

**Ecological Monitoring of *Diurna* and *Odonata*
in the valleys of Emmels and Rechterbach
within the AMICE project (1)**

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1 Introduction

The AMICE project is part of the INTERREG IVB NWE programme, priority 2 "Environmental challenges". This is a financial instrument of the European Union's Cohesion Policy focusing on the North West Europe area. The aim of the AMICE project is to develop a basin-wide climate adaptation strategy, coordinated transnationally, and focused on water discharges and the functions influenced by them. Furthermore, it attempts to realise a set of measures against low-flows and floods and is profitable for the international basin of the Meuse.

Within the project, the Wallonia region maintains a programme for measures and calculations. Workpackage 2 in the Ardennes endeavours to prove, that there are significant opportunities to increase water retention from mid-altitude regional precipitation in the basins of the Meuse. The resulting water restoration can limit the risk of flooding downstream. An additional objective of Workpackage 2 is to confirm that this goal may be reached through the natural letting of the wetlands and valleys (AMICE project 2009). Subsequently two weather and water level stations have been installed in the Emmels and Rechterbach valleys. Additionally, a monitoring of vegetation and insect groups will be performed to show the ecological effects and developments of hydrological restorations in characteristic wetlands in Ardennes. The latter includes ecological studies of the *Diurna* and *Odonata* fauna. This will transpire over a period of four years from 2009 to 2012. The methods and results of this investigation in 2009 will be shown below.

2 Investigation Areas

The areas under investigation are situated in south of eastern Belgium (fig. 1) in the region West-Eifel/Ardennes which is part of the fault-block mountains “Rhenish Slate Mountains” that has arisen during the Variscan orogeny in the early Devonian era. The Eifel/Ardennes is uplands with maximum altitudes of about 700 m AMSL.

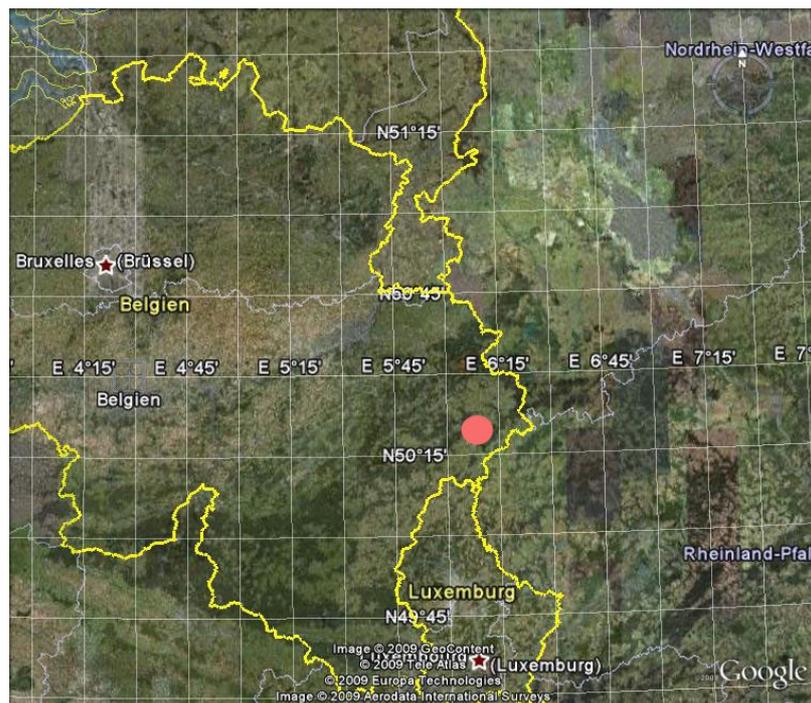


fig. 1: location of the investigation areas

2.1 Climate

The climate of this region is temperate with oceanic influence and a prevailing west wind. The winter is moderately cold with snow and ice and summers are cool and moist. The average temperature of the coldest month (January) is about -1,5 °C and of the warmest (July) 14°C. The annual average temperature is 7°C. The annual rainfall amounts to approximately 1100 - 1300 mm.

Due to the moist and temperate climate, the region of Eifel/Ardennes is traversed by numerous rivers and streams. These running waters drain the region via the rivers of Meuse and Rhine to the North Sea.

