

**Ecological Monitoring of *Diurna* and *Odonata*
in the valleys of Emmels and Rechterbach
within the AMICE project (2)**

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1 Introduction

The second report of the monitoring of *Diurna* and *Odonata* in the valleys of Emmels and Rechterbach within the AMICE project contains the results of the investigations of 2010. The 2nd chapter concerning the investigation areas includes only a short description of the different sites and their changes compared to the previous year. More detailed descriptions of the sites can be found in the first report of 2009 (ARENS 2009). Also an additionally site in the Emmels Valley will be localised and described. In the 3rd chapter the methods of collection will be presented again, especially because of the differences regarding the collection period. The results will be shown and discussed in chapter 4. In the 5th Chapter, the two sites “Emmels Valley” and “Rechterbach Valley” are compared to identify the ecological effects of hydrological restorations and renaturations in characteristic wetlands in Ardennes.

Collecting data and site maps can be found in the appendix.

2 Investigation Areas

Emmels 1

The area of the site “Emmels 1” is still characterised by a western area with periodical wet and dry periods. In the summer 2010 it mostly was dry but only in August as it was raining heavily for several weeks, moist areas appeared. The southern part of this area is increasingly subject to an encroachment with scrubs of *Rubus*. The eastern subarea is generally dryer and the grass in this area will be cut on a regular basis in August.

Emmels 2

There are no signified changes in comparison with the observations of the previous year. The site “Emmels 2” is dominated by wet grassland with a swampy character near the unfortified drainage channel. The area borders to spruce forest in the south and alluvial forest in the north, where the stream flows.

Emmels 3

This is a new site within the monitoring from 2010 on. It is chosen specially to get more informations about the appearance of dragonflies in the Emmels Valley. The course of the stream has an open character and is not lined with trees as it is at the site of “Emmels 2” but still has a natural and dense river bank vegetation. Overall, this site seems to possess better conditions for the appearance of dragonflies but also good ones for butterflies. The vegetation shows wet grassland with some single trees and is localised near by a forest.

Rechterbach

The plantation of *Picea abies* in the southern part is increased to a height of 2,5 to 3 m and the trees are so close together, that a pass is sometimes impossible. More unfortified drainage channels now traverse the open areas with moist grassland and moorland. Otherwise, there are no signified changes in comparison to the previous year

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 this year (2010) for the full period from mid-April until mid-September. Due to the shortened collection period in 2009, the comparison of both collection periods is only possible to a limited degree. The chosen line transects are shown in the site maps (see Appendix). The sites were paced off at intervals of two to four 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

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
tyrphophilic species in the broader sense	IX

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-April 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).

The Red Lists of Wallonia for *Diurna* and *Odonata* use following categories:

Non evaluated	NE
Least concern (= safe)	LC
Near threatened	NT
Vulnerable	VU
Endangered	EN
Critically endangered	CR
Regionally extinct	RE

4 Results

4.1 Emmels 1

Diurna

In 2010, at this site, 19 different species of *Diurna* were captured. The diversity of species is high, considering that the relatively small site and the surrounding areas do not offer optimal conditions for the *Diurna*-fauna. By comparison to 2009, following species were found in addition: *Anthocharis cardamines*, *Gonepteryx rhamni*, *Aphantopus hyperantus*, *Pararge aegeria*, *Melanargia galathea*, *Boloria selene*, *Brenthis ino*, *Nymphalis urticae*, *Lycaena hippothoe*. Except *Gonepteryx rhamni*, *Pararge aegeria* and *Nymphalis urticae*, all this species were found only until mid / end July, so that their additionally capture is probably due to the fact of the shortened collection period of 2009. Not found by comparison to 2009 are the migrant species *Colias crocea* and *Vanessa atalanta* as well as *Lycaena phlaeas*.

In the Red List of Wallonia, four species (*Melanargia galathea*, *Boloria selene*, *Brenthis ino*, *Thymelicus lineolus*) are classified as “Near Threatened” (NC) and one species (*Lycaena hippothoe*) is referred to as “Vulnerable” (VU). *Lycaena hippothoe* is a specialised species for wet grasslands and typical for valleys with an open land character. This species is threatened due to increasing drainage and / or forestation of wet grassland. To protect the species, these habitats must be maintained or restored.

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>Anthocharis cardamines</i>	LC	III	4
<i>Gonepteryx rhamni</i>	LC	IV	2
<i>Pieris rapae</i>	LC	I	4
<i>Pieris brassicae</i>	LC	I	1
<i>Pieris napi</i>	LC	I	7
<i>Satyridae</i>			
<i>Aphantopus hyperantus</i>	LC	II	37
<i>Pararge aegeria</i>	LC	IV	1
<i>Melanargia galathea</i>	NT	II	1
<i>Maniola jurtina</i>	LC	II	5
<i>Nymphalidae</i>			
<i>Boloria selene</i>	NT	III	1
<i>Brenthis ino</i>	NT	VII	3
<i>Nymphalis urticae</i>	LC	I	3
<i>Nymphalis io</i>	LC	I	2
<i>Vanessa cardui</i>	NE (migrant)	I	5
<i>Araschnia levana</i>	LC	IV	1
<i>Lycaenidae</i>			
<i>Lycaena hippothoe</i>	VU	VII	1
<i>Plyommatus icarus</i>	LC	I	15
<i>Hesperiidae</i>			
<i>Thymelicus lineolus</i>	NT	II	5
<i>Thymelicus sylvestris</i>	LC	III	5

The percentage of the ecological groups at this site shows a high but less high number of ubiquitous than in 2009. Regarding the complete collection period in 2010, the new value seems to be more significant. Including the hygrophilous species, there are 32 % of species of open land and also 32 % species with an specialisation for ecotones between forest and open land or wood / forest. Considering the surrounding area of the site (fields and forest), these values appears to be representative for it.

