



Rospuda Valley Survey 2007



review of surveyed groups
species lists
final report - November 2008

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Photos on cover: top left corner: *Nehalienia speciosa*, by Tim Faasen. Middle right: *Boloria euphrosyne*, by Tim Faasen. Middle left: *Colobochyla salicalis*, by Wouter Moerland. Right bottom: Calcereous fen, by Bram Kuijper.

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This is not a field guide. The Rospuda Vally and especially its valuable bogs are very vulnerable. Though more information on the distribution of species in the Rospuda Vally is important, please think twice before you enter the area.

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1 Preface

This is the final report on the biodiversity survey in the Rospuda valley, which took place between 2 and 7 June 2007. Mere six days of surveying the Rospuda area have increased the knowledge on the natural value of the Rospuda area substantially, reflected by this report and its preliminary version, both published online at <http://www.biodiversitysurvey.eu>. By acknowledging that the route of Via Baltica Highway should circumpass the Rospuda Valley by the current government, one big hurdle in the prolonged conservation of the Rospuda area has been taken. All this could not have been realized without the help of a great number of people and organizations. We would therefore like to acknowledge Gerard Schrama, Paulina Dzierzja, Agatha Woswojawa, Ewa Klimkowska, Pawel Pawlikowski, Theun van Gijzen, Thijs Berman, Vincent Kalkman, Janko van Beek, Kees Oosterbeek, Prof. Dr. Matty Berg, Prof. Dr. Han Olf and both Dutch young naturalist's societies (NJN and JNM), Save Wetlands Now (CMoK), the University of Groningen and Wildzoekers. We would like to express special gratitude to the bodies which funded this project: the Uyttenboogaart-Eliassen Stichting (UES), Stichting Bulbzicht, Gerard Schrama and the World Wide Fund (WWF).

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2 Introduction

2.1 Geography and natural history of the Rospuda area

The Rospuda area is located in the northeast of Poland (see map), 15 kilometers northwest from the city of Augustów in Podlachia ($53^{\circ}53'47.54''$ N, $22^{\circ}57'04.00''$ E). The Rospuda Valley is a part of the Augustów forest, which is located in Northeastern Poland. The valley was formed during the glaciations between 10.000 - 30.000 years ago, through a total of 8 different glaciation stages (Ber, 2006). During this time, glaciers cut through the Mazurskie plateau, creating hundreds of small lakes and rivers surrounded by small fluvoglacial hills. The Rospuda river connects a number of these small lakes, and stretches from the Polish-Russian border to the city of Augustów. The part of the Rospuda valley which was subject of the current survey comprises a 20 kilometer long fluvoglacial basin. Within this basin, a lowland river is surrounded by large, calcareous peatlands and mires. Presumably this basin has been a lake as well, but over time it has slowly been filled up with a layer of gyttia, on top of which a thick layer of (floating) peat has formed (pers. comm. R. van Diggelen).

The mires are surrounded by the steep slopes (10-15 m) of a fluvoglacial morainic plateau with mineral sandy soils. The plateau provides mineral rich groundwater to the mire, which is essential to some of the most precious vegetation types growing in the mire. Most of the surrounding morainic plateau is covered with pine forestry plantations, but a number of smaller peat bogs are situated in small mineral-rich depressions, which are accompanied by pristine bog forests.

2.2 Pristine character

Although Rospuda is very valuable mire complex for Polish standards (Karczmarz & Sokolowski, 1988), it has not received any important conservation status, except for an enlisting as an Area of Protected Landscapes [IOS-database](#), which signifies only a marginal conservation status. It has also been enlisted on the Natura 2000 areas shadowlist produced by WWF Poland, Birdlife Poland (OTOP) and other NGOs (Pawlaczyk et al., 2004), but did not receive an official Natura 2000 status until to date.



Figure 2.1: Geographic location of the Rospuda valley

Earlier monitoring by the Save Wetlands Now association (CMoK) revealed that the Rospuda area contains a large number of endangered plants and birds (CMoK, 2006). The richness of the Rospuda valley is reflected in several clearly distinguishable plant associations: mire, reedland, tall-sedge bed, woodland, water, spring and sand dune grassland associations (Sokolowski, 1996) (see also section on vegetation). These precious associations have been maintained since the area has never been intensively used for agricultural purposes. In contrast to numerous other Western European peat reserves (including Biebrzanski NP), this peatland never underwent systematic peat excavation or substantial damages by cultivation. As the area did not undergo any agricultural water drainages, the water relations are left undisturbed causing the unique zonation in vegetation.

2.3 Via Baltica

In the time period during which this project was initiated, the pristine character of Rospuda valley was threatened by the construction of the Via Baltica Highway between Warsaw and the Baltic states. The part of the highway which bypasses Augustow inevitably has to cross the Rospuda river at some point, but the choice of the exact location from a number of alternatives has been the central point of debate. From a perspective which values sustained conservation of the Rospuda mire complex, the least harmful trajectory of the highway would be the “Alternatywa” route, which bypasses the mire complex and crosses the river near the small settlement of Sucha Wieś. However, the officially planned trajectory of the Via Baltica Highway’s route would cut the Rospuda Mire right through its central part, around the coordinates (26500,75800).

2.4 Vegetation zonation in the mire

The most pristine fragment of the valley, the mire, varies in width - from 50 metres in the north to 1200 metres. There is an open expanse of sedge-moss vegetation with a transversal zonality in the vegetation. A large number (23) of Polish Red List species occur in the Rospuda valley (citation). The most valuable plant species are the Musk Orchid *Herminium monorchis* (which is the only site in Poland), Lady’s slipper Orchid *Cypripedium calceolus*, Jacob’s ladder *Polemonium caeruleum* and Adder’s Mouth Orchid *Malaxis monophyllos*.

Close to the Rospuda river we find *Nymphaea alba* and reedbeds (alliance of *Ranunculion fluitantis* (EU-HBD: 3240)) The old oxbow river arms contain a vegetation dominated by Water Soldier *Stratiotis aloides* and Reed Sweet *Glycerium maximum*, but which also contains communities of *Hydrocharition* (EU-HBD: 3150) and Duck weed *Lemna* spp. assemblages of the *Lemnetea* class. A little further from the river sedge communities dominated by *Carex pseudocyperus* and *C. riparia* are encountered (CMoK, 2006).

In the mire more distant from the river a zone with smaller sedge species is located, containing species such as *Carex nigra*, *C. limosa*, *C. rostrata*, *C. lasiocarpa* and *C. lepidocarpa*. Also, “brown mosses”, mostly *Tomenthypnum nitens*, *Drepanocladus* s.l. and several species of *Sphagnum* spp are found here.

Around the calcareous fens in this area, *Menyanthes trifoliata*, Water horsetail *Equisetum fluviatile* and Marsh fern *Thelypteris palustris* are encountered. This part of the mire covers an area of approximately 100 hectares and is one of the most valuable habitats of the Rospuda valley. It is highly dependent on suitable ground water levels and is largely free of encroaching willow or birch. The quaking bogs are also located in this zone and are dominated by *Carex*

lasiocarpa indicating the *Caricion lasiocarpae* association (EU-HBD: 7140). Parts of the open mire are also dominated by *Carex davalliana* (EU-HBD: 7210) (CMoK, 2006).



Figure 2.2: Calcerous fen within the peatland. photo: Bram Kuijper

The open mire zone is surrounded by patches of bog woodland and its characteristic *Vaccinio uliginosi-Betulum Pubescentis* association (EU-HBD: 91D0) and large amounts of pine-birch shrubs *Thelypteridi-betuletum*. Both habitat types occur primarily in the broadest middle part of the valley covering nearly 300 ha. Close to the fluvoglacial hills surrounding the valley are spruce forests on peat or alder swamp forests (carr). Alder swamp forests (EU-HBD: 91E0) cover substantial areas alongside the valley borders in the north and at the location in which Rospuda flows into Lake Necko. These carrs are usually connected with nutrient rich sites, with little horizontal water movement, located on strongly decomposed fen peat formed by beds of reed and tall sedges under permanent flooding (CMoK, 2006).

Scattered throughout the open mire zone are small patches of other types of habitat:

- most importantly raised bogs (EU-HBD: 7110) can be found on the elevated parts of the mire in which peat has lost contact with the underlying ground water level and is directly fed by precipitation. Raised bogs can be found scattered throughout the entire mire and comprise 4 ha in total.
- Scots pine bog woodland, *Vaccinio uliginosi-Pinetum* (EU-HBD: 91D0), covering small fragments among shrub complexes and birch-pine woodland.

- Non-calcareous springs occurring near the edges of the valley as small mid-forest enclaves, consisting chiefly of the *Cardamine amara* - *Chrysosplenium alternifolium* community.



Figure 2.3: Raised bog within the Rospuda reserve. photo: Ewoud van der Ploeg

2.5 Rationale for this survey

Although the vegetation and breeding birds are relatively well-studied in the the area, knowledge is lacking on the status of other taxonomic groups in the Rospuda area, in order to allow for a full assessment of the Rospuda region's ecological value. With the goal of filling this gap of knowledge, this survey was started when members of CMOK (Wetland Conservation Centre) contacted one of the founders of the European Biodiversity Survey (EBS) in 2006. At that time, the plans for the construction of the Via Baltica Highway materialized quickly, which increased the urgency for a survey to collect more data on the natural value of the Rospuda area. The aims of this survey were threefold. First, findings of this survey provide information on the invertebrate diversity that can be found in one of the most pristine mire systems in western Europe. Due to its pristine condition, the Rospuda area can serve as a reference to degraded mire areas in Northern and Western Europe. Secondly, in the unfortunate case the highway will eventually be built through the mire, the current assessment can serve as a baseline study to compare the mire after the road building activities have ceased. Thirdly, the fact that all data can be openly accessed provides an important improvement on the general availability of data on taxonomic groups other than birds and plants in Northeastern Poland.

2.6 Methods

The Rospuda valley was visited from the 2nd to the 9th of June 2007 by a group of 20 committed naturalists, of which 10 were professional biologists with experience on one or more of the faunistic groups under focus. Birds and plants were excluded from the survey, since data



Figure 2.4: Peatlands of the Rospuda reserve, visited by a number of survey members. photo: Ewoud van der Ploeg

was already available on these groups. The following faunistic groups were surveyed: butterflies, moths, dragonflies, carabid beetles, aquatic invertebrates, flies, fish and bats.

The assessment of biodiversity in the area was performed by 35 different 9-hour long expeditions into the area during day and nighttime. In total, the Rospuda valley area and accompanying forests account for ± 75 square kilometers; this survey aimed to thoroughly cover as many 1 x 1 kilometer grid squares in the area as was possible. 20 squares with the most pristine habitats, mainly located in the mire, were visited at least on two different occasions during the survey. 15 squares were visited at least once. Due to the limited accessibility of the area, assessments were done mainly by foot, bike or while canoeing on the main river.

Due to time constraints, no specific efforts other than going through the area were applied to collect observations of most species. Bats were identified using a high-frequency sound converter, aquatic fauna was sampled using nets and moths were observed using light traps. No highly elaborate measures were used to find species (e.g. sophisticated trapping methods or very intensive searching efforts for single indicator species). Some groups such as fish, flies, carabid beetles, reptiles and amphibians are therefore likely to be relatively less sampled compared to dragonflies and butterflies.

3 Aquatic fauna

André van Nieuwenhuijzen

3.1 Introduction

Aquatic organisms play an important role in wet ecosystems such as the Rospuda valley. Since the habitat preferences of many aquatic organisms are quite well known, many species are considered good indicators for the condition of a wetland.

3.2 Methods

Aquatic invertebrates were collected using nets and in the shallow parts of the mire and bog woodland with kitchen sieves. In addition, we aimed to catch the larger species of waterbeetles with traps that are normally used to sample amphibians, so called 'Molchreuse' traps (Büro für Ökologie: M. Henf, Mettman, Germany). Traps were baited with catfood and placed in the following locations:

1. bog, surrounded by small lake, coordinates: 30248-54783
2. Jalowo lake
3. Ślepe lake
4. oxbow lakes on west bank of Rospuda river

Traps were checked and re-baited daily. Some Odonata larvae were collected in this way too, which are included in the chapter 9 on page 38.

3.3 Results

Results will be discussed according to three areas: The Rospuda river itself, the mires and bog woodland around it and finally, the production forest. Only the most remarkable or rare species will be discussed separately.

Species of the river system

The Rospuda river is a typical lowland river in which sandy river beds alternate with old reed beds alongside the river. The river system consists of the main river as well as several old meanders (oxbow lakes) either still in connection to the river or isolated by sedimentation and peat formation. The oxbow lakes are largely covered by Water Soldier *Stratiotes aloides*.

***Unio crassus crassus* (Philipsson, 1788)**

The Thick Shelled River Mussel was seen throughout the sandy parts of the river Rospuda. It is listed in annexes II and IV of the [European Habitats directive](#). According to the Polish Red List this species is endangered and protected by law.

***Anadonta cygnea* (Linnaeus, 1758)**

The Swan mussel is on the Polish Red List because its populations are declining. It is considered to be endangered and protected by law. Several specimens were found in the sandy parts of the river Rospuda.

***Misgurnus fossilis* (Linnaeus, 1758)**

The Weatherfish was caught in oxbow lakes, both isolated and connected ones. It is listed in annex II of the European Habitats directive.

The main river maybe is nothing too special. As it runs through several towns before entering the Rospuda valley, one may expect it to be much affected, and perhaps slightly polluted. Even so, healthy populations of *Aphelocheirus aestivalis*, *Unio crassus* and *Anadonta cygnea* indicate that the water quality is not too bad.

The oxbow lakes are beautifully developed. Water Soldier (*Stratiotes aloides*) is itself an important indicator species for lowland river systems with moderate to high nutrient levels belonging to habitat type EU3150 (Natural eutrophic lakes with Pondweed associations (*Magnopotamion*)). Dense Water Soldier vegetation is a suitable habitat for especially the smaller species of water invertebrates.

3.4 Species of mires and bog-woodland

In the mires and bog-woodland similar invertebrates were encountered, so the two types of habitat will be discussed together.

In both systems a variety of habitats exist. Small and medium sized pools are scattered throughout the area. The extensive shallow parts of the mires and bog-woodland are potentially even more important. In both habitats, snails and water beetles dominated the fauna. This is entirely normal in such shallow and perhaps not permanent waters, where fish are largely absent.

***Hirudo medicinalis* (Linnaeus, 1758)**

The medicinal leech was seen on several occasions, always in the same pool. It is a largish pool in the forest, just east of the bridge. This leech is endangered due to commercial collectorship and degradation of its natural habitats, as well as to reduced abundance of its hosts. According to the Polish Red List this species is vulnerable. It is also listed in annex V of the European Habitats directive.

***Hydroporus elongatulus* (Sturm, 1835)**

This small Dytiscid waterbeetle was encountered at three different locations in the valley, always in shallow and well-vegetated waters, both in the mire and in the bog woodlands. It is probably the rarest water beetle found in the Rospuda area. Its distribution in Poland is unknown to the author, but according to (Nilsson & Holmen, 1995) this species is rare throughout its range, found in various small bodies of stagnant water, often associated with eutrophic lakes or fens.