2.2 Emmels Valley

The Emmels is a tributary of the Amel and therefore part of the river basin of the Meuse. Its source is located in the western area of the village Emmels and rejoins the Amel in Montenau. The Emmels has formed a broad and open valley between the Walleroder Brücke and Montenau with altitudes ranging between 440 and 500 m AMSL. The bedrock consists of shale as well as sandstone and the landscape is shaped by species-rich wet grassland and poor grasslands. They are also relicts of matt grasses and moorland. Parts of the valley are under conservation and are supervised by the BNVS (BNVS 2009).

For the entomological monitoring, two sites were chosen:

Emmels 1

The site “Emmels 1” is separated in two subareas. The western subarea is characterised by periodical wet and dry periods. This area enjoys comparatively undisturbed natural conditions. The eastern subarea is generally dryer and the grass in this area will be cut on a regular basis. Overall, the site “Emmels 1” is a quite species-poor grassland.



fig. 2: 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

The site "Emmels 2" represents wet grassland and typical woody plants of a riverside forest but is still dominated by open land character. There are different open water areas in addition to the stream which bisects the site. A small pond in the moderately wooded part of the site and a small unfortified drainage channel can be found. This site primarily shows a greater species-richness and more structural variety than the site "Emmels 1".

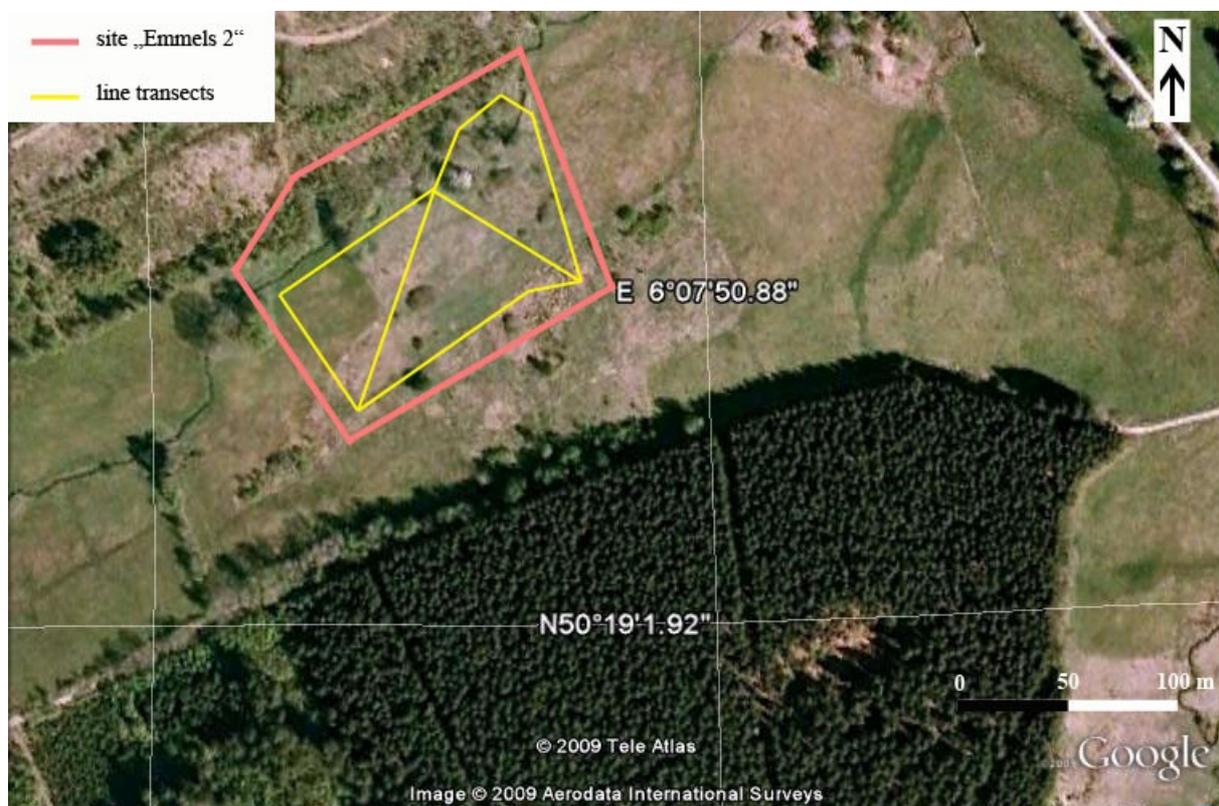


fig. 3: location of the site "Emmels 2"

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	

2.3 Rechterbach Valley

The source of the Rechterbach is situated northwest from the village Rodt in mid-forest between Rodt and Recht. It then flows northwest through the forest and the village of Recht. The stream is also in the catchment area of the Meuse.