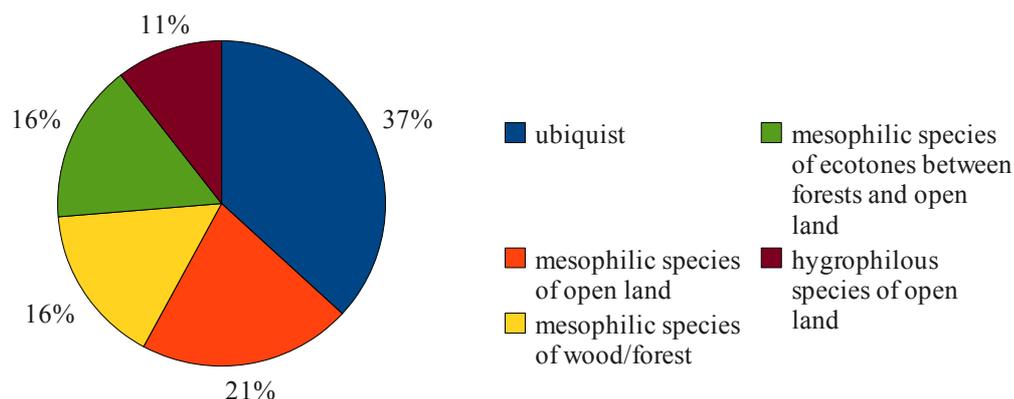


fig. 1: Ecological groups of Diurna and their percentage from the assemblage of species in “Emmels 1”

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

At this site, 17 different species of *Diurna* were captured. By comparison to 2009, the species *Anthocharis cardamines*, *Aporia crataegi*, *Boloria selene*, *Boloria eunomia*, *Lycaena hippothoe*, *Lycaena helle*, *Lycaena phlaes* and *Ochlodes sylvanus* were found in addition, but all only before mid / end July, so that they could not be observed in 2009. Not found by comparison to 2009 are the migrant species *Vanessa atalanta* and *Vanessa cardui* as well as *Araschnia levana*, *Nymphalis io* and *Pieris rapae*. The absence of the migrant species as at the site “Emmels 1” is possibly caused by the long winter period in 2010 with low temperatures until end of April.

Boloria eunomia, *Lycaena hippothoe* and *Lycaena helle* are all specialised on open wetlands and because of the rareness of this habitats, they are classified as “Vulnerable” in the Wallonian Red List. The feed plant for the larvae of *Boloria eunomia* and *Lycaena helle* is *Polygonum bistorta* and is frequently present at this site. Also, *Lycaena helle* is protected under the EU's Fauna Flora Habitat Directive (FFH). Consequently, all habitats of this species are under special protection and must not be destroyed or damaged. This species is thus an important biological indicator for his endangered habitats and prove the high ecological value of this site.

The high number of *Brenthis ino*, a representative of biotopes with a high groundwater level, correlates to the blooming period of the frequent *Filipendula ulmaria* in mid July at this site.

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>Anthocharis cardamines</i>	LC	III	2
<i>Aporia crataegi</i>	LC	II	1
<i>Gonepteryx rhamni</i>	LC	IV	2
<i>Pieris brassicae</i>	LC	I	5
<i>Pieris napi</i>	LC	I	18
Satyridae			
<i>Aphantopus hyperanthus</i>	LC	II	45
<i>Maniola jurtina</i>	LC	II	21
Nymphalidae			
<i>Boloria eunomia</i>	VU	VII	2
<i>Boloria selene</i>	NT	III	2
<i>Nymphalis urticae</i>	LC	I	1
<i>Brenthis ino</i>	LC	VII	36
Lycaenidae			
<i>Lycaena helle</i>	VU	VII	2
<i>Lycaena hippothoe</i>	VU	VII	2
<i>Lycaena phlaeas</i>	LC	II	2
Hesperiidae			
<i>Thymelicus lineolus</i>	NT	II	17
<i>Thymelicus sylvestris</i>	LC	III	21
<i>Ochlodes sylvanus</i>	LC	III	1

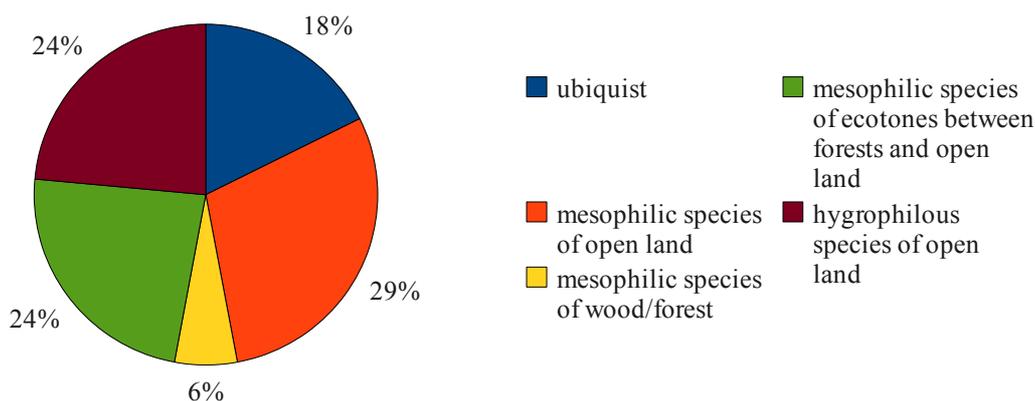


fig. 2: Ecological groups of Diurna and their percentage from the assemblage of species in "Emmels 2"

The percentage of the ecological groups shows a very high number (53 %) of specialized species of open land and much less (18 %) ubiquitous in comparison to the site "Emmels 1".