***Laccornis oblongus* (Stephens, 1835)**

One specimen of this Dytiscid waterbeetle was collected in the mire. It belongs in small waterbodies, such as ditches, seasonal pools and ponds, rich in vegetation, especially mosses, often on peaty mires or fens (Nilsson & Holmen, 1995).

***Dryops anglicanus* (Edwards, 1909)**

The abundance of this species is rather remarkable. It was collected at nearly every site at which water vegetation was abundant, both in the mires and in in the forest. This species is considered indicative of mesotrophic seepage sites (Drost et al., 1992) and as such it is very rare in the Netherlands, where it occurs only in De Wieden.

3.5 Conclusion and discussion

Many of the collected Coleoptera species are typical of mesotrophic (*Dryops anglicanus*) or eutrophic conditions, e.g. *Hydrovatus cuspidatus*, *Ilybius guttiger*, *Hydaticus seminiger*, *Helophorus nanus* and *Limnebius parvulus* (Hansen, 1987; Nilsson & Holmen, 1995).

On a finer scale, the habitat preferences of the above mentioned water beetles appear to be very diverse, if not contradictory. Some species, for instance, are typical of semi-permanent habitats, others are indicative of permanent ones. Some species are assumed to be acidophilous, whereas the abundance of molluscs indicate the pH must be larger than 5. In fact, this assembly of contrasting habitats is exactly what should be expected in a natural river valley. In shallow waters such as the mire, small differences in geomorphology or hydrology may have large consequences. Some parts will be flooded every year, while slightly higher parts may contain water almost permanently. Likewise, some parts of the mire will be heavily influenced by seepage, and thus be alkaline. Other shallow parts will be relatively independent of the ground water level and thus primarily fed by rain and as a consequence slightly acidic in character. So, even if the mire appears largely monotonous from a landscape scale, the mire may in fact offer a lot of variety of habitats on a small scale, making it capable of supporting a large number of species. With 75 species of water beetles, found in just seven days, the Rospuda valley appears to be relatively rich in water beetles. This variety and species richness make the Rospuda Valley mires a rare and valuable habitat.

Species of the production forest

Although the cultivated forest surrounding the Rospuda valley was not the main focus of our survey, this habitat deserves to be mentioned here because of the occurrence of the following species:

***Ochthebius alpinus* (Ienistea, 1979)**

In shallow and probably temporary forest pools some specimens of the waterbeetle *Ochthebius* were collected. Only the males (two specimens) could be identified. They appear to be *O. alpinus*. This record appears to be the first from Poland. The species is known from Switzerland, Norway, Sweden, Finland, Ukraine and Russia. Its habitat is unknown (Jäch, 1998). It is not necessarily

a rare species; it might be overlooked, as its external morphology is very similar to that of the common *Ochthebius minimus*.

4 Moths

Wouter Moerland

4.1 Introduction

In general, distributions of Lepidoptera can be very indicative for the quality and natural history of biotopes. Restrained by ecological features, species can be highly selective in their habitat preference. Therefore, abundances of butterflies have an additional value for the assessment of the Rospuda valley. Assigning indicator species demands detailed knowledge of distributions and life-histories. Compared to the Rhopalocera (butterflies), moths are ecologically less investigated.

The Polish moth diversity is well-known, because of lepidopterological research that has started since the first half of the 19th century. A distributional checklist of the Lepidoptera has been drafted on province-scale, and it reports current species presence in comparison to presence before 1960 (Buszko & Nowacki, 2000). Fluctuations in abundances and species national statuses are for most of the species unclear. To our knowledge, no data are known on Lepidoptera occurring in the Rospuda valley. An extensive inventory of the nearby Puszcza Borecka Forest (Buszko, 2007) has culminated to a species list that likely also resembles the Rospuda diversity for a greater part of the moth species.

Nocturnal Lepidoptera are largely underinvestigated, both their ecology as well as their distribution patterns. Therefore, national lists of endangered moth species often do not reflect the actual status of the species involved. Given that Poland still contains large amounts of pristine habitats that are degraded in other parts of Europe, Poland is likely to still have high abundances of species that are endangered on an international level.

4.2 Material & Methods

From June, 3rd till 8th 2007, a series of moth catching field trips were performed at six different locations in the Rospuda valley. From dusk (around 21.15) to 00.30 (AM), light traps were positioned in a variety of habitats throughout the valley:



Figure 4.1: *Acronicta strigosa* and *Hyppa rectilinea*. photos: Wouter Moerland

- June, 3rd. Herb-rich grassland patch in dry slope forest with deciduous trees (*Corylus* and *Populus*) and scattered conifers; wide view over vast reed land;
- June, 4th. Old mixed and damp oak/conifer woodland, close to the peat-bogs;
- June, 5th. At the border of a vast moist grassland with *Ranunculus* vegetation and an old deciduous forest;
- June, 6th. Bridge over the Rospuda; marshy forest of birch *Betula* spp. and alder *Alnus glutinosa*. Fringes of reeds and damp grassland;
- June, 7th. Sheltered location at the river bank, edged by mature woodland;
- June, 8th. Mature swamp forest at the border of the fen.

Weather circumstances were constant, with slightly colder during later days of the survey (approximately 3°C was the minimum temperature). During daytime, weather circumstances were summerlike, with temperatures of 30°C. After dusk, it was getting cold quickly, with an increasingly foggy atmosphere. Moths were collected in small tubes and released after identification, which took place the next morning. Limited amount of time compelled us to concentrate mostly on the macro-families (*Noctuidae*, *Arctiidae*, *Geometridae*, etc.) and only a few microlepidoptera (*Tortricidae* and *Pyrilidae*). If the identification did not succeed during the survey, further investigation was done after the survey in the Netherlands.

In addition, day-active moths were netted during daily field-excursions. This method yielded a number of species that could not be attracted by light traps.

Discussion of conservation status

In total, 25 moth species are included in the Polish Red Data Book on invertebrates ([Głowaciński & Nowacki, 2004](#)). This list appears to be a collection of extremely local (boreal or central European) species and immigrant species with southern distributions. For Borecka Forest National Park, a two-decades lasting survey delivered only one species found in the Red Data Book. This suggests a rather narrow, biased selection of species that are considered endangered on a national scale. For only a subset of these species –14 in total– a record has ever been documented for the province of Podlaskie ([Buszko & Nowacki, 2000](#)). Also, for the species not included from the red list we need to interpret the relevance of the Rospuda valley on a European level. Therefore, we will refer to status of species in countries with identical biotopes. For example, species reported on the German red data list can be abundant in Poland.

4.3 Results

In total 869 individual moths have been identified after light trapping, which resulted in a list of 155 species of macro- and microlepidoptera. In addition, day-excursions delivered 19 species that were not trapped by light. The cumulative species curve (fig.) shows that the total number of species observed kept increasing continuously during time spent trapping. We can conclude that the survey has therefore not yet been exhaustive, implying that future efforts may yield substantial numbers of additional moth species.

Some characteristic species observed for the following habitats were:

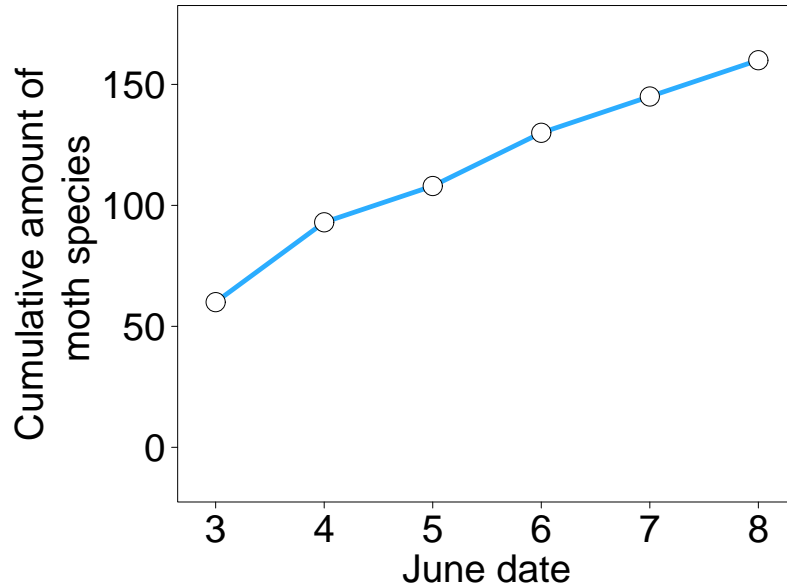


Figure 4.2: Saturation curve of the amount of moth species observed during the 8-day survey

- *Cepphis advenaria*, *Macaria signaria* and *Panthea coenobita* (dry, mixed forests);
- *Angerona prunaria*, *Cyclophora linearia* and *Plagodis pulveraria* (old deciduous forests);
- *Scopula immorata*, *Siona lineata* and *Parasemia plantaginis* (grasslands and open places in woodlands);
- *Pterapherapteryx sexalata*, *Synanthedon spheciformis* and *Sabra harpagula* (damp, marsh forests);
- *Senta flammea*, *Schranksia costraestrigalis* and *Ostrinia palustralis* (marshland with extended reed-beds and peat-bogs).

Although species can be widespread throughout Europe, occurrence is sometimes strictly local. This implies that extinction of populations can have international consequences. Furthermore, certain species can be found internationally scarce, while it occur locally in high densities. A series of observed species reaches the border of its distribution on that longitude of Rospuda. Scarcity of southern species in northern regions is a logical consequence of ecological limitations, and these species are not relevant in this survey. Trends and fluctuations in Polish species are known to a certain extent. Declining species are not embedded in the Red Data Book per se. Taking this into account, we focus at present on species with strongly divided distributions, in particular in Western Europe. In order to simplify the variety in species and habitats of the Rospuda valley, we consider two groups of habitats, namely the wet and dry lands. Moreover, a small group of extremely local species is discussed. These species have a boreal origin, and for Europe they occur only in the very Eastern regions.

4.4 Species of peat-bogs, marshes, reedlands and damp woodlands

These wetlands with restricted occurrence in Europe, represent species with a deeply fragmented distribution. The local presence, together with the fragility of biotope, makes occurring species vulnerable to perturbation due to human activities.

***Lampropteryx otregiata* (Metcalf, 1917)**

Occurring in central and north Europe, this Geometrid has a highly scattered distribution across Europe. It is absent or extremely local in many countries. Also in a major parts of Poland, *L. otregiata* appears absent. In the literature, the species is mentioned boreo-alpine, inhabiting the border zone of shady forests with damp meadows and fens (Bachelard et al., 2007). The larvae feed on the wetland-linked *Galium* species, like *G. palustre* and *G. uliginosum*. During the survey, the species was found once, in an old damp woodland close to the peat bogs. Occurrence within the EU seems to be limited to unaffected habitats, which is highly local as a consequence due to cultivation.

***Senta flammea* (Curtis, 1828)**

Syn. *Mythimna flammea*. Local noctuid throughout its distribution. Waterlogged meadows, marshes and bogs, stream and river banks are the preferred habitat. Crucial is the abundant presence of its host-plant, Common Reed *Phragmites australis*. Local populations in Germany (Gaedicke & Heinicke, 1999), where the species is considered to severely endangered in several Red Data Books (Dudler et al., 1999; Schmidt et al., 2004). It occurs in Eastern and North-Western provinces of Poland (Buszko & Nowacki, 2000), but is strictly confined to its scarce habitat and therefore is highly vulnerable. During this survey, the species was identified twice. Three individuals were attracted the first night, located close to vast reed lands. Another individual was trapped in a marshy forest, close to the peat-bog.

***Acronicta strigosa* (Denis & Schiffermüller, 1775)**

Syn. *Hyboma strigosa*. European noctuid with a discrete distribution. Extremely rare in Belgium, the Netherlands (Waring & Townsend, 2003) and Germany (Dudler et al., 1999; Schmidt et al., 2004). Extinct in Britain (ukmoths); the French distribution is partly unknown (Bachelard et al., 2007), but *A. strigosa* appears to lack in major parts of the country. In Poland, the species appears to be widespread. Only in a single province (Wytokrzyskie), no records are known after 1960. It prefers damp, mature and overgrown *Crataegus* and *Prunus* scrub in the edge-zones of marshes and rivers. In total two individuals were caught at only one site. Here the light trap was positioned at the riverbank, edged by mature woodland and flower-rich hay land.

***Hyppa rectilinea* (Esper, 1788)**

Noctuid distributed locally in central and northern Europe; in western regions absent or extremely local species. Also in Germany *H. rectilinea* is mentioned in several regional Red Data Lists (Dudler et al., 1999; Schmidt et al., 2004). On the European continent, it inhabits chiefly mountainous areas and marshy habitats like swamp forests and scrubs along streams. Heavy

declines in the Netherlands took place around 1960, which are caused by cultivation and regulation of water systems. French populations are mainly located in upper regions with intact habitat. One individual was trapped in the Rospuda survey, in an old mixed woodland.

***Colobochoyla salicalis* (Denis & Schiffermüller, 1775)**

Syn. *Madopa salicalis*. Rare noctuid in western Europe: extinct in Britain ([ukmoths](#)) and extremely rare in the Netherlands [vlindernet.nl](#). It used to be a quite common species in the south of Belgium, but has become very rare now ([Flemish Entomological Society](#)). The French distribution is uncertain, but it appears to be locally and restricted to water-dominated sites. The larvae feed on the young shoots and leaves of aspen *Populus tremulosa* and willows *Salix* spec., which can be found in marshy forests, damp river valleys and river banks. *C. salicalis* is reported from all Polish provinces, but the species is surely endangered by human activities in its habitat. It is mentioned on plural regionally compiled Red Data Books in Germany ([Dudler et al., 1999](#); [Schmidt et al., 2004](#)), which can imply as an omen for coming and ongoing declines in Poland. In the Rospuda, only one individual was caught. Here, the trap was located in a open patch in a slope forest, with a gradient of humidity levels and tree species.

***Polypogon tentacularia* (Linnaeus, 1758)**

Syn. *Pechipogo tentacularia*. Rare and local noctuid species throughout Europe. Extinct, extremely rare or absent in North-Western Europe ([Waring et al., 2003](#); [Dudler et al., 1999](#)), locally occurring elsewhere. It inhabits damp meadows, also in mountainous areas. Polish recordings are throughout the country, but for a couple of provinces, recent (i.e., after 1960) observations lack. One individual was observed during daytime, in a herb rich gradient from dry to moisty.

Additionally, a number of dominating marshland species were determined. These species are threatened by habitat destruction, and together with their regional occurrence, they are included in several Red Data Books. They appeared to be widespread and highly abundant throughout the Rospuda valley. The area also represents important reproduction grounds for the following species: *Synanthedon spheciformis* (Denis & Schiffermüller, 1775), *Phragmataecia castaneae* (Hübner, 1790) and *Orthonama vittata* (Borkhausen, 1794).