Rechterbach

The site has a pronounced mixed structure. The southern part is completely covered by a plantation of *Picea abies* with a growth height of approximately 1,5 m. In the northeast of the site moist grassland, bushes and moorland cohabitate. The grasslands are in parts traversed by an unfortified drainage channel. The northwest shows a tall forest with the stream passing.

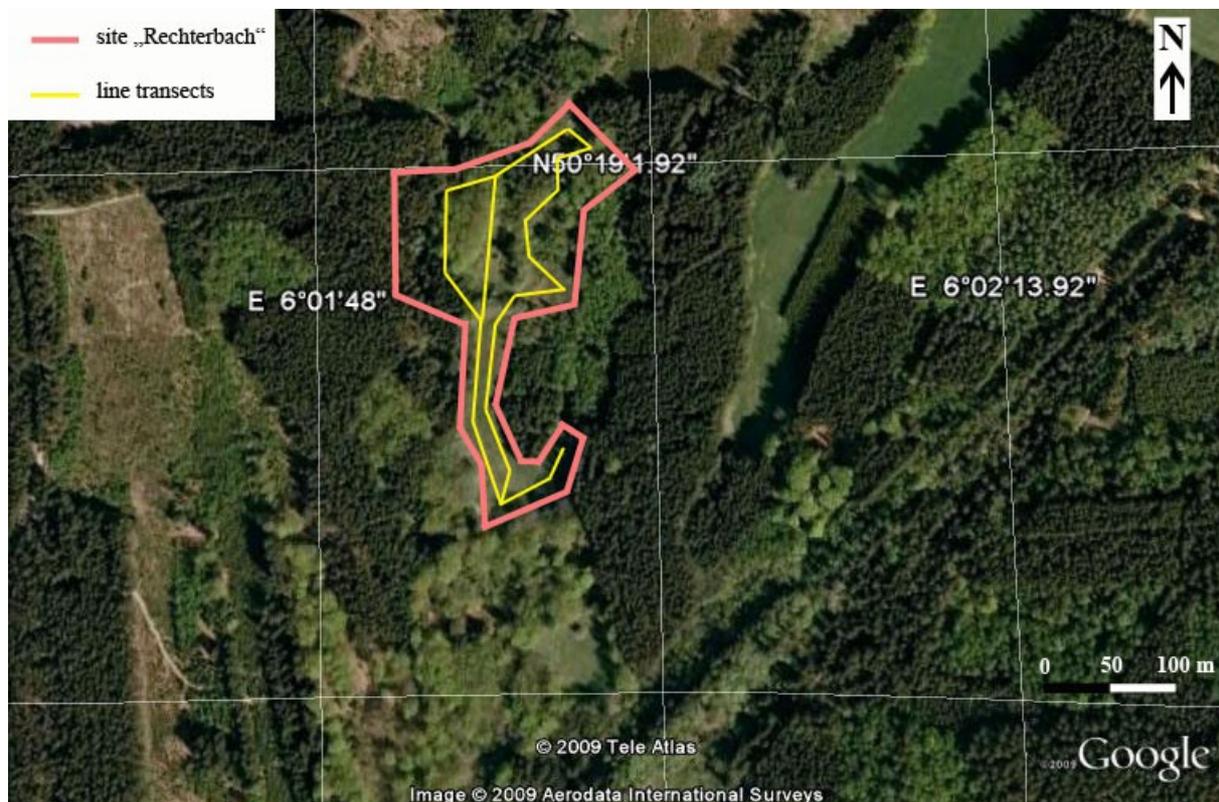


fig. 4: location of the site "Rechterbach"

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	

3 Methods

3.1 Diurna

Ecological studies often use *diurna* as investigation objects because they are relatively easy to detect. The number of species is manageable and there exists considerable knowledge about faunistic, autecology and conservation status.

HERMANN (1992) recommends *diurna* especially for studies in open land country biotopes but also for the bushes and ecotones between forests and open land.

The collection took place using the method of line transects based on POLLARD (1973), but only from mid-July until mid-September. Due to the shortened collection period, it can not be assumed that the entire spectrum of species was captured. The chosen line transects are shown in fig. 2 – 4. The sites were paced off at intervals of one to three weeks along those predetermined paths at a steady tempo. Within a distance of 2.5 m to the left and right of the paths, all visible butterflies were determined and counted by means of visual observation and specimen collection. The sites were inspected during appropriate weather. The standard conditions (standardising of the line transect method by STEFFNY 1984) implies:

Air temperatures of at least 17 ° C

Maximum wind speed 3 (according to Beaufort scale)

Maximum 50% cloud covering

Inspection between 10.00 and 17.00 Summertime

On two days of inspection, the standard conditions could partially not be kept, due to a to high cloud covering (see appendix).