Odonata

At this site, the same two *Odonata*-species as in 2009 were captured. It is *Pyrrhosoma nymphula* and *Calopteryx virgo*.

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 species at this site are probably sufficient for their indigenous appearance,

The preferred habitats of *Pyrrhosoma nymphula* are small lakes, slow-flowing streams and also swampy ponds. At the site “Emmels 2”, there is a swampy unfortified drainage channel, where the species can be observed. The dense bank vegetation of the drainage channel serves this species to hide. Overall, there are good conditions at this site for the indigenous appearance of this species.

4.3 Emmels 3

Diurna

The similarity of this site to the site “Emmels 2” concerning the structure of vegetation, apart from the alluvial forest vegetation, is high. This similarity is also reflected concerning the species range of *Diurna*. There are 16 different species captured at this site. As at the site “Emmels 2”, the vulnerable species of hygrophilous open land, *Boloria eunomia* and *Lycaena helle* were observed. Also at both sites, the species *Thymelicus lineolus*, classified as “Near Threatened” (NC), is present.

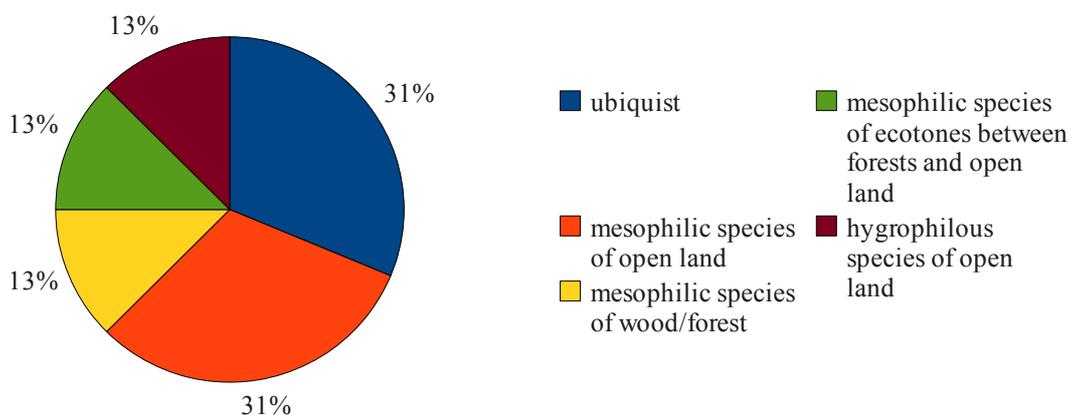


fig. 3: Ecological groups of Diurna and their percentage from the assemblage of species in “Emmels 3”

The percentage of the ecological groups shows also a high number of species of open land (44 %). In comparison to the site “Emmels 2”, there are more ubiquists and less specialised species of ecotones such as *Anthocharis cardamines* and *Boloria selene*. The species range of this site also represents a high ecological value in consideration of the habitats to be protected (wet grasslands).

table 4: 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>Aporia crataegie</i>	LC	II	1
<i>Gonepteryx rhamni</i>	LC	IV	2
<i>Pieris brassicae</i>	LC	I	2
<i>Pieris napi</i>	LC	I	17
<i>Satyridae</i>			
<i>Aphantopus hyperanthus</i>	LC	II	63
<i>Maniola jurtina</i>	LC	II	4
<i>Nymphalidae</i>			
<i>Boloria eunomia</i>	VU	VII	28
<i>Nymphalis urticae</i>	LC	I	2
<i>Nymphalis io</i>	LC	I	1
<i>Vanessa atalanta</i>	NE (migrant)	I	1
<i>Araschnia levana</i> (2 nd gen.)	LC	IV	3
<i>Lycaenidae</i>			
<i>Lycaena helle</i>	VU	VII	5
<i>Lycaena phlaeas</i>	LC	II	22
<i>Hesperiidae</i>			
<i>Thymelicus lineolus</i>	NT	II	16
<i>Thymelicus sylvestris</i>	LC	III	7
<i>Ochlodes sylvanus</i>	LC	III	4

Odonata

As expected, the open characterised course of the stream offers good conditions for the *Odonata*-fauna at this site. The high number of *Calopteryx virgo* illustrates and proves this. Their indigenous appearance depends of the conditions for their larvae. Moderate cool water temperatures and aquatic vegetation are necessary. The stream may not be eutrophic and must have a high oxygen content. Otherwise, the appearance of this species is used for a water quality assessment and indicates a water quality Class I - II.

The second species at this site is *Cordulegaster boltonii*. It is classified in the Red List of Wallonia as “Near Threatened “(NT). This species also indicats a high water quality an oxygen content.