4.5 Species of herby grasslands, mature deciduous and mixed woodlands

Old intact lowland woodlands are uncommon in Europe. The deciduous and coniferous forests in and along the Rospuda valley contain species representative for this ecosystem. A number of these species found are internationally endangered.

***Sabra harpagula* (Esper, 1786)**

The Eurasian hook-tip is widespread in temperate Europe. In north-western Europe, however, it can be very local and confined to some relict sites. It is more easily encountered elsewhere in Europe, but the distribution is scattered, and local declines has become visible since the last years. Elsewhere, a single record of (re) establishment is also mentioned [vlindernet.nl](#). *S. harpagula* is very rare species in Belgium ([Flemish Entomological Society](#)) and mentioned extremely endangered in German Red Data Books ([Dudler et al., 1999](#); [Schmidt et al., 2004](#)). Formerly

widespread in Poland, but not seen after 1960 in five provinces (Buszko & Nowacki, 2000). Presence depends on the larval host-plant, namely *Betulus*, *Tilia* and *Alnus*. In Poland, damp deciduous forest is considered to be the major habitat. Three individuals were attracted in the Rospuda valley. Two moths were trapped at a sheltered site on the river bank, with abundant *Alnus*. The other individual was caught in mature swamp forest.

***Venusia blomeri* (Curtis, 1832)**

Syn. *Discoloxia blomeri*. Widespread but local geometrid throughout Europe and Asia. Abundance is strongly linked with local occurrence of damp deciduous forests with *Ulmus* spp., the larval host plant. Probably absent in many parts of western Europe, and nationally (extremely) endangered in Germany, England and France. No records are known from Western Poland; absence of recent observations suggest a decrease in other provinces (Pomorskie, Malopolskie, Ślskie and Dolnośląskie). A single moth was trapped during the survey, located in a swamp forest at the border of the fen.

4.6 Boreal influences

During the survey, a couple of species were determined that have a pronounced boreal distribution. They mainly occur in the subarctic regions, and European occurrence is only near the borders of the EU.

***Lomaspilis opis* (Butler, 1878)**

Geometrid species, only known from some countries in central and eastern Europe. The distribution appears to be fragmented, and in Poland the species is widespread only in the Eastern part. Migratory influx sometimes occurs in Scandinavian countries. It inhabits damp deciduous forests, with abundant presence of *Betulus*. The European trend for this species is unclear.

***Xylomoia graminea* (Graeser, 1889)**

Moths from the genus *Xylomoia* are seemingly scarce and known from few localities, ranging from Western parts of Russia towards Japan (Mikkola, 1998). Westwards in Europe, all species, including *X. graminea* are rare, and little is known about their biology. Like most *Xylomoia* species, *X. graminea* occurs in lowlands, meadows or wetlands and moist forests. Besides European Russia, European localities are only found in three provinces in Poland, namely Podlaskie, Mazowieckie and Lubelskie (Buszko & Nowacki, 2000). Here the species is restricted to virgin habitats, like moist places in birch forests, wet grasslands and lush meadows with *Carex* (Mikkola, 1998). The disjunctive distribution is surely affected by the limited number of sample sites. A certain fact is the very local occurrence of *Xylomoia graminea* in Europe. Our six-day survey revealed presence in the Rospuda valley, for at least two collection sites. Here, *X. graminea* was found in a moist hay land with *Ranunculus* close to mature mixed forests, and in a herb-rich grassland patch in dry slope forest with deciduous trees. On this site specimens might have been attracted from the vast reedlands in the valley. The species seems to occur in relatively high densities, since successively seven and fourteen individuals were found. Identification took

place in the Netherlands, since no figure was available in field guides. In consequence, additional records from other sample sites in the Rospuda may have been missed.

4.7 Conclusion and discussion

This survey has provided useful information for assessing the natural values in the Rospuda valley: it provided data on the occurrence of several species that are rare or endangered in Western Europe and which are bound to moist forests, marshes and bogs. This study also provides an important improvement to the known data on the distribution of moths in this region of Poland.

However, a sample period of just one week reveals only a small part of the present moth diversity. Different flight seasons cause a rapid turnover rate in species community. Only a seasonal survey would deliver a complete impression of the moth diversity. Additionally, different searching methods like smearing or a caterpillar search should deliver species that cannot be attracted by light. Nevertheless, this survey implied a first exploration in the moth diversity of the Rospuda. Plural species indicate the natural importance of the Rospuda in a national and international context. Intact lowland bogs and marsh forests are rare throughout Europe, and regionally the Polish landscape still comprises of similar ecosystems. In recent years, however, degradation and diminishing number of moth species is noted in the western provinces of Poland (Buszko & Nowacki, 2000). This process is especially apparent in large and intensively cultivated agricultural areas. An ongoing decay is likely, and will extend eastwards. Together with neighbouring wetlands in Podlaskie, the Rospuda area can be regarded as core in the distributions of many wetland species, mentioned above. Moreover, on European scale *Xylomia graminea* is highly dependent on the Rospuda valley and few other Polish localities. Long-term persistence in Europe is uncertain considering the infrastructural and economical pressures on existing nature reserves.

5 Hoverflies *Syrphidae*

Bram Kuijper & Maarten Schrama

5.1 Introduction

The use of insect groups such as *Chironomidae* larvae or *Carabidae* as bioindicators is supported by a vast array of research (e.g. (Desender et al., 1994; Turin, 2005)) whereas the potential applicability of *Syrphidae* as environmental indicators is yet only beginning to be explored. Until now, *Syrphidae* have been used predominantly as indicators for habitat quality and biotope diversity at the landscape scale (Sommaggio, 1999): this is because *Syrphidae* have excellent dispersal capabilities, making adult hoverflies not strictly bound to the same microhabitat as larvae are. Sampling the diversity of adult hoverflies in a certain area does reflect a certain number of microhabitats in the nearby area, but does not give in-depth information on the quality of each habitat. With regards to the Rospuda valley region, this implies that *Syrphidae* are more useful indicators of landscape diversity than specific aspects of the peatlands and moors in the area. The Polish Red Data Book on invertebrates contains 19 species of diptera (Głowaciński & Nowacki, 2004), all of which have not been observed during our survey in the Rospuda region. Given the limited amount of recent data on the distribution of diptera in Poland, it makes it difficult to infer information on the status of the species not mentioned on the red list. The status of the discussed species in surrounding countries (Czech Republic and the easternmost federal provinces of Germany) will be mentioned where applicable.

5.2 Material & Methods

During the survey, efforts concentrated on the following Dipteran families: hoverflies *Syrphidae* and horseflies *Tabanidae*. The collected specimens of horseflies have not been conserved properly which hampered proper identification. We therefore publish only the records that have been done on *Syrphidae* in this report. The primary search strategy for Dipteran flies was to search by eye for flies in transects at forest edges with high presence of flowering plants or leaves exposed to the sun. Flies were netted for identification. If the identification did not succeed during the field trips, specimens were collected for further investigation. Next to scanning transects, malaise traps were put up on two locations on the mire for 6 and 4 days respectively. The latter traps did not result in any rare or interesting *Syrphids*, compared to records done manually.

5.3 Results

A total of 64 hoverfly species has been observed during the six-day visit to the Rospuda valley. The most interesting and characteristic species encountered were: *Chalcosyrphus piger*, *Microdon mutabilis/myrmicae*, *Microdon analis*, *Xylota caeruleiventris*, *Sericomyia lappona* and *Trichopsomia joratensis*. The habitat of these species in the Rospuda valley as well as their statuses in Poland and in Central Europe will be discussed. None of these species has been annotated on the Polish Red Data Book (Głowaciński & Nowacki, 2004) A full list of species can be found in [Appendix A](#).

Chalcosyrphus piger

One individual was observed during a visit of the *Calthion palustris* grassland (coordinates: 62300-597900) in the northern part of the valley. The individual was found foraging on umbellifer flowers at the edge of the grassland.

Due to the general scarcity of this species throughout Europe, not much information is available on its habitat preferences, limiting any inferences on its specific microhabitat within the Rospuda Valley. Bańkowska (1980) reports *C. piger* in Poland from oak-hornbeam forests and lowland beech forests. Barkemeyer (1994) mentions old observations of *C. piger* larvae in dead bark of *Pinus* and *Picea*, which would indicate that the species is not restricted to deciduous forests. Gårdenfors (2005) reports that adults were observed to visit flowers of *Ranunculus acris*, which were indeed numerous flowering on the *Calthion palustris* grassland in the Rospuda valley.

C. piger is very rare throughout Europe: to our knowledge, the last published record for Poland has been published by Bańkowska (1980), without noting the specific sites or dates of the records. With regards to neighbouring countries and the rest of Europe, *C. piger* is noted as critically endangered in the neighbouring Czech Republic (Farkač et al., 2005), near extinct in Bayern, Germany (STMUGV, 2005), extinct in Sachsen-Anhalt (Dziock et al., 2004), critically endangered in Denmark (NERI, 2004) and has been recorded only 6 times in France from 1970 onwards (Sarhou & Monteil, 2006). The most recent sightings in Northwestern Europe were two records in the Netherlands and one in Belgium (Reemer et al., 2000). Although *C. piger* appears to be as scarce in Poland as in the surrounding countries, Poland is the only country that did not consider to give *C. piger* any conservation status.

Microdon cf. mutabilis/myrmicae

Individuals belonging to the cryptic species complex *Microdon cf. mutabilis/myrmicae* were found at numerous locations in the Rospuda Valley. *Microdon cf. mutabilis/myrmicae* was mainly observed in the parts of the Rospuda valley in which raised bogs were found to be growing on top of the peatland. At all locations, numerous individuals were observed, indicating that the species is common in the Rospuda Valley. Based on habitat characteristics and the fact that only *M. myrmicae* has been recorded from Poland with certainty, it is almost certain that all observed specimens during our assessment belong to *M. myrmicae* and not to *M. mutabilis*.

As stated, it is currently not possible to distinguish adult individuals of *M. mutabilis* and *M. myrmicae*. *M. mutabilis* and *M. myrmicae* can only be distinguished by larval characteristics and by their choice of ant hosts (Schnrogge et al., 2002). Like all other European species of *Microdon*, both *M. mutabilis* and *M. myrmicae* are strongly dependent on the presence of specific ant hosts, since they can pheromonally manipulate ant hosts and feed on ant larvae inside ant nests (Beuker, 2004). *M. myrmicae* larvae have been reported from nests of different *Myrmica* species (mainly from *M. scabrinodis*, but Polish records reported by Stankiewicz (2003) also report from nests of *M. rubra* and *M. gallienii*), whereas *M. mutabilis* has only been reported parasitizing the ant *Formica lemni*. Unfortunately, we did not search for any potential host ant mounds and subsequent presence of potential *Microdon* larvae.

M. myrmicae is the only species of this species-complex to have been recorded in Poland with certainty (Stankiewicz, 2003), whereas *M. mutabilis* has only been recorded in Great-Britain (Beuker, 2004). The sites in the Rospuda valley area are similar to the habitat of oligotrophic

grasslands and fens from which *M. myrmicae* is known in the Netherlands (Beuker, 2004), making it almost certain that our records indeed correspond to *M. myrmicae*.

As all hoverflies mentioned in this contribution, *M. myrmicae* has no conservation status in Poland. To our knowledge, there is no distribution data known for this species in Poland. (Stankiewicz, 2003) collected specimens from three sites in Eastern Poland; together with compared to Western European countries. In neighbouring countries, *M. myrmicae* is stated as vulnerable in the Czech Republic (Farkač et al., 2005). In the easternmost German provinces that have published red lists on Syrphidae, it stated as extinct in Sachsen-Anhalt (Dziock et al., 2004), vulnerable in Bayern (STMUGV, 2005).

Microdon analis

Individuals of *M. analis* (synonym: *M. eggeri*) have been found in the southern part of the mire wetland (coordinates 627000-5974000), on the gradient between deciduous forest on the valley's hillside and the mire. The ant hosts on which *M. analis* parasitises during the larval stage are *Lasius niger* and *Formica rufa* (Rotheray, 1993). Both ant species prefer a more forested and drier habitat compared to the ant hosts of *M. myrmicae* (see above). Bańkowska (1980) reports *M. analis* from the submontane zone (Tatra), whereas our record is from Northeast Poland. *M. analis* has no conservation status in Poland. In neighbouring countries, *M. analis* is stated as vulnerable in the Czech Republic (Farkač et al., 2005) and stated as endangered (but status unknown) in Sachsen-Anhalt (Dziock et al., 2004). In other German provinces, it has not been listed as endangered.

Xylota caeruleiventris

One female *X. caeruleiventris* has been observed on the same location as the rare species *Chalcosyrphus piger*: the *Calthion palustris* grassland (coordinates: 62300-597900) on the east bank of the river Rospuda. The individual has been collected for further investigation, given the difficulties of identifying *X. caeruleiventris* - *X. jakutorum* females.

(Bańkowska, 1980) reported *X. caeruleiventris* from riverine carrs with *Fraxino-alnetum*. Since the Rospuda river is on both sides by patches of carrs, this species may be expected to be more common in the Rospuda area. Females of this species are hard to distinguish from its sister species *X. jakutorum* (Bartsch et al., 2002). The collected specimen could be identified as *X. caeruleiventris* since the thoracic dorsum had pale hairs above the wing base. According to (Bartsch et al., 2002), taxonomically certain records *X. caeruleiventris* are currently lacking from Poland.

Sericomyia lappona

A single observation of *S. lappona* has been done at a small lake with raised bog (coordinates: 62400-597800) at the western side of the valley.

Larvae of *S. lappona* are confined to small water pockets within bogs, demonstrating their strong relationship to the threatened raised bog habitat type (NJN, 1998). (Bańkowska, 1980) reports *S. lappona* from the alpine zone in southern Poland, moors and moist forests.

According to its status in other European countries *S. lappona* is the least endangered species of the six species that are mentioned here. *S. lappona* has not been annotated on the red list of the

Czech Republic, indicating the fact that *S. lappona* can be locally common around marshes and bogs. In Germany, *S. lappona* has only been listed as potentially vulnerable in Sachsen-Anhalt.

Trichopsomia joratensis

T. joratensis is listed as vulnerable in the Czech Republic (Farkač et al., 2005). It is not listed on any German red list. Due to its inconspicuous appearance, this species can be easily overlooked.

5.4 Conclusions

Regarding the records done on hoverflies, none of the six species that are protected according to the Polish red list were caught. Nevertheless, the Rospuda area comprises a number of species that can be regarded as vulnerable or highly endangered in other countries in Central Europe, as discussed in the results section. The presence of two *Microdon* species, *Sericomya lappona* and *Xylota caeruleiventris* unsurprisingly indicate the presence of karr forests and peatlands in the Rospuda area. More interesting is the finding of the saprophytic species *Chalcosyrphus piger* which reproduces in old forests. All in all, these syrphid species emphasize that the Rospuda area consists of relatively large peatlands surrounded by patches of mature forests. However, also some species that are normally strongly associated with peatlands and mires, such as *Anasymia lunulata*, *Eristalis anthophorina*, *E. cryptarum* and *E. rupium* have yet to be observed in the Rospuda area. Moreover, due to time constraints and experience limiting to the more conspicuous species of Syrphids among the observers, families such as *Platycheirus* and *Cheilosia* were largely ignored during field trips.