The interpretation of the results includes the assignment of the particular species to different ecological groups (see table 1), the use of their conservation status and their occurrence frequency.

table 1: classification of the diurna-species into ecological groups
(BLAB & KUDNRA 1982, modified)

ecological group	
ubiquist	I
mesophilic species of open land	II
mesophilic species of ecotones between forests and open land	III
mesophilic species of wood/forest	IV
xerothermophilous species of open land	V
xerothermophilous species of biotopes with woody plants	VI
hygrophilous species of open land	VII
montane species	VIII

The determination of the species was made using FICHEFET (2008).

3.2 Odonata

The investigation of the dragonfly fauna is particularly useful in biotopes with water structures. Also the high number of endangered species makes investigations with this species group a very meaningful task, due to their appearance accords with a high-quality of the (aquatic) biotopes.

The collection took place also from mid-July until mid-September. The sites also were paced off at intervals of one to three weeks along the riversides and unfortified drainage channels areas. The capture of the species inventory was carried out by means of visual observation and specimen collection.

The interpretation of the results was made by using informations about the autecology and the conservation status of the particular species. Also the assessment as a possible indigenous or not indigenous species was considered.

The determination of the species was made using GOFFART et al. (2006).

4 Results

4.1 Emmels 1

Diurna

At this site, 12 different species of *Diurna* were captured; which is a good value considering that the relatively small site and the surrounding areas do not offer optimal conditions for the *Diurna*-fauna. In the Red List of Wallonia, nine species are classified as “Least Concern” (LC) and only one particular species (*Thymelicus lineolus*) is referred to as “Near Threatened” (NC). Because the Red List species are often highly specialized to certain types of biotopes, this relation reduces the ecological value of the *Diurna*-fauna for this site.

Colias crocea, *Vanessa atalanta* and *Vanessa cardui* are so called migrants. These Mediterranean species will grow in number in the future due to the ongoing effects of global warming.

table 2: 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>Pieris rapae</i>	LC	I	11
<i>Pieris brassicae</i>	LC	I	1
<i>Pieris napi</i>	LC	I	39
<i>Colias crocea</i>	NE (migrant)	I	1
<i>Satyridae</i>			
<i>Maniola jurtina</i>	LC	II	1
<i>Nymphalidae</i>			
<i>Vanessa atalanta</i>	NE (migrant)	I	2
<i>Vanessa cardui</i>	NE (migrant)	I	10
<i>Araschnia levana</i>	LC	IV	6
<i>Inachis io</i>	LC	I	3
<i>Lycaenidae</i>			
<i>Lycaena phlaeas</i>	LC	II	1
<i>Plyommatus icarus</i>	LC	I	4
<i>Hesperiidae</i>			
<i>Thymelicus lineolus</i>	NT	II	3
<i>Thymelicus sylvestris</i>	LC	III	2

The percentage of the ecological groups at this site shows a high number of ubiquitous. This value confirms the statement made, that the assemblage of species of this site has no high specialization. Area representative for that location is the reasonably large number (23 %) of mesophilic species of open land.

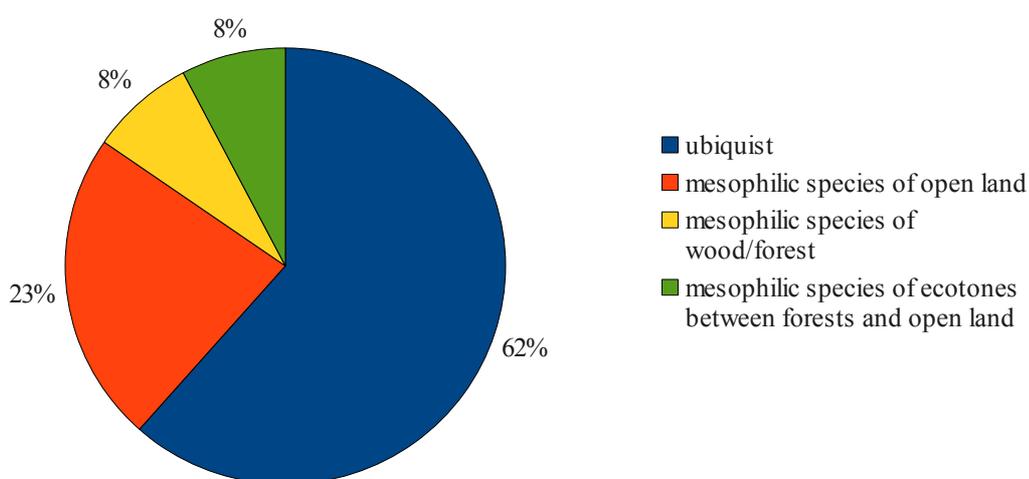


fig. 5: Ecological groups of Diurna and their percentage from the assemblage of species in "Emmels 1"