4.3 Rechterbach

Diurna

The *Diurna*-fauna at this site is represented by 13 species. There is one migrant (*Vanessa atalanta*) and two species (*Boloria selene*, *Brenthis ino*) classified as “Near Threatened” (NC). *Boloria selene*, frequent in a quit high number, often can be found in moorlands and grasslands grown after deforestations, which both are present at this site.

table 5: 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	8
<i>Gonepteryx rhamni</i>	LC	IV	8
<i>Pieris brassicae</i>	LC	I	2
<i>Pieris napi</i>	LC	I	23
<i>Satyridae</i>			
<i>Aphantopus hyperantus</i>	LC	II	43
<i>Maniola jurtina</i>	LC	II	6
<i>Nymphalidae</i>			
<i>Boloria selene</i>	NT	III	13
<i>Brenthis ino</i>	NT	VII	4
<i>Nymphalis io</i>	LC	I	1
<i>Vanessa atalanta</i>	NE (migrant)	I	1
<i>Araschnia levana</i>	LC	IV	3
<i>Lycaenidae</i>			
<i>Lycaena phlaeas</i>	LC	II	1
<i>Hesperiidae</i>			
<i>Thymelicus sylvestris</i>	LC	III	24

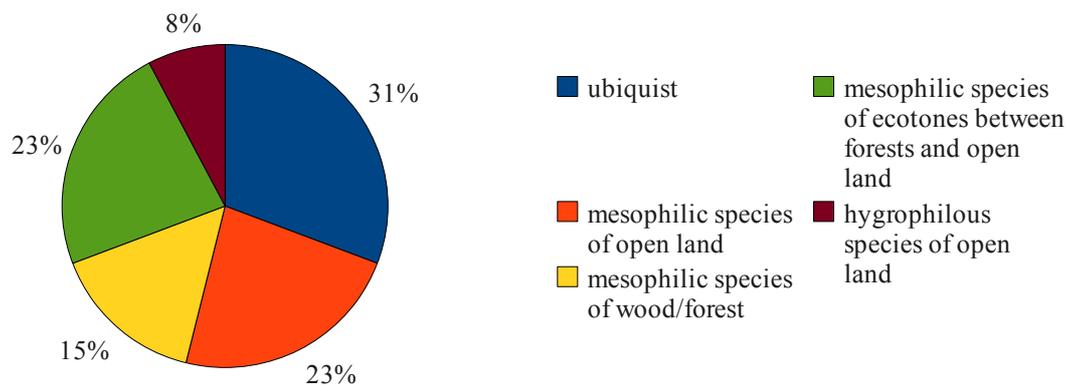


fig. 4: Ecological groups of Diurna and their percentage from the assemblage of species in “Rechterbach”

Considering the complete collection period in 2010, there are more specialised species and thus less ubiquitous in the species range of this site. With *Anthocharis cardamines* and *Boloria selene*, there are two species of ecotones between open land and forest / wood. Also the open land specialists *Brenthis ino* (hydrophilic) and *Lycaena phlaeas* can be found. This rather balanced distribution of ecological groups in the species range of this site represents the mixed structure of biotopes.

Odonata

At this site, one *Odonata*-species were captured. It is the common ubiquitous *Enallagma cyathigerum*.

5 Comparison between Emmels Valley and Rechterbach Valley

The sites in the Emmels Valley chosen for this monitoring all have a background of nature conservation. At all three sites, the intensive use (agriculture and forestry) was ceased. In parts, different conservation measures were and are realised. At the site “Emmels 1”, the western part is regulated by an annual mowing grass, whereas the eastern part is subject to natural succession. At the site “Emmels 2”, the previously intensive agriculture use was ceased and now it is subject to partially extensive grazing. Otherwise, the site “Emmels 3” was used for intensive forestry. After deforestation, the ground was shaped. At the site “Rechterbach” no nature conservation measures were realised. The area is used mainly by forestry. In the southern part, there is a plantation of *Picea abies*. Other parts, specially near by the stream, are used as high forest. The swampy part is traversed by unfortified drainage channels. The effects of conservation measures in the Emmels Valley can be demonstrated and proved by comparison to the “not affected” (by nature conservation) area in the Rechterbach Valley. Regarding the *Diurna*- and *Odonata*-fauna, those effects can be confirmed. The species range of “Rechterbach” shows in comparison to the summarised species range of “Emmels” less species of open land, especially hygrophilous ones, and more species of ecotones between open land and forest / wood. Also, there are no species at the site “Rechterbach” that were not found in “Emmels”. The opposite, in Emmels, there are some species that were not observed in “Rechterbach”. From these species, particularly interesting are the species *Boloria eunomia*, *Lycaena hippothoe* and *Lycaena helle*, because they are all specialised on open wetlands and classified as “Vulnerable” in the Wallonian Red List, but also the open land species *Aporia crataegi*, *Melanargia galathea* (NT) and *Thymelicus lineolus* (NT). Also, the conditions for dragonflies are better in “Emmels” than in “Rechterbach”, proved by the appearances of *Caloteryx virgo*, *Cordulegaster boltonii* and *Pyrrhosoma nymphula*.

table 6: Summarised Species List with conservation status, ecological classification and frequency for all sites of "Emmels"

Species	Conservation status Wallonian Red List 2006	Ecological classification
Pieridae		
<i>Anthocharis cardamines</i>	LC	III
<i>Gonepteryx rhamni</i>	LC	IV
<i>Pieris rapae</i>	LC	I
<i>Pieris brassicae</i>	LC	I
<i>Aporia crataegi</i>	LC	II
<i>Pieris napi</i>	LC	I
Satyridae		
<i>Aphantopus hyperantus</i>	LC	II
<i>Pararge aegeria</i>	LC	IV
<i>Melanargia galathea</i>	NT	II
<i>Maniola jurtina</i>	LC	II
Nymphalidae		
<i>Boloria eunomia</i>	VU	VII
<i>Boloria selene</i>	NT	III
<i>Brenthis ino</i>	NT	VII
<i>Nymphalis urticae</i>	LC	I
<i>Nymphalis io</i>	LC	I
<i>Vanessa cardui</i>	NE (migrant)	I
<i>Vanessa atalanta</i>	NE (migrant)	I
<i>Araschnia levana</i>	LC	IV
Lycaenidae		
<i>Lycaena helle</i>	VU	VII
<i>Lycaena phlaeas</i>	LC	II
<i>Lycaena hippothoe</i>	VU	VII
<i>Plyommatus icarus</i>	LC	I
Hesperiidae		
<i>Thymelicus lineolus</i>	NT	II
<i>Thymelicus sylvestris</i>	LC	III
<i>Ochlodes sylvanus</i>	LC	III

