)

18.08.12	
temperature (°C)	31
level of cloud covering (%)	0
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Araschnia levana</i>	1
<i>Nymphalis io</i>	1
<i>Nymphalis urticae</i>	2
<i>Pieris napi</i>	3
<i>Vanessa cardui</i>	1
<u>Odonata</u>	
no species	

09.09.12	
temperature (°C)	25
level of cloud covering (%)	0
wind force (Beaufort)	1-3
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	2
<u>Odonata</u>	
no species	

Rechterbach

28.04.12	
temperature (°C)	20
level of cloud covering (%)	60
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Anthocharis cardamines</i>	4
<i>Boloria selene</i>	1
<u>Odonata</u>	
no species	

17.06.12	
temperature (°C)	19
level of cloud covering (%)	15
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Anthocharis cardamines</i>	1
<i>Boloria selene</i>	4
<i>Aphantopus hyperantus</i>	1
<i>Brenthis ino</i>	1
<i>Thymelicus sylvestris</i>	7
<u>Odonata</u>	
no species	

24.07.12	
temperature (°C)	22
level of cloud covering (%)	30
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	26
<i>Nymphalis C-album</i>	1
<i>Nymphalis io</i>	1
<i>Ochlodes sylvanus</i>	14
<i>Pieris brassicae</i>	5
<i>Thymelicus sylvestris</i>	6
<u>Odonata</u>	
no species	

30.05.12	
temperature (°C)	18
level of cloud covering (%)	50
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Boloria selene</i>	2
<i>Brenthis ino</i>	2
<i>Gynopteryx rhamni</i>	3
<i>Pieris napi</i>	2
<i>Thymelicus sylvestris</i>	1
<u>Odonata</u>	
no species	

09.07.12	
temperature (°C)	20
level of cloud covering (%)	40
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	2
<i>Boloria selene</i>	1
<i>Ochlodes sylvanus</i>	3
<i>Pieris brassicae</i>	2
<i>Pieris napi</i>	2
<i>Thymelicus lineola</i>	2
<i>Thymelicus sylvestris</i>	1
<u>Odonata</u>	
<i>Enallagma cyathigerum</i>	1

12.08.12	
temperature (°C)	23
level of cloud covering (%)	20
wind force (Beaufort)	2-3
species	frequency
<u>Diurna</u>	
<i>Gynopteryx rhamni</i>	1
<i>Pieris brassicae</i>	2
<i>Pieris napi</i>	3
<u>Odonata</u>	
no species	

Rechterbach (2)

18.08.12	
temperature (°C)	30
level of cloud covering (%)	0
wind force (Beaufort)	0
species	frequency
<u>Diurna</u>	
<i>Gynoptheryx rhamni</i>	2
<i>Pieris napi</i>	2
<i>Nymphalis io</i>	1
<i>Nymphalis urticae</i>	4
<i>Vanessa cardui</i>	1
<u>Odonata</u>	
no species	

09.09.12	
temperature (°C)	23
level of cloud covering (%)	0
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	3
<u>Odonata</u>	
no species	