Odonata

The only *Odonata*-species observed at this site is *Libellula depressa*. It is a primary settler of habitats with less vegetation but in all probability not indigenous at this site, which is due to not permanent existing open water areas. This is also the reason no other species were found. In the Wallonian Red List *Libellula depressa* is referred to as “Least Concern” (LC).

4.2 Emmels 2

Diurna

At this site, 14 different species of *Diurna* were captured and only one of them is in the Red List of Wallonia. Eleven species are classified as “Least Concern” (LC) and also the same one particular species (*Thymelicus lineolus*) as at the site “Emmels 1” is classified as “Near Threatened” (NT). For the migrants *Vanessa atalanta* and *Vanessa cardui* applies the same as mentioned above.

table 3: Species List with conservation status, ecological classification and frequency for the site "Emmels 2"

Species	Conservation status Wallonian Red List 2006	Ecological classification	Frequency
Pieridae			
<i>Gonepteryx rhamni</i>	LC	IV	1
<i>Pieris rapae</i>	LC	I	16
<i>Pieris brassicae</i>	LC	I	6
<i>Pieris napi</i>	LC	I	15
Satyridae			
<i>Aphantopus hyperanthus</i>	LC	II	2
<i>Maniola jurtina</i>	LC	II	8
Nymphalidae			
<i>Vanessa atalanta</i>	NE (migrant)	I	1
<i>Vanessa cardui</i>	NE (migrant)	I	2
<i>Aglais urticae</i>	LC	I	1
<i>Inachis io</i>	LC	I	3
<i>Araschnia levana</i>	LC	IV	14
<i>Brenthis ino</i>	LC	VII	2
Hesperiidae			
<i>Thymelicus lineolus</i>	NT	II	3
<i>Thymelicus sylvestris</i>	LC	III	13

The high number of *Araschnia levana* is due to the fact, both, the conditions for the butterfly caterpillars (high humidity and shade) as well as for the imagines (shrubs) are given plenty.

The percentage of the ecological groups shows a lower but also high number of ubiquists in comparison to the site “Emmels 1”. The distribution of the remaining groups reflects the relations of the vegetation structure and their respective surface areas. Especially to note is the present of *Brenthis ino*, which is a representative of biotopes with a high groundwater level.

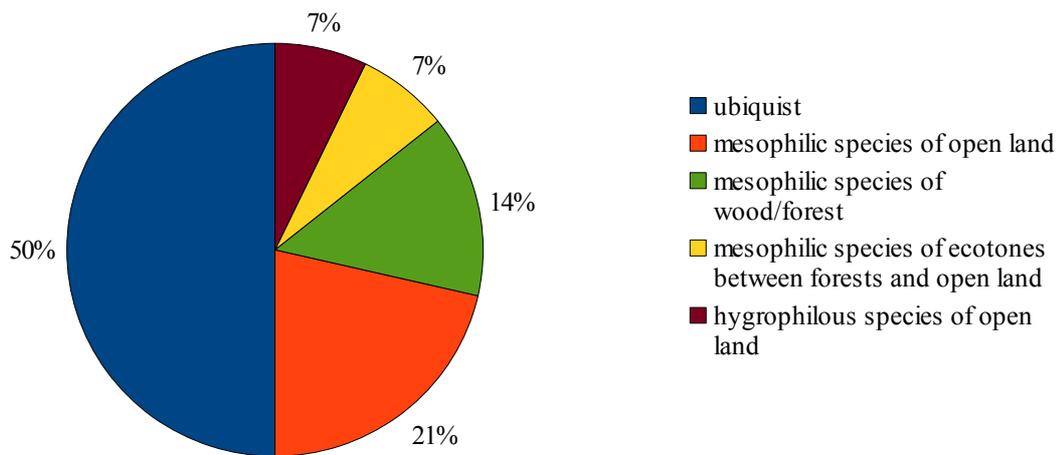


fig. 6: Ecological groups of Diurna and their percentage from the assemblage of species in “Emmels 2”

Odonata

At this site, two *Odonata*-species were captured. It is *Pyrrhosoma nymphula* and *Calopteryx virgo*. The preferred conditions of *Pyrrhosoma nymphula* can be found at small lakes, slow-flowing streams and also at swampy ponds. At the site “Emmels 2”, there is a swampy unfortified drainage channel, where the species can be observed. Overall, there are good conditions at this site for the indigenous appearance.