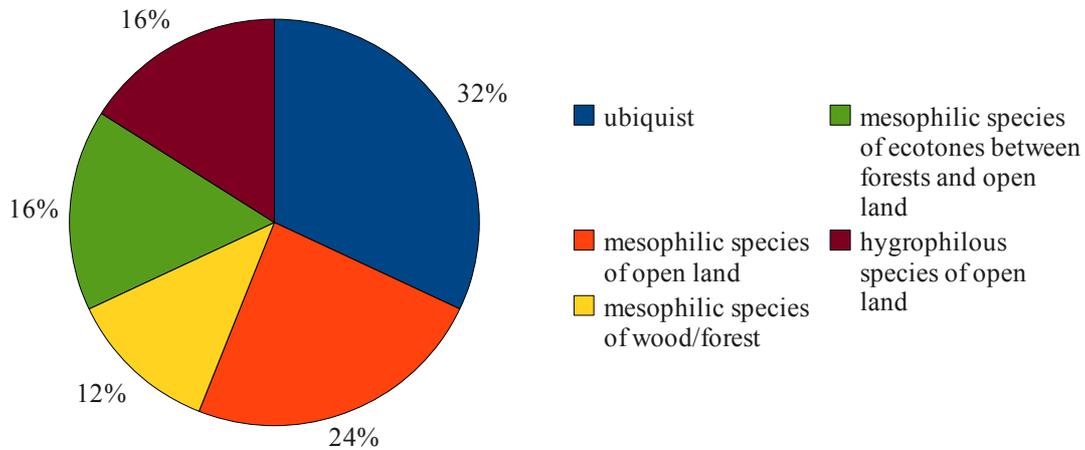


fig. 5: Ecological groups of Diurna and their percentage from the assemblage of species in "Emmels"

6 Outlook

The investigations of the next two years will probably show potentially developments in the species ranges of the sites in the Rechterbach Valley and Emmels Valley. It must be observed however, if the developments of the *Diurna*- and *Odonata*-fauna are in relation to the developments of the biotopes. In addition, it is maybe possible to detect annual variations. Because of the very rainy August in 2010, there were less species to observe than in 2009. Also, the long winter in 2010 may have had influence on the appearance of certain species.

The new site “Emmels 3” will be maintained because of the new informations specially concerning the *Odonata*-fauna.

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Appendix

Site maps

Emmels 1



fig. 6: location of the site "Rechterbach"

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

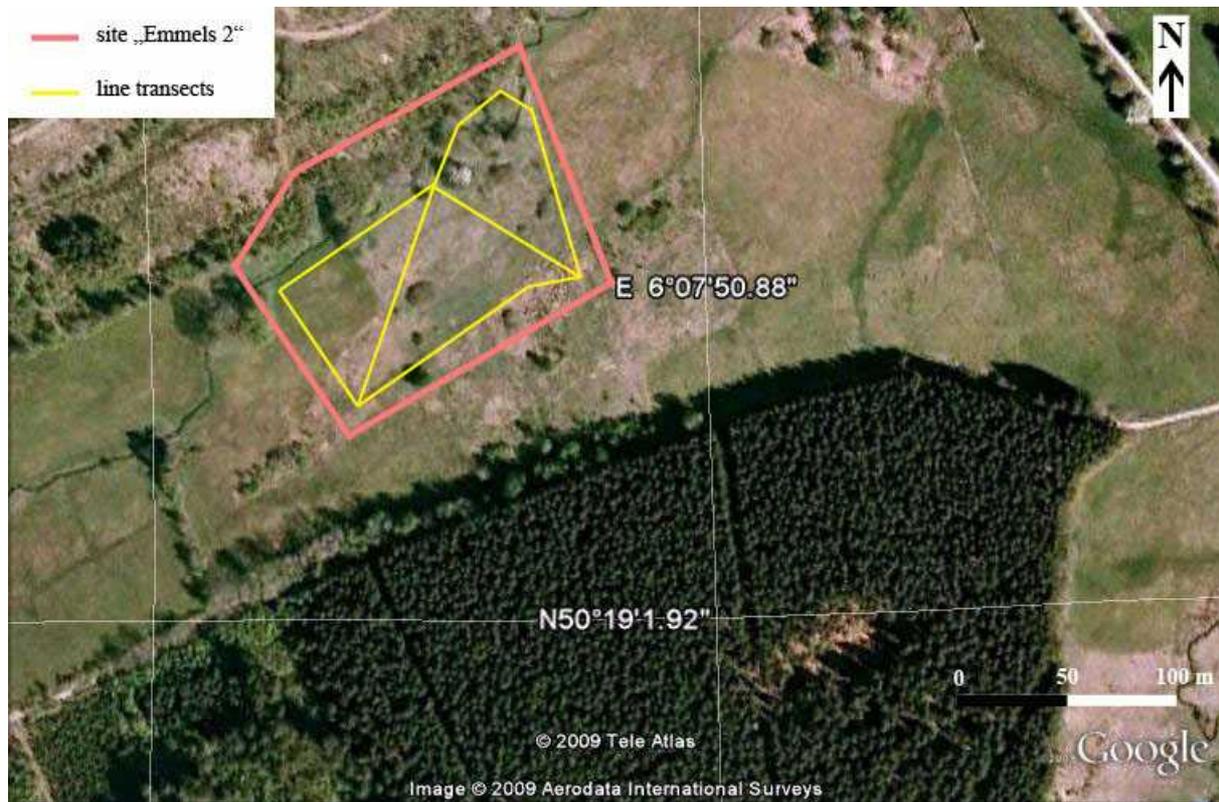


fig. 7: location of the site "Emmels 1"