5.5 Future suggestions

After this short survey, there are many open questions that are certainly worth further investigation. A number of future suggestions are posed to stimulate research on the Diptera in the Rospuda area and in the rest of Poland.

- i. More effort to investigate the status of the Syrphid *Chalcosyrphus piger* would be appreciated, given the scarcity of this hoverfly in western Europe. Are there more populations of this hoverfly present in forests of the Northeast (i.e., Białowieża National Park, Wigierski National Park, forests to the east of Augustów, Knyszyn)?
- ii. The likely presence of the Syrphid *Microdon myrmicae* as opposed to its sister species *M. mutabilis* in Rospuda can only be confirmed by searching for the presence of its ant host species. Is the ant species *Myrmica scabrinodis* indeed numerous in the Rospuda valley?

6 Butterflies

Tim Faasen

6.1 Introduction

Compared to other invertebrates, butterflies have been investigated quite intensively throughout Europe during the last century. This is partly due to the fact that butterflies are relatively easy to study as they are large, colourful and active during the day. However, with the growing knowledge on these insects it became more and more clear that butterflies were not only nice to study from an aesthetic point of view, but also very interesting as indicator species because many species are very specific in their needs.

In several countries projects have been or are being carried out to produce nationwide overviews of the distribution of species. Poland is one of these countries. In 1997 a distribution-atlas was published containing information on the occurrence of all known Polish species between 1986 and 1995 (Buszko, 1997). An important milestone, but not a final product: distributions change over the years, due to, for instance, changes in land use or climatic factors.

Nevertheless, the atlas is an important reference for determining how widespread species are in Poland. This is important for conservationists as species that occur only very local are more likely to disappear. Besides being rare, another argument to take protective measurements is decline in numbers. To determine if species are declining over the years it is necessary to compare the distribution in different periods. These kind of comparisons have been carried out in Poland, resulting in a Polish Red Data Book (Głowaciński & Nowacki, 2004).

In line with what is stated above, statements in this chapter on the importance of certain butterfly-species are based three different types of data (mainly based on (Tolman & Lewington, 1997)):

- A Habitat-requirements of the species (a more selective species is regarded more important);
- B Distribution of the species (a species that occurs more localized or scattered is regarded more important);
- C Trend of occurrence (a declining species is regarded as more important).

6.2 Material & methods

From June the 3rd until the 8th 2007 the butterflies of the Rospuda valley have been investigated during daily field excursions. This resulted in a database of approximately 250 records. In total 24 1x1 kilometer grid squares were visited. In these butterflies were identified using binoculars or sometimes with help of a net. Butterflies were always identified on site. No specimens have been collected. The weather conditions were slightly cold during the first two days, but temperatures increased to a suitable level for butterflies later in the week.

6.3 Results

In total 327 individual butterflies have been identified, which resulted in a list of 43 species. Six more species were encountered during a short visit in August 2007 by Maarten Schrama. Among the species that were identified in the Rospuda valley, several are very critical in their habitat-requirements. Some of those are quite rare, endangered and for this reason even internationally protected. The following table gives an overview of the most important species:



Figure 6.1: Cranberry blue *Plebeius optilete*. photo: Tim Faasen

Of these species *Plebeius optilete* and *Satyrrium pruni* occur only very locally in Poland. *Boloria aquilonaris* is declining alarmingly in Poland and therefore included in the Polish Red Data Book on invertebrates (Głowaciński & Nowacki, 2004). *Coenonympha tullia* and *Nymphalis xanthomelas* are declining rapidly not only in Poland but throughout Europe and are therefore placed on the European Red List of threatened species. *Coenonympha hero* and *Lopina achine* are so severely threatened that they are protected internationally under the [European Habitats Directive](#). This is the most severe form of protection possible.

Species are not protected by putting a fence around them. They should be protected by guaranteeing the survival of their habitat. To do this effectively it needs to be clear what the important habitats are. For the Rospuda-valley this pertains not to a single habitat. What makes the Rospuda-valley really special for butterflies is the presence of several habitats within short distance, without any migration barriers, in combination with a very low level of disturbance. Of these habitats some are remarkably well developed. Especially the calcareous peatlands and mires and the raised bogs are worth mentioning. Other elements that form an important habitat for endangered butterflies are the deciduous forests; in particular the light-gaps within these forests and the forest-edges.

In the following paragraphs the most important species are described in more detail.

Table 6.1: Important butterfly species observed during the survey

| Scientific name | English name | Polish name | Dutch name | status |
|------------------------------|----------------------|----------------------|-------------------------|--------|
| <i>Coenonympha hero</i> | Scarce Heath | Strzępotek hero | zilverstreephooibeestje | HD |
| <i>Lopinga achine</i> | Woodland Brown | Osadnik wielkooki | boszandoog | HD |
| <i>Coenonympha tullia</i> | Large Heath | Strzępotek soplaczek | veenhooibeestje | RE |
| <i>Nymphalis xanthomelas</i> | Scarce Tortoiseshell | Rusalka drzewoszek | oostelijke vos | RE |
| <i>Boloria aquilonaris</i> | Cranberry Fritillary | Dostojka akwilonaris | veenbesparelmoervlinder | RP |
| <i>Plebeius optilete</i> | Cranberry Blue | Modraszek bagniczek | veenbesblauwtje | rare |
| <i>Satyrrium pruni</i> | Black Hairstreak | Ogończyk śliwowiec | pruimenpage | rare |

Coenonympha hero

Populations of this species are usually small and far apart. The species is confined to moist grasslands on nutrient-poor peaty soils. Here the larvae feed on grasses like *Elymus*, *Hordeum*, *Deschampsia* and also on *Carex remota*. In most parts of its range this species is declining rapidly, despite of its protected status. In Poland this species is recorded from very few small, isolated localities, in the east and south. This species is in desperate need of protection here.



Figure 6.2: Peatland within the Rospuda reserve. This part of the peatland was one of the best sites to observe *Coenonympha hero* as well as *Coenonympha tullia*. photo: Ewoud van der Ploeg

Within the Rospuda valley this species was found only in the southern half. There it was found in almost all grid squares. No less than 40 specimens were recorded, scattered over 8 square km. This implies that a very important population is present in this area.

Lopingia achine

This species is usually found in small gaps in deciduous forests with lots of shrubs and in forest-edges, where the larvae feed on *Brachypodium sylvaticum* and *B. pinnatum*. The species is threatened by extinction in Poland. Very few populations are remaining. These are all in the north-eastern and southern part of the country. The only larger population known is in Puszcza Bialowieska Forest. In the rest of Europe the situation is not much better: decline throughout its range.

In the Rospuda-valley this species was recorded 15 times throughout the valley (in 12 grid squares). The species is present along all forest-edges in this area and can be encountered regularly, making the Rospuda-valley a core-area for this species in Poland!

Coenonympha tullia

The habitat of this species can be described as being bogs and heather vegetations on organic soils, most often with scattered trees and one or more *Eriophorum*-species, which can function as a feeding plant for the caterpillars. The caterpillars are also found on *Rhynchospora alba* and *Carex rostrata*.

Coenonympha tullia is recorded in all parts of Poland, but with relatively few localities per province. It seems to be more frequent in the eastern part of the country. On a European scale this species is declining and therefore included on the European Red List of threatened species.

Within the Rospuda-valley 32 specimens of this butterfly are recorded in the central and southern part of the area investigated (10 grid squares). It is therefore fair to conclude that a large population is present. This species is probably dependent on the patchily distributed higher parts within the mire vegetation, with little influence of calcium-rich groundwater.

Nymphalis xanthomenas

This species lives in low densities in moist deciduous forests in river-valleys. Here the larvae feed on *Salix* and *Populus*. This species is very rare in Poland. At the few localities where it has been seen, in the southern and eastern part of the country, usually only single specimens were encountered.

Nymphalis xanthomelas is confined to the eastern part of Europe and very rare within its range nowadays. In the beginning of the 20th century it was common in some parts, but it has declined rapidly.

In the Rospuda-area no adults of this species have been encountered, because this butterfly does not fly before July. However, on one locality 4 caterpillars were found which belonged unmistakably to this species. This does not only show that this rarity reaches the area, but it definitely reproduces here as well.

The caterpillars were found in the northern half of the area under investigation, in a species-rich moist grassland, on the transition to wet forest, east of the Rospuda-river. On this locality this transition from grassland to forest was very gradual, with many warm and sheltered places.

Boloria aquilonaris

The habitat of this species consists of raised bogs sheltered by open forests in the vicinity of open water. This is about the most vulnerable and endangered habitat-type present in this part of Europe. Obviously species that are solely dependant on this habitat are very vulnerable as well. The larvae feed on *Vaccinium oxycoccos* and can take two year to develop into adults.

In Poland this species has been recorded from just a few, mostly small localities in the northern and south-eastern part of the country. Conservation is much needed for this rare species.

In the Rospuda-valley *Boloria aquilonaris* has been recorded from only 1 locality on the northern border of the area surveyed. Three specimens were seen in the bog-vegetation bordering a large lake (together with several other very critical insect-species).

Plebeius optilete

This species can be found in raised bogs and heather-vegetations on organic soils, often with scattered trees. The larvae feed on *Vaccinium*, *Andromeda* and *Erica*. In most parts of Europe



Figure 6.3: Cranberry Fritillary *Boloria aquilonaris*. photo: Tim Faasen

this species is rare, due to its habitat-requirements. In Poland it is endangered by extinction because of the limited area in which it occurs. It is recorded from all parts of Poland, but in very few localities.

In de Rospuda-valley it is seen twice in the south-eastern part of the study area. It is quite likely that its distribution in the area is wider than this. The flight-period of this species was only just beginning when the field work was carried out.

On the localities where *Plebeius optilete* was recorded there was a very open forest consisting of young trees with *Sphagnum*-vegetation at their base. These *Sphagnum*-mosses were growing above the influence of ground-water and formed a living-area for *Vaccinium oxycoccos*.

Satyrium pruni

The food-plant of this species is a major factor in its habitat: *Satyrium pruni* lives in full-grown *Prunus*-shrubs, mainly *Prunus spinosa*. These can be found in sheltered, sunny open areas in deciduous forest or along forest-edges. Adults feed on flowering shrubs like *Ligustrum* and *Rubus*. In Europe this species is quite widespread, but mostly rare. In Poland it is also recorded in all parts of the country, but usually not abundant. In the northern part it is particularly rare.

The records in the Rospuda-area form the 4th known locality of this species in the province of Podlaskie. Three specimens have been seen along forest-edges in the southern half of the area investigated.

Other interesting species

Besides the species with a very high priority for conservation several other species have been seen that are also interesting and most certainly not present everywhere: *Aporia crataegi*; confined to the north-eastern and southern part of Poland, where it is scarce. This species can be found in all kinds of habitat. The larvae feed on several shrubs and trees, like *Prunus*, *Pyrus* and *Crataegus*.

- *Lycaena hippothoe*; recorded throughout Poland in suitable habitats. This species is confined to wet grasslands. The larvae feed on *Polygonum bistorta* and several *Rumex*-species. This species got extinct in some parts of western Europe. *Lasiommata maera*; recorded from almost all parts of Poland, but also absent from large areas and in many cases not abundant. This species occurs in dry, rocky areas, where the larvae feed on several grass-species.

- *Melitaea diamina*; recorded from scattered localities throughout Poland, but not common. Lives in moist herb-vegetations near forests and streams. Larvae feed on *Valeriana*.
- *Boloria euphrosyne*; recorded from scattered localities throughout Poland, but not common. Characteristic species of forest-edges. Larvae feed on *Viola*.
- *Carterocephalus palaemon*; species of the southern part of Poland. Rare in the northeast. This species lives in moist places along forest-edges, often near water. The larvae feed on grasses.

During a short second visit to the Rospuda-area in august, Maarten Schrama found several species to complement the list. Most interesting were *Argynnis adippe* and *Colias* cf. *alfacariensis*. The latter was 99% certain, but not collected for confirmation.

6.4 Discussion

From the insect-groups investigated in this survey, the research on butterflies and dragonflies produced probably the most complete species-list due to the fact that these species are relatively easy to find and identify in the field. However, just as for most of the other groups, a species-inventory can never be complete if the fieldwork is not distributed over a full season. Species that are not unlikely to be missed are e.g. *Anthocharis cardamines*, *Neozephyrus quercus*, *Satyrrium ilicis*, *Lycaena virgaureae*, *Cupido argiades*, *Plebeius argus*, *Polyommatus semiargus*, *Polyommatus amandus*, *Apatura ilia*, *Apatura iris*, *Limenitis camilla*, *Limenitis populi*, *Nymphalis antiopa*, *Argynnis aglaja*, *Argynnis laodice*, *Aphantopus hyperantus*, *Coenonympha glycerion*, *Pararge aegeria*, *Lasiommata megera*, *Pyrgus malvae*, *Heteropterus morpheus* and *Carterocephalus silvicolus*. In addition to these, it is quite likely that also some species that are less common than the ones mentioned above occur in the Rospuda valley.

Nevertheless, this short survey makes clear that the Rospuda-valley is extremely important for butterflies. The species-diversity is very high and comprises many species that are very strict in their habitat-requirements and are therefore rare, endangered and sometimes even protected by the [European Habitats Directive](#). The protection of these species can only be successful when protective measurements focus on preserving their habitats as a whole. This means preservation of the entire Rospuda-system including its natural vegetations and surrounding forests, its ground-water-flows and its catchment-areas.

7 Carabid Beetles *Coleoptera* - *Carabidae*

Maarten Schrama & Bram Kuijper The use of Carabidae in habitat surveys is backed by a long-standing amount of work on the species specific ecological preferences of Carabid beetles (for reviews, see Thiele (1977); Desender et al. (1994); Turin (2005)). With this amount of data available, inferences can be made based on the Carabid beetle community present in an area on the ecological status of a certain area (Turin, 2005). Moreover, long-term surveys of Carabid beetle community turnover can closely reflect any accompanying changes in the environment (e.g., Meijer (1989)). Given the limited amount of time to do a survey on Carabid beetles (8 days), it was unfortunately not possible to sample across several trajectories on a year-round basis, so that full information on the Carabid beetle community can be obtained. Such intensive research methods are required, since substantial variation exists among indicative Carabid species in their yearly activity peak (den Boer & den Boer-Daanje, 1990; den Boer & van Dijk, 1996, 1998).

Since our survey lasted only 8 days, we were only able to obtain a snap-shot assessment of the Carabid beetles in the Rospuda area. During the 8-day survey, 60 pitfalls were dug in along 2 transects located in the direction from the alder swamp into the mire. Some occasional samples were also collected by hand on diverse locations in the mire and also in areas outside the Rospuda valley (extensively used pastures with marshlands), but always along an east-west gradient along the longitudinal coordinate 5980000 (see table XX). Most collected species were identified after the survey had taken place. Data on species-specific habitat preferences was obtained from Turin (2005) and Müller-Motzfeld (2006).