Calopteryx virgo is classified as “Endangered“ (EN in the Wallonian Red List)” and due to this their present must be regarded as ecological precious. *Calopteryx virgo* is found mainly on small to medium sized streams with relatively low water temperature and a moderate to fast flow. Moreover, in contrast to *Calopteryx splendens*, it is found even in streams within forests and on moor streams. The conditions for this rare species at this site are probably sufficient for their indigenous appearance. In total, the low species-rich is due to the fact there are only little areas without vegetation to bask.

4.3 Rechterbach

Diurna

The *Diurna*-fauna at this site is represented by 13 species. There is one migrant (*Vanessa cardui*) and one species (*Thymelicus lineolus*) classified as “Near Threatened” (NC).

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>Gonepteryx rhamni</i>	LC	IV	3
<i>Pieris rapa</i>	LC	I	8
<i>Pieris brassicae</i>	LC	I	1
<i>Pieris napi</i>	LC	I	25
<i>Satyridae</i>			
<i>Aphantopus hyperanthus</i>	LC	II	11
<i>Maniola jurtina</i>	LC	II	5
<i>Pararge aegeria</i>	LC	IV	1
<i>Nymphalidae</i>			
<i>Vanessa cardui</i>	NE (migrant)	I	9
<i>Inachis io</i>	LC	I	3
<i>Araschnia levana</i>	LC	IV	17
<i>Argynnis paphia</i>	LC	IV	3
<i>Hesperiidae</i>			
<i>Thymelicus lineolus</i>	NT	II	8
<i>Thymelicus sylvestris</i>	LC	III	16

The percentage of the ecological groups at this site shows a higher number of specialised species than at the other sites. The high number (31 %) of mesophilic species of wood/forest correlates to the conditions at this site (more woody plants, more forest area).

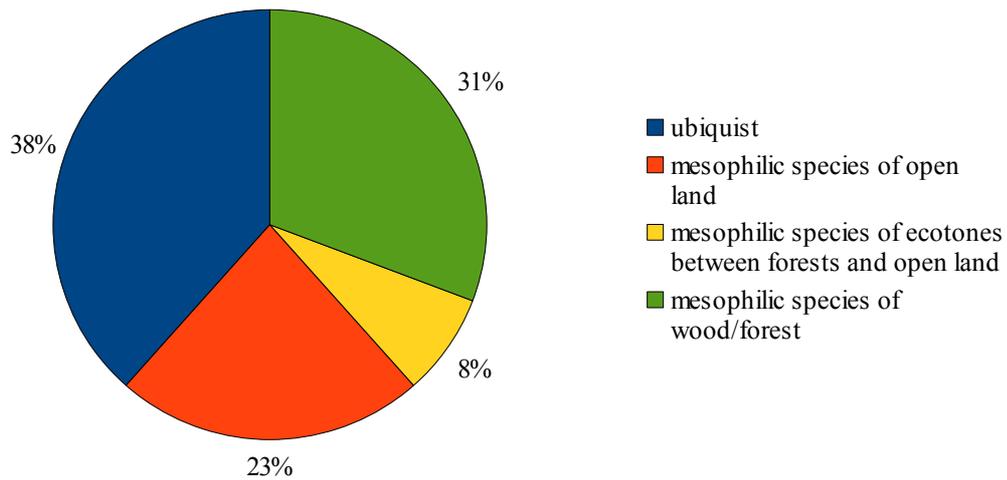


fig. 7: Ecological groups of Diurna and their percentage from the assemblage of species in "Rechterbach"

Odonata

At this site, also two *Odonata*-species were captured. It is *Aeshna cyanae* and *Calopteryx virgo*. Both are classified to the category "Least Concern" (LC) and are ubiquitous as well as common. The low number of species is caused by no sunny areas near the stream and high grown vegetation (few open country character).