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

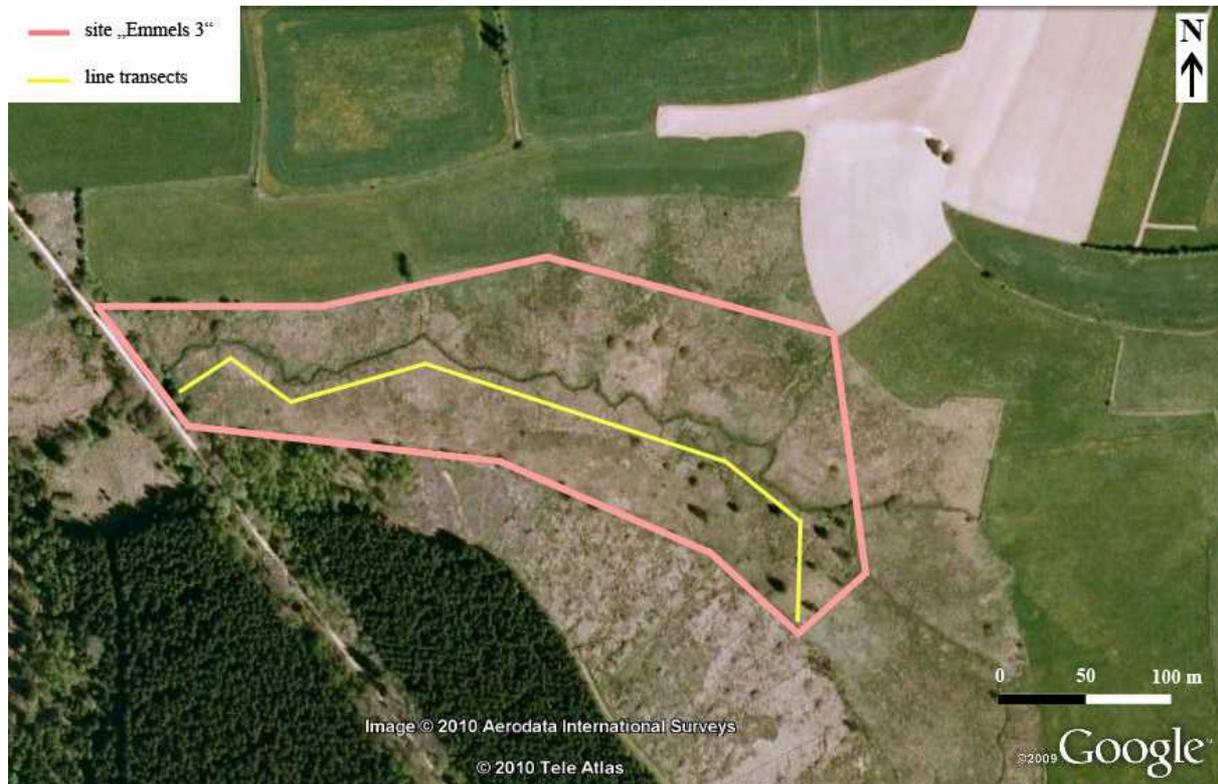


fig. 8: location of the site "Emmels 1"