7.1 Discussion of species

In total, our survey yielded 131 individuals distributed over 36 different species of Carabid beetles, either collected by pitfall trapping or hand sampling. In table XX the species are sorted based on the latitudinal coordinates of their observation sites. Unfortunately, most of the species observed could not be related to mire habitats, with the exception of *Pterostichus rhaeticus*. Most collected species are eurytopic: they are either characteristic of forests (e.g. *Pterostichus aetiops*) or indicating recently disturbed areas (roads, agricultural fields), e.g., *Pseudophonus rufipes*. Next to *P. rhaeticus*, the few other interesting findings include: *Agonum olivaceum* (eastern species, distribution in Poland unknown), *A. fulliginosum* and *Harpalus laevipes*, which are characteristic species of Karr forests and other Riverine forests (see table XX).

7.2 Conclusion

The fact that our Carabid beetle records are dominated by a large share of very eurotopic types not specific to mires and peatlands, sharply contrasts to our findings with respect to other taxonomic groups. Since these other groups do closely reflect the pristinity of the peatland, it is intriguing why the Carabid beetles show so little resemblance. Some examples of species specific of peats and mires are *Agonum ereceti*, *Bembidion humerale* or *Carabus nitens*. We argue that the lack of such peatland-specific species is due to our limited experience of sampling Carabid beetles on peatlands: none of the participants previously have ever taken part in other surveys of Carabid beetles in peatlands or marshes. Next to that, although pitfalls are the standard research

method to assess Carabid beetle communities, additional intensive hand sampling is often required to augment the assessments on Carabid beetles. This pertains especially to areas in which thick layers of *Sphagnum* form a highly permeable ground layer around the pitfall (pers. comm. T. van Gijzen), reducing the potential of beetles entering the trap. Secondly, our sampling was flawed by the many border effects introduced by using pitfalls across transect from the neighbouring forest towards the peatland (Turin, 2005). Forest-type habitats dominated along the gradient. In hindsight, it would have been much better to place the exclusive pitfall trajectories in either the forest or the peatland and to avoid gradients altogether. We conclude that the sampling of Carabid beetles has been largely insufficient, mainly due to our lack of experience. It offers a challenge for future researchers to improve the data on the Carabid fauna in the Rospuda area.

8 Mammals

Jord Prangma

8.1 Introduction

The presence of large mammals in the Rospuda valley is clearly visible in the numerous trails present throughout the valley. Especially the many constructions of beavers near the lakes and the smaller side streams catch the eye. Because the presence of the larger animals was well known, we decided to focus our attention to less the conspicuous mammals.

More data on the distribution of mice would have been valuable for instance, however, a survey of mice with life traps is highly labour-intensive. We decided not to put our attention to this group. The only systematically investigated mammals in the area during our survey are bats.

All species of bats are strictly protected in Poland since 1952, moreover all species of bats are listed on the European Habitats Directive. The main reason of this is the general decline of many populations since world war II due to pesticides and habitat loss (B. W. Woloszyn). Nine bat species are listed on the Red List of Threatened Animals in Poland ([Głowaciński & Nowacki, 2004](#)).

8.2 Material & Methods

The bats were surveyed mainly by locating them with ultrasonic detectors (so called 'bat-detectors') and identifying them based on species specific calls. The survey was intense, yet a high level of familiarity with the area is a necessity for a good survey. Due to the difficult terrain and the fact that only one excursion per night was available for surveying bats, the results cannot be expected to form a complete list. The survey points were mostly located near bridges over the Rospuda and other landscape elements that could serve as corridors for migration or feeding.

8.3 Results

After intensive search during 7 nights three species of bats were found: *Myotis daubentonii*, *Myotis dasycneme* and *Pipistrellus sp.*

Pipistrellus sp

Pipistrellus pipistrellus and *Pipistrellus nathusii* are species of closed to half open habitat. The distinction between both species cannot be made based on observations with bat-detectors alone. Though either one or both of the species certainly have a population within the area they cannot be considered a specific indicator for the natural richness of the valley.

Myotis daubentonii

Myotis daubentonii is a species that feeds exclusively above water. Though of course absence of this species would be a bad indication for the quality of the area, its presence is not considered

to indicate a special natural richness.

Myotis dasycneme

Myotis dasycneme was positively identified twice at different locations along the Rospuda river (omschrijving waar ik weet het niet). These bats hunt and feed above open water and banks of rivers and lakes, their range can extend quite far and is known to reach up to 20 km of their residence. *M. dasycneme* is listed on the Red List of Threatened Animals in Poland ([Głowaciński & Nowacki, 2004](#)). Considering the large number of lakes in the Rospuda area it is quite probable that a population of these bats is present in the vicinity of the valley. More research to locate the residence of this Europe wide threatened species and realize protection is recommended.

8.4 Conclusion

Further research for instance using netting techniques to get better data on the distribution of bats in the Rospuda valley is recommended. Effort to locate colonies of *Myotis dasycneme* to effectively ensure their protection is a matter of high priority.

9 Stoneflies *Plecoptera*

Bram Koese

9.1 Introduction

Stoneflies (Plecoptera) are characteristic inhabitants of clean, running waters. Therefore, they play a key role in many biological water quality assessments, for example the various systems designed for the EU Water Framework Directive (EWFD) ([van der Molen, 2004](#)). In contrast to mayflies (Ephemeroptera) and caddisflies (Trichoptera), who have many representatives in stagnant waters, almost all European stonefly species are restricted to (fast) flowing waters. Their presence is therefore an immediate indication of fairly constant high oxygen levels and a natural dynamic of the stream in terms of temperature and solvents. In the Rospuda valley, suitable habitat is provided by the Rospuda itself and by adjacent small trickles, running from neighboring hills. During a short visit of the author between June 6 to 9, three species of stoneflies were found which indicates a good water quality of the Rospuda.

9.2 Stoneflies in Poland

According to ([Wojtas, 1964](#)), 86 species of stoneflies have been found in Poland. The highest diversity is found in the Tatra mountains from where 68 species alone have been recorded. In the lowlands of northeastern Poland, [Wojtas \(1964\)](#) mentions only 10 species. He characterizes this area as 'fast nicht durchforscht'. Consequently, the real composition of the stonefly fauna is supposed to consist of many more species. By comparing other lowland areas on the same latitude (e.g. the Netherlands: 27 species ([Koese, 2008](#)), lowlands of Niedersachsen and Nordrhein-Westfalen, Germany: 23 species ([Reusch & Weinzierl, 1999](#))) the actual diversity is likely to be at least twice as much. All species of stoneflies found the Rospuda valley (3) are present on the list of [Wojtas \(1964\)](#). Since only a small portion of the area could be visited in only a short moment of the flight period, some (early spring) species might have been overlooked.

9.3 Material & Methods

During the day, adult stoneflies were sampled by checking suitable shelters (trunks in the river, cracks on the bridge). In the north, where it was possible to wade through the Rospuda, 'kicking samples' were made in an attempt to collect larvae (that is: kicking the stones and collect the debris under the stone downstream). Due to the life cycle of most species, the presence of larvae would have been unlikely and, as expected, no larvae were found in this way. On two occasions, stoneflies were caught in a light trap. These specimens were likely to be accidental passers-by, since stoneflies are generally not attracted to light.

9.4 Discussion of observed species

***Isoperla Grammatica* Poda, 1761**

Among the three stonefly species found in the area, *Isoperla grammatica* is the most strenuous species regarding its environmental demands. It is a carnivorous stonefly. Typical for carnivorous stoneflies is that they are generally larger and therefore are more critical with respect to oxygen levels. This strikingly yellow species has a length of about 1 centimeter, but looks more elongated due to its long wings. The species is still very widespread and common in Europe, although it has declined on many locations. The species used to be common in the Netherlands, but it has not been found there since 1954 (Koesse, 2008). The species was found on many locations in the Rospuda valley, especially in the north. Skins were found on all bridges in the north, as well as adults. Respectively two and four specimens were caught in a light trap along the Rospuda on June 6 and 7 (see chapter 4 for details of the location).

***Nemurella pictetii* Klapalek, 1900**

Numerous larvae were found in a very small trickle close to the main river, which seeps out of the ground on the west side of the valley (UTM coordinates: 0626503-59756623). Due to its erratic life cycle, the species could be found in almost any developmental stage in any time of the year, except mid-winter (Lieske & Zwick, 2007). The species is known as ‘second-most-tolerant’ stonefly in Europe next to *Nemoura cinerea*.

***Nemoura cinerea* Retzius, 1783**

One drifting pregnant female was caught on the Rospuda river in the north. Compared to other stoneflies, *Nemoura cinerea* is a highly tolerant stonefly Brinck (1949). Therefore, its presence is of little ecological value. Still, the species is much more demanding towards water quality compared to many other aquatic insects. The species is likely to occur in low densities along the bank vegetation. *Nemoura cinerea* avoids stony substratum.

10 Dragonflies and Damselflies *Odonata*

Matthijs Courbois All individual species that were recorded will be discussed, since Odonata are not as speciose as other groups such as Diptera or Moths and Odonata were intensively investigated taxonomic group during the survey. In total, 16 species of Zygoptera and 30 species of Anisoptera were observed.

10.1 Zygoptera - Damselflies

Calopteryx splendens

This species has been recorded throughout the Rospuda reserve, but has less records than *C. virgo*. It is probably reproducing mostly in the Rospuda river itself and maybe at some small other streams too, especially the more open stream in the south has large numbers. Frequently flies together with *C. virgo*.

Calopteryx virgo

Records of this species have been done throughout the whole area. Probably reproducing at slightly smaller streams compared to *C. splendens* and the Rospuda river itself. This species is the most often recorded dragonfly of the Rospuda nature reserve.

Lestes sponsa

This spreadwing species is only seen at two localities in August. However, it is likely that the species is much more abundant. Based on the suitable habitat of peatland, we predict that this species occurs in far larger numbers in July or August.

Lestes dryas

L. dryas has been recorded at only one single location. Notably, this species is generally absent in calcareous peat moors and may therefore be rare in the Rospuda region. In the Dutch National Park *De Weerribben*, a very intensively researched peatmoor area in the Netherlands, the species has only been recorded twice **Citation lacking**. In the near distance of *L. dryas*, additional records were done of the butterfly *Pleibeius optilete*, the bumblebee *Bombus humilis* and the ground beetle *Carabus violaceus*. All these species indicate raised bogs and *Erica*-heathlands. Also the plants at the particular area, such as *Oxycoccus palustris* are an indication it was no ordinary calcareous peatland, but more raised peat.

Lestes virens

This species is known from two typical localities during a second visit in early August: the two small lakes surrounded by raised bogs with *Sphagnum*. The calcareous peat area is no suitable ecotope for this species, so more localities of this species are not that likely. Searching for

the species should be done at small depressions in bog woodland areas, from half July to early September.

Ischnura elegans

This species is very common at ponds, mires and lakes. In the Rospuda valley *I. elegans* is recorded from the several peat sites, but definitely not everywhere. It is also seen at the lake and the fen in the north. In the Rospuda valley it is not one of the most common species, an indication for its good natural quality. In more intensively cultivated lands, *I. elegans* quickly becomes one of the commonest species. For example, in two large calcareous peatmarshes areas in the Netherlands it is described as ‘very commonfb (Ruiter, 2002) - **citatie graag aanvullen**.

Enallagma cyathigerum

This species is only recorded from three locations: at the fen in the north, in the marshy area along the small stream at the north side of the lake and at one site in the calcareous peatland were flying one or more individuals. The visit early June is before the flight peak of *E. cyathigerum*, so it is possible that this species occurs at more locations.

Coenagrion pulchellum

A common species throughout the whole area, also recorded at both fens. This is a very common species in the Dutch calcareous peatlands. In Flanders, a part of Belgium without any great peatmarshes, *C. pulchellum* is endangered and placed on the Red List (de Knijf, 1996) - **citatie onbekend, graag aanvullen**. In northeastern Poland this is probably a common species.

Coenagrion puella

A common species in most areas. Also recorded from many location in de peatmarshes, but not recorded from the northern fen.

Coenagrion hastulatum

Especially found at the two fens, but occasionally in the peatland alongside the Rospuda river. Also a *C. hastulatum* population was found along the small stream at the north side of the Jalowo lake in the north of the Rospuda reserve. *C. hastulatum* is in its western range a species of very stable habitats, needing mesotrophic fens with seepage water and moderate pH (not too low). Further eastwards along the species’ distribution range in Europe, this species is common in a broader array of habitats (NVL, 2002) – **citation lacking**, so in eastern Poland it is definitely not as rare as in the Netherlands or the western parts of Germany.

Coenagrion armatum

Polish Red list - critically endangered

This species is found within the peatland area, at an ancient and disconnected river arm of the Rospuda river, relatively dislocated from the stream’s current riverbed. The old meander is not

in direct contact with the Rospuda river, but still contains open water. The field trip in early June was probably a little too late, since the flight peak of *C. armatum* in Poland is probably in May. This is one of the rarest dragonfly species in Poland (Głowaciński & Nowacki, 2004), so it is recommended to make a survey to explore all habitats that are potentially suitable for reproduction in the area. Such a survey should take place at half May at the old river beds, that have vegetations consisting of water soldier *Stratiotes aloides* or knee-deep water with water horsetail *Equisetum fluviatile*.

Erythromma najas

Found at open water in the peatlands beside the Rospuda river, mainly at old meanders. Also records from the two fens. A common species at calcareous peatmarshes and fens with floating vegetation.

Erythromma viridulum

Only found in August at the northern fen. The species is known as a migrant, so reproduction could be elsewhere. To find out, this species should be surveyed in July and early August.

Pyrrhosoma nymphula

A very common species, observed at almost every visited location. Probably reproduction in most habitats.

Nehalennia speciosa

Polish Red list fb endangered

IUCN fb near threatened

Together with *Coenagrion armatum* the most interesting dragonfly species observed. The pigmy damselfly has been seen at the two fens in June. In August, it has also been seen at the northern fen. This species is very rare. In Poland it is endangered and after 1975 only known from 28 localities (Głowaciński & Nowacki, 2004). Only 8 of them are in actual nature reserves, so more protected zones must be created. Not only the fens, but also the surrounding area should be preserved in order to maintain suitable fens with a proper vegetation of sedges (*Carex* spp). Both fens contain an area with *Sphagnum* and at the edge of the open water a *Carex*-vegetation. This species flies through this *Carex* vegetation. *N. speciosa* is hard to find, since it is very small and most dragonfly specialists are not accustomed to observe imagos flying across the vegetation instead of in the open.

Platycnemis pennipes

P. pennipes was found throughout the area and was one of the commonest species during our visit in June. The species is known to hunt at some distance from its larval habitat. Maybe *P. pennipes* is reproducing mainly at the Rospuda river itself, but it is possible some other waters are used too for reproduction.