5 Conclusion

Measured by the collection period (4 days of collection from mid-July to mid September) and the sometimes adverse weather conditions, the collection data for butterflies at all three sites assessed as positive. The species lists largely correspond to the existing habitat structures. Only the small number of protected species and the moderate number of specialists weaken the outcome. Probably not all species have been recorded, so that one can only wonder whether the results in the coming years prove an even greater ecological value or not. In relation to the habitat structure of the areas in "Emmels 1" and "Emmels 2", no major changes are expected for the following year. On the site of "Rechterbach" likely major changes in habitat structure will be observed as a result of natural succession and/or removal of spruces. It is possible that these changes will be reflected in the spectrum of species of butterflies fauna.

The gathering of the dragonfly fauna provide a total of rather moderate results. This was to be expected insofar as the investigation areas do not provide good conditions for the existence of a diverse dragonfly fauna. It is possible that more detailed studies from next year on offer new findings and thus a better valuation of the habitats for the dragonfly fauna. Therefore, the investigation area of Emmels Valley may be extended by a further site.

Literature

- AMICE project (2009): Adaptation of the Meuse to the Impacts of Climate Evolutions.
<http://www.amice-project.eu/en/amice-project.php>. 2009-09-18
- BLAB, J. & KUDRNA, O. (1982): Hilfsprogramm für Schmetterlinge.- Naturschutz Aktuell, **6**-
Greven.
- BNVS (2009): Belgische Natur- und Vogelschutzgebiete. BNVS-Naturschutzgebiete in Ostbelgien.
<http://www.bnvs-ostbelgien.org/naturschutzgebiete.shtml>. 2009-09-18
- FICHEFET (2008): Papillons de jour de Wallonie (1985 - 2007). Publication du Groupe de Travail
Lépidoptères *Lycaena* et du Département de l'étude du Milieu Naturel et Agricole. -
Faune - Flore - Habitats, **4**. - Gembloux.
- GOFFART, P. et al. (2006): Les Libellules de Belgique. Repartition, tendances et habitats. Publication
du Groupe de Travail Libellules *Gimphus* et du Centre de Recherche de la Nature, des
Fôrets et du Bois. - Faune - Flore - Habitats, **1**. - Gembloux.
- HERMANN, G. (1992): Tagfalter und Widderchen. Methodisches Vorgehen bei Bestandsaufnahmen
zu Naturschutz- und Eingriffsplanung.- In: TRAUTNER, J. [Hrsg.]: Arten- und
Biotopschutz in der Planung: Methodische Standards zur Erfassung von
Tierartengruppen. BVDL-Tagung Bad Wurzbach, 9.-10. Nov. 1991.- Ökologie in
Forschung und Anwendung, **5**: 145-162.- Weikersheim.
- POLLARD, E. et al. (1975): A method of assessing the abundance of butterflies in Monks Wood
Natural Nature Reserve in 1973. – Ent. Gaz. **26**: S. 79-88.
- STEFFNY, H. et al (1984): Zur Bedeutung verschiedener Rasengesellschaften für Schmetterlinge
(Rhopalocera, Hesperiiidae, Zygaenidae) und Hummeln (Apidae, Bombus) im
Naturschutzgebiet Taubergießen (Oberrheinebene). - Transsekt-Untersuchungen als
Entscheidungshilfe für Pflegemaßnahmen. - Natur u. Landschaft **59**: 435-443.

Appendix

Collection data

Emmels 1

25.07.2009	
Temperature (°C)	17
Level of cloud covering (%)	80
Wind force (Beaufort)	2
Species	Frequency
<u>Diurna</u>	
<i>Lycaena phlaeas</i>	1
<i>Manolia jurtina</i>	1
<i>Pieris napi</i>	4
<i>Thymelicus lineolus</i>	2
<i>Thymelicus sylvestris</i>	2
<i>Vanessa cardui</i>	9
<u>Odonata</u>	
<i>Libellula depressa</i>	1

05.08.2009	
Temperature (°C)	22
Level of cloud covering (%)	5
Wind force (Beaufort)	0
Species	Frequency
<u>Diurna</u>	
<i>Araschnia levana</i>	6
<i>Colias crocea</i>	1
<i>Inachis io</i>	3
<i>Pieris brassicae</i>	1
<i>Pieris napi</i>	4
<i>Pieris rapae</i>	6
<i>Plyommatus icarus</i>	4
<i>Thymelicus lineolus</i>	1
<i>Vanessa atalanta</i>	2
<u>Odonata</u>	
<i>no species</i>	