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

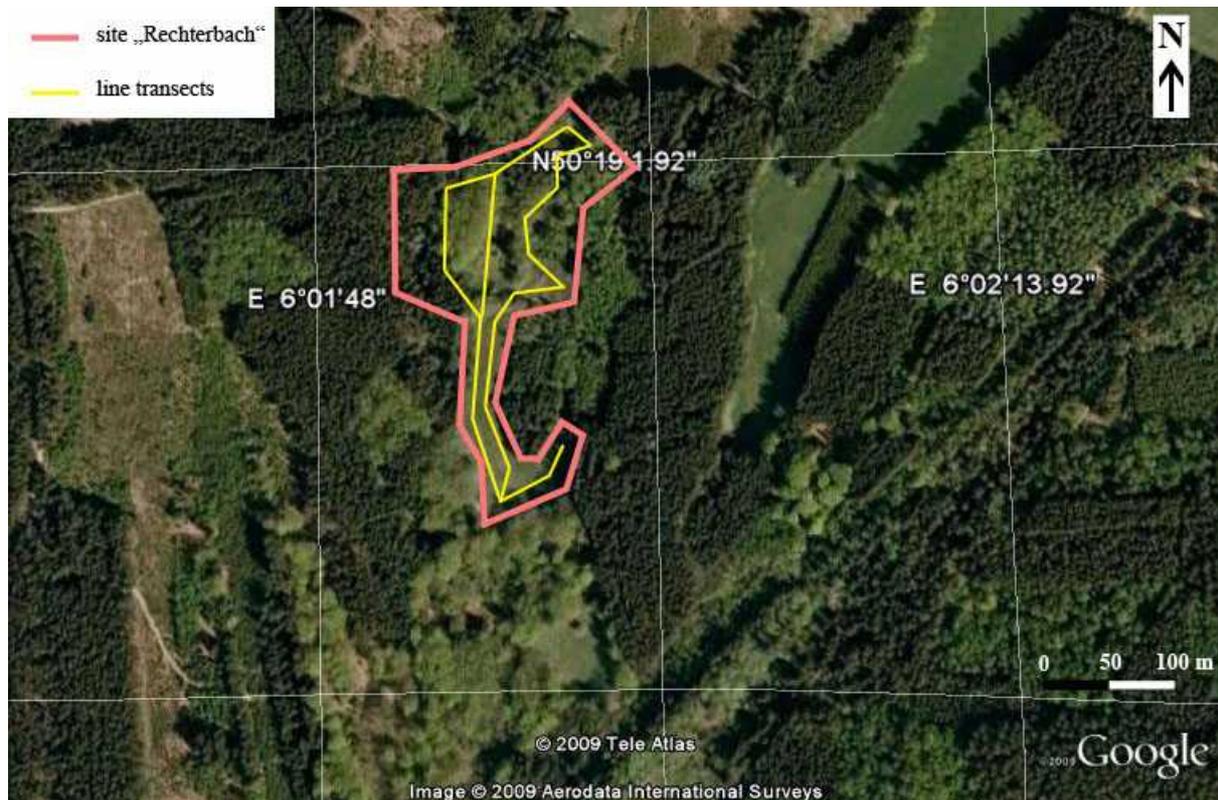


fig. 9: location of the site "Emmels 2"

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

Emmels1

23.04.10	
temperature (°C)	16
level of cloud covering (%)	10
wind force (Beaufort)	2
species	frequency
<u>Diurna</u>	
<i>Nymphalis io</i>	1
<i>Gonepteryx rhamni</i>	1
<u>Odonata</u>	
no species	

22.05.10	
temperature (°C)	20
level of cloud covering (%)	5
wind force (Beaufort)	2-3
species	frequency
<u>Diurna</u>	
<i>Anthocharis cardamines</i>	4
<i>Pieris napi</i>	1
<u>Odonata</u>	
no species	

29.06.10	
temperature (°C)	26
level of cloud covering (%)	30
wind force (Beaufort)	2
species	frequency
<u>Diurna</u>	
<i>Lycaena hippothoe</i>	1
<i>Aphantopus hyperantus</i>	4
<i>Brenthis ino</i>	3
<i>Vanessa cardui</i>	4
<i>Polyommatus icarus</i>	5
<i>Boloria selene</i>	1
<i>Pieris brassicae</i>	1
<u>Odonata</u>	
no species	

10.07.10	
temperature (°C)	34
level of cloud covering (%)	10
wind force (Beaufort)	2
species	frequency
<u>Diurna</u>	
<i>Nymphalis urticae</i>	2
<i>Thymelicus lineola</i>	5
<i>Aphantopus hyperantus</i>	32
<i>Thymelicus sylvestris</i>	2
<u>Odonata</u>	
no species	

27.07.10	
temperature (°C)	22
level of cloud covering (%)	75
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Nymphalis urticae</i>	1
<i>Melanargia galathea</i>	1
<i>Aphantopus hyperantus</i>	1
<i>Thymelicus sylvestris</i>	3
<i>Pieris napi</i>	1
<i>Araschnia levana</i> (2 nd gen.)	1
<i>Polyommatus icarus</i>	2
<i>Maniola jurtina</i>	5
<u>Odonata</u>	
no species	

20.08.10	
temperature (°C)	24
level of cloud covering (%)	5
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	2
<i>Polyommatus icarus</i>	5
<i>Araschnia levana</i>	1
<i>Vanessa cardui</i>	1
<i>Pieris rapae</i>	4
<i>Pararge aegeria</i>	1
<i>Gynopteryx rhamni</i>	1
<i>Nymphalis io</i>	1
<u>Odonata</u>	
no species	

Emmels 1 (2)

02.09.10	
temperature (°C)	18
level of cloud covering (%)	70
wind force (Beaufort)	1
species	frequency
<i>Diurna</i>	
<i>Pieris napi</i>	3
<i>Polyommatus icarus</i>	3
<i>Odonata</i>	
no species	

21.09.10	
temperature (°C)	18
level of cloud covering (%)	10
wind force (Beaufort)	0-1
species	frequency
<i>Diurna</i>	
no species	
<i>Odonata</i>	
no species	

Emmels 2

24.04.10	
temperature (°C)	20
level of cloud covering (%)	15
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Gonepteryx rhamni</i>	1
<i>Pieris napi</i>	1
<i>Anthocharis cardamines</i>	1
<u>Odonata</u>	
no species	

22.05.10	
temperature (°C)	20
level of cloud covering (%)	5
wind force (Beaufort)	2-3
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	11
<i>Gonepteryx rhamni</i>	1
<i>Anthocharis cardamines</i>	1
<u>Odonata</u>	
no species	

12.06.10	
temperature (°C)	14
level of cloud covering (%)	100
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Lycaena helle</i>	2
<i>Lycaena phlaeas</i>	2
<i>Lycaena hippothoe</i>	1
<i>Boloria eunomia</i>	2
<i>Ochlodes sylvanus</i>	1
<u>Odonata</u>	
<i>Pyrrhosoma nymphula</i>	2

10.07.10	
temperature (°C)	33
level of cloud covering (%)	5
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	42
<i>Brenthis ino</i>	33
<i>Lycaena hippothoe</i>	1
<i>Maniola jurtina</i>	16
<i>Thymelicus sylvestris</i>	14
<i>Thymelicus lineola</i>	17
<i>Boloria selene</i>	2
<i>Pieris brassicae</i>	3
<i>Aporia crataegie</i>	1
<u>Odonata</u>	
<i>Calopteryx virgo</i>	3

27.07.10	
temperature (°C)	22
level of cloud covering (%)	50
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Aphantopus hyperantus</i>	3
<i>Brenthis ino</i>	3
<i>Maniola jurtina</i>	5
<i>Thymelicus sylvestris</i>	7
<i>Pieris napi</i>	2
<i>Pieris brassicae</i>	2
<u>Odonata</u>	
no species	