Figure 10.1: *Nehalennia speciosa*. photo: Tim Faasen

10.2 Anisoptera - dragonflies

Aeshna mixta

Only found in August, since it is one of latest appearing dragonflies. Hunting imagines were seen at all kind of sites. In August *A. mixta* is one of the commonest species.

Aeshna isoceles

This species has been observed at several different sites. Most sites were located in the large calcareous peatlands, but the species has also been seen at the fen near the bridge over the Rospuda. *A. isoceles* is a common species in peatmarshes.

Aeshna grandis

This species has only been seen at the last day of our visit in June at two locations. Both locations in were in the peatmarshes and both observations regarded one single individual. *A. grandis* is probably more common later in June and during the summer.

Aeshna viridis

This species is observed as larve at three old meanders of the Rospuda, in the peatland valley. In August the species was seen at several locations along the Rospuda river, all with water soldier (*A. stratoides*) vegetation.

Aeshna juncea

This species has been observed once, emerging from a small wet area within a reed marsh, during the visit in June. Peatlands are not a common habitat for this species, fens with *Sphagnum* are



Figure 10.2: A recently disconnected old meander of the Rospuda river, one of the locations in which *Aeshna viridis* larvae were found. photo: Ewoud van der Ploeg

a more likely habitat to observe this species. *A. juncea* had a flight peak in summer, so probably most individuals emerge later. Both fens appeared to contain some suitable habitat for this species. A reproduction site in peatland with water soldier *Stratiotes aloides* is known from northern Germany, so for a good survey of this species also the old meanders must be checked.

Aeshna cyanea

One single individual has been found in August. Probably the species is much more common. Especially in the waters near the forest at the edge of the peatlands, this species is probably very common.

Anax imperator

This species has been recorded twice. Both records are from the calcareous peatmarshes. This large species can fly and hunt at a long distance from its reproduction site, so we cannot be sure it is reproducing in the Rospuda reserve.

Anax parthenope

A few different males were hunting above the lake and the reedlands in the peatlands. Moreover, at the sand quarry just outside of the Rospuda reserve, a reproduction site was found in which three copulas were found. This species appears to be increasingly common in Central Europe.

Brachytron pratense

This species is common in peatmarshes and mainly flies in June. It has also been seen at the fen near the bridge over the Rospuda river. Most reproduction sites are in the peatmarshes and old meanders along the Rospuda river, but it is possible *B. pratense* uses the fen too.

Gomphus vulgatissimus

A very common species at the riversides. Records are from the whole area, but the larvae of this species are only known from not too large rivers which have not been degraded by industries or agriculture. The species has been observed at a lot of different sites, but a part of them are not suitable habitat for reproduction. So, most probably *G. vulgatissimus* only reproduces at the Rospuda river itself and maybe at some other streams in the area.

Ophiogomphus cecilia

Seen at a few locations along the Rospuda river. In western Europe, this is an endangered species, but in Poland it is not on the Red List. Also larvae were observed in the small stream north of the big lake.

Onychogomphus forcipatus

Seen at several locations along the Rospuda river, also larvae in the small stream north of the big lake. A common species throughout Europe in small rivers which are not degraded by industries or agriculture.

Cordulia aenea

This species is generally observed at different types of habitat. Around the northern fen, several visits recorded the species. It has also been seen at the stream north of the Jalowo lake, with several marshy patches along the stream. Most records, however, are from the open valley along the river itself. All old meanders, reedmarshes and calcareous peat bogs with open water seem suitable habitat for *C. aenea*, so it's a common species in this range of the Rospuda reserve.

Somatoclora metallica

This species is recorded five times in early June. The locations are quite different: near the two fens, along the Rospuda itself and in the peatmarshes. The trees along the water could be a common factor, since both fens and the Rospuda River are at that particular site surrounded by trees. Also in the peatlands occur a lot of trees at several locations. **explanation lacking.. why are trees particularly important to this species** Throughout Europe, records of this species are rare in calcareous peatmarshes (NVL, 2002) – **citation lacking**. It would be good to gather more locations in peatmarshes, but *S. metallica* is not a threatened species. Even at polluted streams, where most other dragonflies do generally not survive, this species still occurs. We did not put much effort into observing this species, so maybe it is more common than recorded.

Somatocloria flavomaculata

Common in the peatlands. This species reproduces in waters which are almost fully covered with vegetation. In the peatlands, many old waters are filled up with *Sphagnum*, reed and a lot of different plant species. These habitats are not easily recognised as dragonfly habitats, but the males hunt throughout the surrounding area even if there is no water left for reproduction. Most males hunt at sides with small birchs, willows or other trees. We did not search for the locations in which reproduction takes place, but during the survey for butterflies, that fly at the same hunting sites as *S. flavomaculata* males, hunting males have been observed at all kinds of locations in the peatlands with some trees.

Somatocloria arctica

Polish Red list fb vulnerable

There were a few encounters with this species of small raised bogs in bog woodland, but strangely they were all in the calcareous peat area. The species is not observed at bog woodland or the small raised bogs around the two fens. There also seemed no suitable area for *S. arctica*-larvae: small wet depressions in raised bogs with a few square meters of open water. *S. arctica* has been seen on three occasions, so it is almost sure they are no migrants from other areas. It could be hard to find the reproduction area of this species in the reserve, because it is almost impossible to survey the habitat of *S. arctica* and because the exact locations in which reproduction takes place can be quite small. In a Dutch nature reserve, dragonfly specialists have had to make several trips before the actual place of reproduction was located.

Epitheca bimaculata

This species is often more seen as exuviae than imago. Exuviae were first found on bare soil, but during the field trip some members specialized in finding them in the vegetation. Notably, the vegetation in which exuviae were found could be several meters away from the Jalowo lake's coastline. The species is observed at the Jalowo lake, but also on a few other locations. Single individuals at the fen near the bridge, by the Rospuda river itself near the bridge, but two individuals were observed in the southern part of the peatmarsh. *E. bimaculata* has also been observed at an old meander at some distance from the Rospuda river, in which also *Coenagrion armatum*, *Leucorrhinia caudalis* and *L. albifrons* were observed.

Libellula quadrimaculata

Common species throughout the whole area. In calcareous peatmarshes and fens *L. quadrimaculata* is throughout Europe a common species.

Libellula depressa

This species has been seen at different sites, but has almost not been observed in the peatmarsh area. *L. depressa* is a species of very new habitats, water with only a small part covered by vegetation. This species spreads easily and only single individuals were found. Most sites are not very suitable for reproduction for this species, so some of the recorded individuals are probably reproducing in waters around the nature area, in ponds for example.

Libellula fulva

This species is known from old meanders in the peatland, reed vegetation and at the border of the peatland and the Rospuda river. A few records from other habitat types, all other visited habitats. It is likely these imagines were originally from the peatmarshes along the river, because this is one of the most common species. At the big lake, suitable vegetations of reed seems to exist so probably *L. fulva* occurs at the lake too.

Orthetrum cancellatum

A very common species, observed at most visited locations.

Leucorrhinia dubia

This species is recorded from both fens and one record from the peatmarshes. The *Sphagnum* around both fens is probably suitable for the larvae of this species.

Leucorrhinia rubicunda

Only one record of this species in the whole area. Maybe we were a little late, but early June should be a good time to watch this species. It is not likely some species were identified wrong: at both *L. dubia* and *L. rubicunda* sites we watched out for both species very carefully.

Leucorrhinia pectoralis

This species is recorded from several locations in the peatmarshes. But it is not a very common species in this area, although our trip was during the flight peak. *L. pectoralis* also seems to reproduce at the fen near the bridge and in the marshy area around a small stream. This area is surrounded by forest with a small, more open part. At this point, the water from the streams spreads and feeds a small marsh. Also *Coenagrion hastulatum* and the butterfly *Boloria selene* occur at this small site.

Leucorrhinia albifrons

A rare species, observed at three sites: both fens and at one location in the peatlands. This location is surrounded by reed, with watersoldier *Stratiotes aloides* in the water. Probably an old meander, but not in direct contact with the Rospuda river itself. Both fens contain a zone with *Sphagnum* and *Carex*-species.

Leucorrhinia caudalis

This species occurs at exactly the same locations as *L. albifrons*. The species are known to be rare and still occur often together. They both need submerged and emerged vegetation, often in fens surrounded by forest. Also old meanders are mentioned in NVL (2002) – citation lacking, with instead of trees high reedbeds around the water. Although *L. caudalis* prefers a little more mesotrophy and a lower pH, both species reproduce at the same habitat in the Rospuda reserve.



Figure 10.3: Lilypad Whiteface *Leucorrhinia Caudalis*. photo: Tim Faasen

Sympetrum danae

Observed early August at the northern fen. For a good survey of this species one must search during summer.

Sympetrum pedemontanum

Sympetrum sanguineum

Flying at the northern fen in early August. For this species survey in the summer is also needed.

Sympetrum vulgatum

This species was found at the northern fen, early August.

10.3 Missing species

We visited the area early in June, and a few days by two persons during early August. To know all dragonfly species in a certain area, it is necessary to visit also in July and make a longer stay in August. Many species specific for the summer period are found on only a few locations, but are much more abundant than our records tell right now. For instance, most *Lestes*, *Aeshna* and *Sympetrum* species definitely could be found at more locations in a good survey in the summer. The same holds for *Erythromma viridulum* and *Enallagma cyathigerum*. Also some species are probably missed at both field trips. *Ceriagrion tenellum* for instance, could be expected around

both fens. *Lestes viridis* could occur at some areas like the mens, the lake, the small marsh around the stream north of the lake and at a lot of locations in the peatland area. *Sympetrum striolatum* has not been observed, but this very common species seems to avoid calcareous peatlands. In two large Dutch peatmarshes, the species is also missing **Ruiter 2002**, E. Ruiter *pers. comm.* *Cordulegaster boltonii* is also an interesting species to look out for. It is rare in Poland, listed as vulnerable on the Red List ([Glowaciński & Nowacki, 2004](#)). Some small streams may be suitable habitat and maybe some parts of the Rospuda river itself too.

11 Grasshoppers *Orthoptera*

Since the best time to survey Orthoptera is in the period from July to September, we were not able to make a thorough investigation on this taxonomic group. A second visit by some members of the survey group during August 2007 however was successful in recording a total of 17 Orthoptera species, see table 13.8. Not any specialities were found, but notable species include *Decticus verrucivorus* and *Chortippus dorsatus*. Both species are strongly declining in Western Europe, but are still common in Poland. A more thorough survey on the Orthoptera in the Rospuda valley would be necessary to make conclusions on the importance of the area for Orthoptera.

12 Conclusion

This survey, performed from June 2 through June 9 2007 recorded over 500 species in many different faunistic groups. Of these species, 16 are listed in the European Habitats Directive and 7 are listed in the Polish Red List. These high numbers form the lower limit of the actual numbers; without a fieldwork that is distributed over the full season the survey cannot be complete. Moreover many of the taxonomic groups that were studied are to our opinion underrepresented in the regional red lists due to lack of knowledge of their status in Poland.

The species found are indicative of pristine and natural habitats such as active raised bogs and calcareous fens, which are becoming increasingly scarce in Europe. Water relations are crucial to preserve the areas natural richness. The slightest alterations in water relations are very likely to induce shifts towards much less valuable habitats, causing rapid and irreversible losses of associated biodiversity. Human activities such as infrastructure will in almost any case negatively affect the water relations in the area.

The isolated location of the valley has protected it against a large number of adverse human influences until now. The area is a unique combination of natural habitats with very few comparable sites within Europe left. Its natural values can -with proper protection- be preserved here for future generations. Moreover the Rospuda valley could serve as an icon to represent the beautiful nature present around Augustow or in the North-East Poland as a whole.

13 Appendix

13.1 Addendum: amphibian fauna of the Rospuda Valley

Wouter de Vries

Stimulated by the preliminary report on the Rospuda Valley Survey, which focused especially on the entomofauna, Rosa Carrera López and Wouter de Vries have paid a brief visit to several locations in the surrounding of the Rospuda Valley where the Via Baltica is planned. The main purpose was to obtain an impression on the habitats present and the potential value for amphibians. During the brief visit it was possible to do several valuable observations, but it was far from possible to obtain a complete overview of available habitats and species. The following is a brief note on observations of the visit and other notes on amphibians in addition to those mentioned in the preliminary report.

During the brief visit on 17th of August 2007 Moorfrogs (*Rana arvalis*) (European Habitats Directive Annex IV) adults and juveniles were observed within the wet forest and on the meadows surrounding the valley. Considering the habitats within the valley, it can be assumed that *Rana arvalis* is one of the common amphibians in the valley, together with the Common grass frog (*Rana temporaria*) and Common toad (*Bufo bufo*) (both EU-HBD Annex V). For the locations of the observed amphibians and a lizard see table 13.1.



Figure 13.1: Viviparous lizard *Lacerta vivipara*

According to A. Wajrak (a Polish journalist on natural history) a video exists depicting an adult Great crested newt (*Triturus cristatus*, EU-HBD Annex II and IV) that was caught within the valley road stretch. Areas where the Great crested newt is reproducing usually have also a high value for other amphibian species that are listed on Annex II and/or IV of the European Habitat Directive, such as *Rana lessonae* (EU-HBD Annex IV), Common spadefoot toad (*Pelobates fuscus*) (EU-HBD Annex IV) and Fire bellied toad (*Bombina bombina*) (EU-HBD Annex II, IV). The habitats in which the dragonfly *Epiptera bimaculata* was found during the survey were investigated on amphibians, but it appears to be a suitable amphibian habitat for *Triturus cristatus* and other rare amphibians, depending on the amount of fish. Also the old meanders with *Stratiotes aloides* can have a rich amphibian fauna.

On the north and south side of the valley, within less than a kilometer from the planned road, there are several ponds and wet depressions that are of the type that rare species of amphibians use (*Bombina bombina*, *Triturus cristatus*, *Rana arvalis*, *Rana lessonae*, *Pelobates fuscus*). Since all these species have huge metapopulations in this part of northeastern Poland, and suitable ponds are present surrounding the planned road, it can be assumed that the metapopulations will be crossed through by the highway.

On the basis of the before described observations, the natural distribution of species and the possibilities within the natural landscape of the Rospuda Valley, it should be considered that both common and rare amphibian species can have populations in and surrounding the planned road stretch in the Rospuda valley. Construction of the road there might affect breeding waters and/or populations of at least the following amphibian species: *Triturus cristatus*, *Lissotriton vulgaris*, *Bombina bombina*, *Pelobates fuscus*, *Bufo bufo*, *Rana lessonae*, *Rana esculenta*, *Rana temporaria*, *Rana arvalis*.