29.08.2009	
Temperature (°C)	18
Level of cloud covering (%)	70
Wind force (Beaufort)	2-3
Species	Frequency
<u>Diurna</u>	
<i>Pieris napi</i>	28
<i>Pieris rapae</i>	2
<u>Odonata</u>	
<i>no species</i>	

09.09.2009	
Temperature (°C)	20
Level of cloud covering (%)	5
Wind force (Beaufort)	1
Species	Frequency
<u>Diurna</u>	
<i>Pieris napi</i>	3
<i>Pieris rapae</i>	3
<i>Vanessa cardui</i>	1
<u>Odonata</u>	
<i>no species</i>	

Emmels 2

25.07.2009	
Temperature (°C)	20
Level of cloud covering (%)	60
Wind force (Beaufort)	2
Species	Frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	2
<i>Araschnia levana</i>	11
<i>Brenthis ino</i>	2
<i>Inachis io</i>	2
<i>Manolia jurtina</i>	5
<i>Pieris brassicae</i>	4
<i>Pieris napi</i>	1
<i>Pieris rapae</i>	10
<i>Thymelicus lineolus</i>	2
<i>Thymelicus sylvestris</i>	10
<i>Vanessa atalanta</i>	1
<i>Vanessa cardui</i>	1
<i>Zygaena spec.</i>	1
<u>Odonata</u>	
<i>Calopteryx virgo</i>	6

05.08.2009	
Temperature (°C)	22
Level of cloud covering (%)	5
Wind force (Beaufort)	1-2
Species	Frequency
<u>Diurna</u>	
<i>Aglais urticae</i>	1
<i>Araschnia levana</i>	3
<i>Gonepteryx rhamni</i>	1
<i>Inachis io</i>	1
<i>Manolia jurtina</i>	3
<i>Pieris napi</i>	11
<i>Pieris rapae</i>	6
<i>Thymelicus lineolus</i>	1
<i>Thymelicus sylvestris</i>	3
<i>Vanessa cardui</i>	1
<u>Odonata</u>	
<i>Pyrrhosoma nymphula</i>	4

29.08.2009	
Temperature (°C)	18
Level of cloud covering (%)	95
Wind force (Beaufort)	1-2
Species	Frequency
<u>Diurna</u>	
<i>no species</i>	
<u>Odonata</u>	
<i>no species</i>	

09.09.2009	
Temperature (°C)	23
Level of cloud covering (%)	0
Wind force (Beaufort)	0
Species	Frequency
<u>Diurna</u>	
<i>Pieris brassicae</i>	2
<i>Pieris napi</i>	3
<u>Odonata</u>	
<i>no species</i>	

Rechterbach

25.07.2009	
Temperature (°C)	22
Level of cloud covering (%)	50
Wind force (Beaufort)	2
Species	Frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	11
<i>Araschnia levana</i>	8
<i>Maniola jurtina</i>	2
<i>Pieris napi</i>	10
<i>Pieris rapae</i>	5
<i>Thymelicus lineolus</i>	6
<i>Thymelicus sylvestris</i>	7
<i>Vanessa cardui</i>	7
<u>Odonata</u>	
<i>Calopteryx virgo</i>	1

05.08.2009	
Temperature (°C)	22
Level of cloud covering (%)	10
Wind force (Beaufort)	0
Species	Frequency
<u>Diurna</u>	
<i>Araschnia levana</i>	9
<i>Argynnis paphia</i>	1
<i>Gonepteryx rhamni</i>	2
<i>Inachis io</i>	3
<i>Maniola jurtina</i>	3
<i>Pararge aegeria</i>	1
<i>Pieris napi</i>	8
<i>Pieris rapae</i>	3
<i>Thymelicus lineolus</i>	2
<i>Thymelicus sylvestris</i>	9
<i>Vanessa cardui</i>	2
<u>Odonata</u>	
<i>Aeshna cyanae</i>	1

29.08.2009	
Temperature (°C)	18
Level of cloud covering (%)	40
Wind force (Beaufort)	1
Species	Frequency
<u>Diurna</u>	
<i>Argynnis paphia</i>	1
<i>Pieris brassicae</i>	1
<i>Pieris napi</i>	6
<u>Odonata</u>	
<i>Aeshna cyanae</i>	1

09.09.2009	
Temperature (°C)	26
Level of cloud covering (%)	0
Wind force (Beaufort)	1
Species	Frequency
<u>Diurna</u>	
<i>Argynnis paphia</i>	1
<i>Gonepteryx rhamni</i>	1
<i>Pieris napi</i>	1
<u>Odonata</u>	
<i>no species</i>	