20.08.10	
temperature (°C)	24
level of cloud covering (%)	5
wind force (Beaufort)	1-3
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	3
<u>Odonata</u>	
no species	

Emmels 2 (2)

02.09.10	
temperature (°C)	18
level of cloud covering (%)	70
wind force (Beaufort)	2
species	frequency
<i>Diurna</i>	
<i>Pieris napi</i>	1
<i>Nymphalis urticae</i>	1
<i>Odonata</i>	
no species	

21.09.10	
temperature (°C)	18
level of cloud covering (%)	10
wind force (Beaufort)	1
species	frequency
<i>Diurna</i>	
no species	
<i>Odonata</i>	
no species	

Emmels 3

24.04.10	
temperature (°C)	20
level of cloud covering (%)	25
wind force (Beaufort)	2-3
species	frequency
<u>Diurna</u>	
<i>Gonepteryx rhamni</i>	1
<i>Pieris napi</i>	1
<u>Odonata</u>	
no species	

26.06.10	
temperature (°C)	25
level of cloud covering (%)	50
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Lycaena phlaes</i>	22
<i>Lycaena helle</i>	5
<i>Boloria eunomia</i>	24
<i>Nymphalis urticae</i>	2
<u>Odonata</u>	
<i>Calopteryx virgo</i>	44

27.07.10	
temperature (°C)	24
level of cloud covering (%)	50
wind force (Beaufort)	0-2
species	frequency
<u>Diurna</u>	
<i>Araschnia levana</i> (2 nd gen.)	3
<i>Aphantopus hyperantus</i>	17
<i>Pieris napi</i>	9
<i>Gynopteryx rhamni</i>	1
<i>Pieris brassicae</i>	1
<i>Thymelicus sylvestris</i>	7
<i>Nymphalis io</i>	1
<i>Vanessa atalanta</i>	1
<i>Maniola jurtina</i>	4
<u>Odonata</u>	
no species	

22.05.10	
temperature (°C)	20
level of cloud covering (%)	5
wind force (Beaufort)	3
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	4
<u>Odonata</u>	
no species	

09.07.10	
temperature (°C)	32
level of cloud covering (%)	50
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Boloria eunomia</i>	4
<i>Aphantopus hyperantus</i>	46
<i>Pieris brassicae</i>	1
<i>Ochlodes sylvanus</i>	4
<i>Aporia crataegi</i>	1
<i>Thymelicus lineola</i>	16
<u>Odonata</u>	
<i>Cordulegaster boltonii</i>	1
<i>Calopteryx virgo</i>	12

20.08.10	
temperature (°C)	24
level of cloud covering (%)	5
wind force (Beaufort)	1-3
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	2
<u>Odonata</u>	
no species	

Emmels 3 (2)

02.09.10	
temperature (°C)	18
level of cloud covering (%)	70
wind force (Beaufort)	2-3
species	frequency
<u>Diurna</u>	
no species	
<u>Odonata</u>	
no species	

21.09.10	
temperature (°C)	18
level of cloud covering (%)	10
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	1
<u>Odonata</u>	
no species	

Rechterbach

24.04.10	
temperature (°C)	18°
level of cloud covering (%)	5
wind force (Beaufort)	1-2
species	frequency
<u>Diurna</u>	
<i>Nymphalis io</i>	1
<i>Pieris napi</i>	2
<u>Odonata</u>	
no species	

23.05.10	
temperature (°C)	22
level of cloud covering (%)	0
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	7
<i>Araschnia levana</i>	1
<i>Anthocharis cardamines</i>	4
<i>Vanessa atalanta</i>	1
<u>Odonata</u>	
no species	

13.06.10	
temperature (°C)	20
level of cloud covering (%)	15
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	5
<i>Araschnia levana (l. Gen.)</i>	1
<i>Anthocharis cardamines</i>	4
<i>Boloria selene</i>	7
<i>Gynopteryx rhamni</i>	2
<i>Lycaena phlaeas</i>	1
<u>Odonata</u>	
no species	

09.07.10	
temperature (°C)	30
level of cloud covering (%)	70
wind force (Beaufort)	1-3
species	frequency
<u>Diurna</u>	
<i>Pieris brassicae</i>	2
<i>Boloria selene</i>	6
<i>Aphantopus hyperatus</i>	39
<i>Thymelicus sylvestris</i>	5
<i>Brenthis ino</i>	4
<u>Odonata</u>	
<i>Enallagma cyathigerum</i>	1

27.07.10	
temperature (°C)	20
level of cloud covering (%)	50
wind force (Beaufort)	0-1
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	5
<i>Aphantopus hyperantus</i>	4
<i>Thymelicus sylvestris</i>	19
<i>Maniola jurtina</i>	6
<i>Araschnia levana</i>	1
<u>Odonata</u>	
no species	

20.08.10	
temperature (°C)	21
level of cloud covering (%)	40
wind force (Beaufort)	1
species	frequency
<u>Diurna</u>	
<i>Pieris napi</i>	4
<i>Gynopteryx rhamni</i>	6
<u>Odonata</u>	
no species	

Rechterbach (2)

02.09.10	
temperature (°C)	18
level of cloud covering (%)	80
wind force (Beaufort)	0
species	frequency
<u><i>Diurna</i></u>	
no species	
<u><i>Odonata</i></u>	
no species	

21.09.10	
temperature (°C)	18
level of cloud covering (%)	20
wind force (Beaufort)	0-1
species	frequency
<u><i>Diurna</i></u>	
no species	
<u><i>Odonata</i></u>	
no species	