Table 13.1: Observations of the 17th of August 2007 on amphibians (and a lizard) within and along the planned road in the Rospuda valley. Coordinate system used is UTM 34U (mapdate WGS 84).

| English name | Scientific name | X-coordinate | Y-coordinate | additional remarks |
|-------------------|-------------------------|--------------|--------------|---|
| Common grass frog | <i>Rana temporaria</i> | 0628051 | 5976952 | Only juveniles observed. |
| | | 0625324 | 5973284 | Only juveniles observed. At the edge of the forest, south side, near Tapilowka. |
| Common toad | <i>Bufo bufo</i> | 0626175 | 5973819 | Only juveniles observed; at the forest edge. |
| | | 0627599 | 5977744 | Dead adult, just outside area where road is planned. |
| Moor Frog | <i>Rana arvalis</i> | 0626143 | 5973819 | Adult, Forest near meadow |
| | | 0626564 | 5974343 | Adult and juveniles near wet depression. |
| | | 0625971 | 5973620 | Adult in meadow, near Tapilowka. |
| Viviparous lizard | <i>Lacerta vivipara</i> | 0626658 | 5974266 | Adult. Edge of wet depression within forest. |

Table 13.2: Potentially interesting locations for amphibians

| Description | X-coordinate | Y-coordinate | additional remarks |
|---|--------------|--------------|---|
| Wet, sunexposed depression within wet forest, potential breeding habitat for amphibians: <i>Rana temporaria</i> , <i>R. arvalis</i> , <i>Lissotriton vulgaris</i> . | 0626076 | 5973603 | Forest edge, southedge valley near Tapilowka. |
| Wet depression, 20 cm deep) with young <i>Alder</i> and <i>Myosotis</i> . Potential breeding habitat for <i>Triturus cristatus</i> , <i>Lissotriton vulgaris</i> , <i>Rana arvalis</i> , <i>R. Temporaria</i> . | 0626663 | 5974201 | Within wet forest in valley. |

13.2 Species lists

Moths - Lepidoptera

Table 13.3: List of observed Moth species

| family | genus | species |
|-------------------|----------------------|---------------------|
| Arctiidae | <i>Atolmis</i> | <i>rubricollis</i> |
| | <i>Cybosia</i> | <i>mesomella</i> |
| | <i>Diacrisia</i> | <i>sannio</i> |
| | <i>Eilema</i> | <i>sororcula</i> |
| | <i>Spilosoma</i> | <i>lubricipeda</i> |
| | <i>Spilosoma</i> | <i>lutea</i> |
| | <i>Spilosoma</i> | <i>urticae</i> |
| Cossidae | <i>Phragmataecia</i> | <i>castaneae</i> |
| Drepanidae | <i>Drepana</i> | <i>curvatula</i> |
| | <i>Drepana</i> | <i>falcataria</i> |
| | <i>Habrosyne</i> | <i>pyritoides</i> |
| | <i>Sabra</i> | <i>harpagula</i> |
| | <i>Tetheella</i> | <i>fluctuosa</i> |
| Geometridae | <i>Abraxas</i> | <i>sylvata</i> |
| | <i>Angerona</i> | <i>prunaria</i> |
| | <i>Asthena</i> | <i>albulata</i> |
| | <i>Biston</i> | <i>betularia</i> |
| | <i>Bupalus</i> | <i>pinaria</i> |
| | <i>Cabera</i> | <i>exanthemata</i> |
| | <i>Cabera</i> | <i>pusaria</i> |
| | <i>Cepphis</i> | <i>advenaria</i> |
| | <i>Chiasmia</i> | <i>clathrata</i> |
| | <i>Cosmorhoe</i> | <i>ocellata</i> |
| | <i>Cyclophora</i> | <i>linearia</i> |
| | <i>Cyclophora</i> | <i>punctaria</i> |
| | <i>Ecliptopera</i> | <i>capitata</i> |
| | <i>Electrophaes</i> | <i>corylata</i> |
| | <i>Ematurga</i> | <i>atomaria</i> |
| | <i>Epirrhoe</i> | <i>alternata</i> |
| | <i>Epirrhoe</i> | <i>rivata</i> |
| | <i>Epirrhoe</i> | <i>tristata</i> |
| | <i>Euchoeca</i> | <i>nebulata</i> |
| | <i>Euphyia</i> | <i>unangulata</i> |
| | <i>Geometra</i> | <i>papilionaria</i> |
| | <i>Horisme</i> | <i>tersata</i> |
| | <i>Hydrelia</i> | <i>flammeolaria</i> |
| <i>Hydriomena</i> | <i>impluviata</i> | |
| <i>Hypomecis</i> | <i>punctinalis</i> | |

Continued on next page

Table 13.3: List of observed Moth species

| family | genus | species |
|---------------|-------------------------|----------------------|
| | <i>Jodis</i> | <i>lactearia</i> |
| | <i>Lampropteryx</i> | <i>otregiata</i> |
| | <i>Ligdia</i> | <i>adustata</i> |
| | <i>Lomaspilis</i> | <i>marginata</i> |
| | <i>Lomaspilis</i> | <i>opis</i> |
| | <i>Lomographa</i> | <i>bimaculata</i> |
| | <i>Lomographa</i> | <i>temerata</i> |
| | <i>Macaria</i> | <i>alternata</i> |
| | <i>Macaria</i> | <i>liturata</i> |
| | <i>Macaria</i> | <i>notata</i> |
| | <i>Macaria</i> | <i>signaria</i> |
| | <i>Mesoleuca</i> | <i>albicillata</i> |
| | <i>Orthonama</i> | <i>vittata</i> |
| | <i>Perizoma</i> | <i>alchemillata</i> |
| | <i>Petrophora</i> | <i>chlorosata</i> |
| | <i>Plagodis</i> | <i>dolabraria</i> |
| | <i>Plagodis</i> | <i>pulveraria</i> |
| | <i>Pterapherapteryx</i> | <i>sexalata</i> |
| | <i>Scopula</i> | <i>floslactata</i> |
| | <i>Scopula</i> | <i>immorata</i> |
| | <i>Siona</i> | <i>lineata</i> |
| | <i>Thera</i> | <i>firmata</i> |
| | <i>Timandra</i> | <i>comae</i> |
| | <i>Venusia</i> | <i>blomeri</i> |
| | <i>Xanthorhoe</i> | <i>designata</i> |
| | <i>Xanthorhoe</i> | <i>ferrugata</i> |
| | <i>Xanthorhoe</i> | <i>montanata</i> |
| | <i>Xanthorhoe</i> | <i>spadicearia</i> |
| Lasiocampidae | <i>Dendrolimus</i> | <i>pini</i> |
| | <i>Macrothylacia</i> | <i>rubi</i> |
| Limacodidae | <i>Apoda</i> | <i>limacodes</i> |
| Lymantriidae | <i>Calliteara</i> | <i>pudivunda</i> |
| Noctuidae | <i>Abrostola</i> | <i>tripartita</i> |
| | <i>Abrostola</i> | <i>triplasia</i> |
| | <i>Acronicta</i> | <i>psi/tridens</i> |
| | <i>Acronicta</i> | <i>rumicis</i> |
| | <i>Acronicta</i> | <i>strigosa</i> |
| | <i>Agrotis</i> | <i>exclamationis</i> |
| | <i>Anaplectoides</i> | <i>prasina</i> |
| | <i>Apamea</i> | <i>crenata</i> |
| | <i>Apamea</i> | <i>unanimis</i> |
| | <i>Autographa</i> | <i>pulchrina</i> |

Continued on next page

Table 13.3: List of observed Moth species

| family | genus | species |
|---------------|---------------------|-------------------------|
| | <i>Axylia</i> | <i>putris</i> |
| | <i>Ceramica</i> | <i>psi</i> |
| | <i>Colobochyla</i> | <i>salicalis</i> |
| | <i>Colocasia</i> | <i>coryli</i> |
| | <i>Diachrysia</i> | <i>chrysitis</i> |
| | <i>Diarsia</i> | <i>mendica</i> |
| | <i>Dypterygia</i> | <i>scabriuscula</i> |
| | <i>Elaphria</i> | <i>venustula</i> |
| | <i>Hada</i> | <i>plebeja</i> |
| | <i>Hadena</i> | <i>bicruris</i> |
| | <i>Hadena</i> | <i>luteago</i> |
| | <i>Heliiothis</i> | <i>nubigera</i> |
| | <i>Herminea</i> | <i>grisealis</i> |
| | <i>Hypena</i> | <i>proboscidalis</i> |
| | <i>Hyppa</i> | <i>rectilinea</i> |
| | <i>Lacanobia</i> | <i>oleracea</i> |
| | <i>Laspeyria</i> | <i>flexula</i> |
| | <i>Leucania</i> | <i>obsoleta</i> |
| | <i>Mesapamea</i> | <i>secalis</i> |
| | <i>Moma</i> | <i>alpium</i> |
| | <i>Mythimna</i> | <i>pallens</i> |
| | <i>Mythimna</i> | <i>pudorina</i> |
| | <i>Ochropleura</i> | <i>plecta</i> |
| | <i>Oligia</i> | <i>latruncula</i> |
| | <i>Oligia</i> | <i>strigilis</i> |
| | <i>Panthea</i> | <i>coenobita</i> |
| | <i>Polia</i> | <i>nebulosa</i> |
| | <i>Protodeltote</i> | <i>pygarga</i> |
| | <i>Rivula</i> | <i>sericealis</i> |
| | <i>Schrankia</i> | <i>costraestrigalis</i> |
| | <i>Senta</i> | <i>flammea</i> |
| | <i>Xestia</i> | <i>c-nigrum</i> |
| | <i>Xestia</i> | <i>ditrapezium</i> |
| | <i>Xylomoia</i> | <i>graminea</i> |
| Nolidae | <i>Deltote</i> | <i>uncula</i> |
| | <i>Earias</i> | <i>clorana</i> |
| | <i>Nola</i> | <i>confusalis</i> |
| | <i>Pseudoips</i> | <i>prasinana</i> |
| Notodontidae | <i>Drymonia</i> | <i>dodonaea</i> |
| | <i>Gluphisia</i> | <i>crenata</i> |
| | <i>Leucodonta</i> | <i>bicoloria</i> |
| | <i>Notodonta</i> | <i>dromedarius</i> |

Continued on next page

Table 13.3: List of observed Moth species

| family | genus | species |
|---------------|----------------------|-------------------------|
| | <i>Notodonta</i> | <i>ziczac</i> |
| | <i>Phalera</i> | <i>bucephela</i> |
| | <i>Pheosia</i> | <i>tremula</i> |
| | <i>Ptilodon</i> | <i>capucina</i> |
| | <i>Stauropus</i> | <i>fagi</i> |
| Pyralidae | <i>Agrotera</i> | <i>nemoralis</i> |
| | <i>Cataclysta</i> | <i>lemnata</i> |
| | <i>Chrysoteuchia</i> | <i>culmella</i> |
| | <i>Crambus</i> | <i>lathoniellus</i> |
| | <i>Dioryctria</i> | <i>schuetzeella</i> |
| | <i>Elophila</i> | <i>nymphaeata</i> |
| | <i>Eurrhypara</i> | <i>hortulata</i> |
| | <i>Nymphula</i> | <i>stagnata</i> |
| | <i>Ostrinia</i> | <i>palustralis</i> |
| | <i>Perinephela</i> | <i>lancealis</i> |
| | <i>Phlyctaenia</i> | <i>coronata</i> |
| | <i>Scoparia</i> | <i>ambigualis</i> |
| | <i>Udea</i> | <i>olivalis</i> |
| Sphingidae | <i>Deilephila</i> | <i>elpenor</i> |
| | <i>Deilephila</i> | <i>porcellus</i> |
| | <i>Mimas</i> | <i>tiliae</i> |
| | <i>Smerinthus</i> | <i>ocellatus</i> |
| | <i>Sphinx</i> | <i>pinastri</i> |
| Tortricidae | <i>Ancylis</i> | <i>mitterbacheriana</i> |
| | <i>Ancylis</i> | <i>unculana</i> |
| | <i>Apotomis</i> | <i>turbidana</i> |
| | <i>Eucosma</i> | <i>metzneriana</i> |
| | <i>Eulia</i> | <i>ministrana</i> |
| | <i>Hedya</i> | <i>dimidiana</i> |
| | <i>Hedya</i> | <i>nubiferana</i> |
| | <i>Pandemis</i> | <i>cerasana</i> |
| | <i>Phiaris</i> | <i>umbrosana</i> |
| | <i>Rhyacionia</i> | <i>pinivorana</i> |

Hoverflies - Syrphidae

Table 13.4: List of observed Syrphidae

| genus | species |
|----------------------|----------------------|
| <i>Anasymia</i> | <i>interpuncta</i> |
| <i>Anasymia</i> | <i>contracta</i> |
| <i>Anasymia</i> | <i>transfuga</i> |
| <i>Anasymia</i> | <i>lineata</i> |
| <i>Baccha</i> | <i>elongata</i> |
| <i>Criorhina</i> | <i>berberina</i> |
| <i>Chalcosyrphus</i> | <i>piger</i> |
| <i>Chrysotoxum</i> | <i>cautum</i> |
| <i>Chrysotoxum</i> | <i>festivum</i> |
| <i>Dasysyrphus</i> | <i>albostriatus</i> |
| <i>Dasysyrphus</i> | <i>tricinctus</i> |
| <i>Episyrphus</i> | <i>balteatus</i> |
| <i>Eristalis</i> | <i>abusiva</i> |
| <i>Eristalis</i> | <i>arbustorum</i> |
| <i>Eristalis</i> | <i>intricaria</i> |
| <i>Eristalis</i> | <i>lineata</i> |
| <i>Eristalis</i> | <i>nemorum</i> |
| <i>Eristalis</i> | <i>tenax</i> |
| <i>Eristalis</i> | <i>picea</i> |
| <i>Eumerus</i> | <i>strigatus</i> |
| <i>Eupeodes</i> | <i>corrollae</i> |
| <i>Eupeodus</i> | <i>luniger</i> |
| <i>Eupeodus</i> | <i>nielsenii</i> |
| <i>Eupeodes</i> | <i>latifaciatus</i> |
| <i>Helophilus</i> | <i>hybridus</i> |
| <i>Helophilus</i> | <i>affinis</i> |
| <i>Helophilus</i> | <i>pendulus</i> |
| <i>Helophilus</i> | <i>trivittatus</i> |
| <i>Lejogaster</i> | <i>metallina</i> |
| <i>Leucozona</i> | <i>lucorum</i> |
| <i>Leucozona</i> | <i>laternaria</i> |
| <i>Melanogaster</i> | <i>nuda</i> |
| <i>Melanostoma</i> | <i>mellinum</i> |
| <i>Microdon</i> | <i>analis</i> |
| <i>Microdon</i> | <i>cf. mutabilis</i> |
| <i>Myathropa</i> | <i>florea</i> |
| <i>Neoascia</i> | <i>tenur</i> |
| <i>Neoascia</i> | <i>podagrica</i> |
| <i>Orthonevra</i> | <i>intermedia</i> |
| <i>Parasyrphus</i> | <i>vittiger</i> |

Continued on next page

Table 13.4: List of observed Syrphidae

| genus | species |
|----------------------|------------------------|
| <i>Parhelophilus</i> | <i>versicolor</i> |
| <i>Parhelophilus</i> | <i>consimilis</i> |
| <i>Parhelophilus</i> | <i>frutetorum</i> |
| <i>Pipiza</i> | <i>accola</i> |
| <i>Platycheirus</i> | <i>sp.</i> |
| <i>Pyrophaena</i> | <i>rosarum</i> |
| <i>Rhingia</i> | <i>campestris</i> |
| <i>Scaeva</i> | <i>pyrastris</i> |
| <i>Sericomyia</i> | <i>silentis</i> |
| <i>Sericomyia</i> | <i>lappona</i> |
| <i>Sphaerophoria</i> | <i>scripta</i> |
| <i>Sphegina</i> | <i>elegans</i> |
| <i>Syrirta</i> | <i>pipiens</i> |
| <i>Temnostoma</i> | <i>vespiforme</i> |
| <i>Trichopsomyia</i> | <i>joratensis</i> |
| <i>Tropidia</i> | <i>scita</i> |
| <i>Volucella</i> | <i>bombylans</i> |
| <i>Volucella</i> | <i>pelluscens</i> |
| <i>Xylota</i> | <i>caeruleiventris</i> |
| <i>Xylota</i> | <i>segnis</i> |
| <i>Xylota</i> | <i>sylvarum</i> |
| <i>Xanthogramma</i> | <i>pedessequum</i> |
| <i>Xantandrus</i> | <i>comtus</i> |

Carabid Beetles - Carabidae

Table 13.5: Coleoptera recorded along a west-to-east gradient along the 5980000 latitudinal coordinate (UTM)

| X-coordinate | Y-coordinate | genus | species | habitat preferences |
|--------------|--------------|----------------------------|-------------------------|--|
| 621000 | 5980000 | <i>Carabus</i> | <i>violaceus</i> | common forest species, also in cultivated lands |
| | | <i>Pterostichus</i> | <i>oblongopunctatus</i> | very common forest species |
| | | <i>Pterostichus</i> | <i>spec</i> | |
| | | <i>Agonum</i> | <i>olivaceum</i> | no data known; rare. |
| | | <i>Pterostichus</i> | <i>oblongopunctatus</i> | very common forest species |
| 623859 | 5978978 | <i>Agonum</i> | <i>fuliginosum</i> | wet meadows and reed-lands |
| | | <i>Carabus</i> | <i>granulatus</i> | eurytopic, moisty habitats, common |
| | | <i>Carabus</i> | <i>nemoralis</i> | eurotopic, very common in various habitats |
| | | <i>Carabus</i> | <i>violaceus</i> | common forest species, also in cultivated lands |
| | | <i>Pterostichus</i> | <i>aethiops</i> | forest species |
| | | <i>Pterostichus</i> | <i>melanarius</i> | common, especially in cultivated areas |
| | | <i>Pterostichus</i> | <i>niger</i> | common, moisty habitats, especially forests |
| | | <i>Pterostichus</i> | <i>oblongopunctatus</i> | very common forest species |
| 624813 | 5977404 | <i>Pterostichus</i> | <i>rhaeticus</i> | oligothrophic habitats, such as moors, moist heatlands and forests |
| | | <i>Poecilus</i> | <i>lepidus</i> | dry heathlands or sands, not common |
| 625078 | 5978143 | <i>Agonum</i> | <i>assimilis</i> | Disturbed areas |
| | | <i>Agonum</i> | <i>fuliginosum</i> | common, often in forests |
| | | <i>Carabus</i> | <i>granulatus</i> | eurytopic, moisty habitats, common |
| | | <i>Carabus</i> | <i>hortensis</i> | common forest species |
| | | <i>Cychrus</i> | <i>caraboides</i> | forest species, also in moist and open areas |
| | | <i>Elaphrus</i> | <i>cupreus</i> | vegetation rich and muddy siltations and banks |

Continued on next page

Table 13.5: Coleoptera recorded along a west-to-east gradient along the 5980000 latitudinal coordinate (UTM)

| X-coordinate | Y-coordinate | genus | species | habitat preferences |
|---------------------|---------------------|--------------------------------------|--------------------------------------|---|
| | | | <i>Loricera pilicornis</i> | various habitats characterized by moisty soils |
| | | | <i>Pterostichus minor</i> | river banks and marshes |
| | | | <i>Pterostichus niger</i> | common, moisty habitats, especially forests |
| | | | <i>Pterostichus oblongopunctatus</i> | very common forest species |
| | | | <i>Pterostichus rhaeticus</i> | oligothrophic habitats, such as moors, moist heatlands and forests |
| 625975 | 5981596 | Calathus | fuscipes | eurytopic species, mostly in dry habitats |
| | | <i>Carabus cancellatus</i> | | fields, meadows, scrublands. declines in Western Europe |
| | | <i>Pseudophonus rufipes</i> | | very common, especially in cultivated areas |
| 627224 | 5976528 | <i>Calathus</i> | <i>micropterus</i> | dominant in coniferous forests, but also in deciduous forests. Prefers dry soils. |
| | | <i>Pterostichus oblongopunctatus</i> | | very common forest species |
| 628000 | 5973000 | <i>Carabus violaceus</i> | | common forest species, also in cultivated lands |
| | | <i>Pterostichus niger</i> | | common, moisty habitats, especially forests |
| | | <i>Carabus nemoralis</i> | | europic, very common in various habitats |
| | | <i>Pterostichus niger</i> | | common, moisty habitats, especially forests |
| 628312 | 5974680 | <i>Agonum fuliginosum</i> | | common, moist habitats |
| | | <i>Harpalus laevipes</i> | | less common in Central Europe. Moisty forests. |
| | | <i>Poecilus versicolor</i> | | common species, various habitats |
| | | <i>Syntomus truncatellus</i> | | sandy soils, warm and open habitats |

Continued on next page

Table 13.5: Coleoptera recorded along a west-to-east gradient along the 5980000 latitudinal coordinate (UTM)

| X-coordinate | Y-coordinate | genus | species | habitat preferences |
|---------------------|---------------------|---------------------|-------------------------|---|
| 629185 | 5975835 | <i>Semiophonus</i> | <i>signaticornis</i> | warme en droge rud- erale plekken, akkers, ook zandige rivieroev- ers |
| 628906 | 5974149 | <i>Poecilus</i> | <i>lepidus</i> | dry heathlands or sands, not common |
| | | <i>Pterostichus</i> | <i>nigrita</i> | common species, river banks, especially on banks covered with sedges <i>Carex</i> spp. |
| 628576 | 5974729 | <i>Amara</i> | <i>littorea</i> | on cultivated fields and wastelands, not very common |
| | | <i>Notiophilus</i> | <i>biguttatus</i> | common, various habi- tats |
| | | <i>Notiophilus</i> | <i>rufipes</i> | warm habitats, espe- cially in exposed sites of beech forests |
| | | <i>Pterostichus</i> | <i>oblongopunctatus</i> | very common forest species |
| 628510 | 5974652 | <i>Amara</i> | <i>aenea</i> | eurytope groep |
| | | <i>Harpalus</i> | <i>affinis</i> | very common species |
| | | <i>Notiophilus</i> | <i>rufipes</i> | warm habitats, espe- cially in exposed sites of beech forests |
| 628423 | 5974803 | <i>Carabus</i> | <i>violaceus</i> | common forest species, also in cultivated lands |
| | | <i>Harpalus</i> | <i>rufipalpis</i> | pine heathlands and sparse forests, sandy soils |
| | | <i>Patrobus</i> | <i>styriacus</i> | moisty habitats in karr forests |

Damselflies and Dragonflies - Zygoptera and Anisoptera

Table 13.6: List of observed Damselflies (Odonata: Zygoptera)

| genus | species |
|--------------------|-------------------|
| <i>Coenagrion</i> | <i>pulchellum</i> |
| <i>Coenagrion</i> | <i>puella</i> |
| <i>Coenagrion</i> | <i>hastulatum</i> |
| <i>Coenagrion</i> | <i>lunulatum</i> |
| <i>Coenagrion</i> | <i>armatum</i> |
| <i>Pyrrhosoma</i> | <i>nymphula</i> |
| <i>Calopteryx</i> | <i>virgo</i> |
| <i>Calopteryx</i> | <i>splendens</i> |
| <i>Platecnemis</i> | <i>pennipes</i> |
| <i>Erytromma</i> | <i>najas</i> |
| <i>Erytromma</i> | <i>viridulum</i> |
| <i>Ishnura</i> | <i>elegans</i> |
| <i>Nehallemia</i> | <i>speciosa</i> |
| <i>Lestes</i> | <i>sponsa</i> |
| <i>Lestes</i> | <i>virens</i> |

Table 13.7: List of observed Dragonflies (Odonata: Anisoptera)

| genus | species |
|---------------------|-----------------------|
| <i>Leucorrhinia</i> | <i>albifrons</i> |
| <i>Leucorrhinia</i> | <i>pectoralis</i> |
| <i>Leucorrhinia</i> | <i>dubia</i> |
| <i>Leucorrhinia</i> | <i>rubicunda</i> |
| <i>Leucorrhinia</i> | <i>caudalis</i> |
| <i>Aeshna</i> | <i>viridis</i> |
| <i>Aeshna</i> | <i>grandis</i> |
| <i>Aeshna</i> | <i>juncea</i> |
| <i>Aeshna</i> | <i>isosceles</i> |
| <i>Aeshna</i> | <i>mixta</i> |
| <i>Anax</i> | <i>parthenope</i> |
| <i>Anax</i> | <i>imperator</i> |
| <i>Brachytron</i> | <i>pratense</i> |
| <i>Libellula</i> | <i>fulva</i> |
| <i>Libellula</i> | <i>depressa</i> |
| <i>Libellula</i> | <i>quadrimaculata</i> |
| <i>Epithea</i> | <i>bimaculata</i> |
| <i>Orthetrum</i> | <i>cancellatum</i> |

Continued on next page

Table 13.7: List of observed Dragonflies (Odonata: Anisoptera)

| genus | species |
|----------------------|----------------------|
| <i>Somatochlora</i> | <i>metallica</i> |
| <i>Somatochlora</i> | <i>flavomaculata</i> |
| <i>Somatochlora</i> | <i>arctica</i> |
| <i>Cordulia</i> | <i>aenea</i> |
| <i>Gomphus</i> | <i>vulgatissimus</i> |
| <i>Ophiogomphus</i> | <i>cecilia</i> |
| <i>Onychogomphus</i> | <i>forcipatus</i> |
| <i>Sympetrum</i> | <i>vulgatum</i> |
| <i>Sympetrum</i> | <i>pedemontanum</i> |
| <i>Sympetrum</i> | <i>danae</i> |
| <i>Sympetrum</i> | <i>sanguineum</i> |

Grasshoppers - Orthoptera

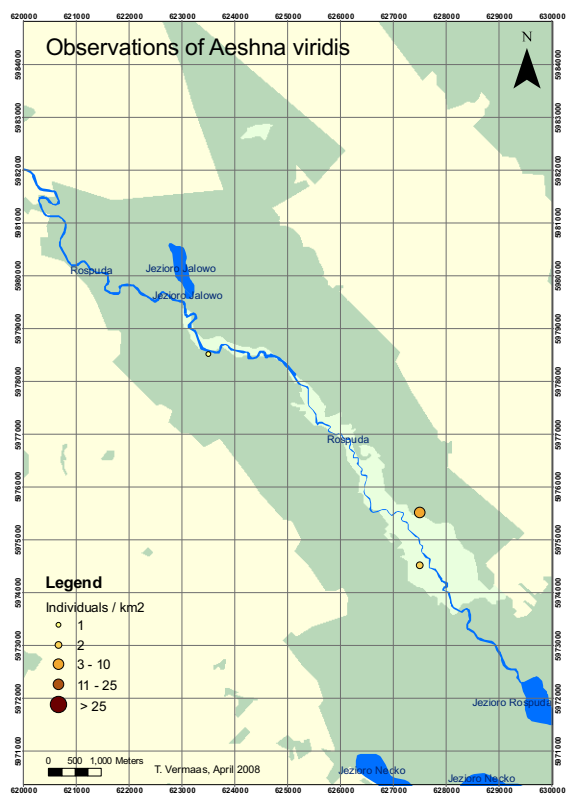
Table 13.8: List of observed Grasshoppers (Orthoptera)

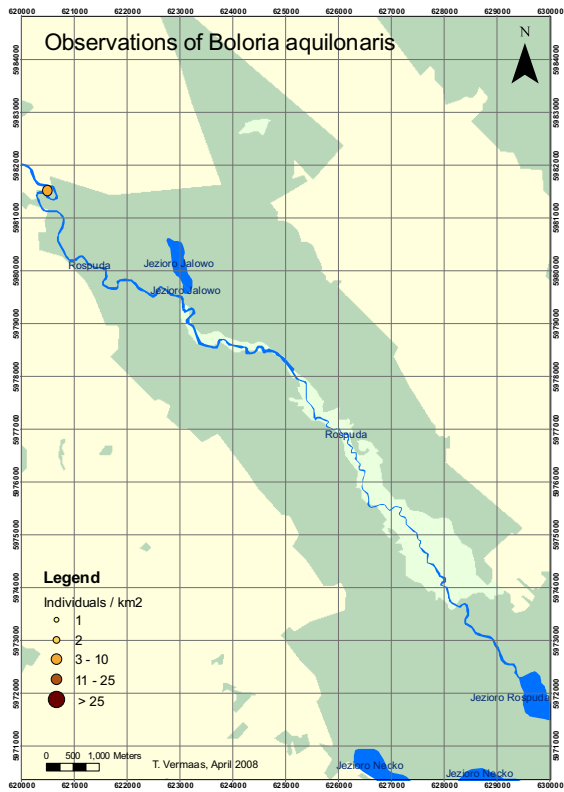
| genus | species | visit observed |
|-----------------------|---------------------|-----------------------|
| <i>Tetrix</i> | <i>subulata</i> | June |
| <i>Chorthippus</i> | <i>parallellus</i> | August |
| <i>Chorthippus</i> | <i>biguttulus</i> | August |
| <i>Chorthippus</i> | <i>apricarius</i> | August |
| <i>Chortippus</i> | <i>brunneus</i> | August |
| <i>Chortippus</i> | <i>dorsatus</i> | August |
| <i>Chortippus</i> | <i>montanus</i> | August |
| <i>Euthystira</i> | <i>brachyptera</i> | August |
| <i>Chrysochraon</i> | <i>dispar</i> | August |
| <i>Stethophyma</i> | <i>grossum</i> | August |
| <i>Decticus</i> | <i>verrucivorus</i> | August |
| <i>Metrioptera</i> | <i>bicolor</i> | August |
| <i>Myrmeleotettix</i> | <i>maculatus</i> | August |
| <i>Omocestus</i> | <i>viridulus</i> | August |
| <i>Tettigonia</i> | <i>cantans</i> | August |
| <i>Tettigonia</i> | <i>viridissima</i> | August |
| <i>Conocephalus</i> | <i>dorsalis</i> | August |

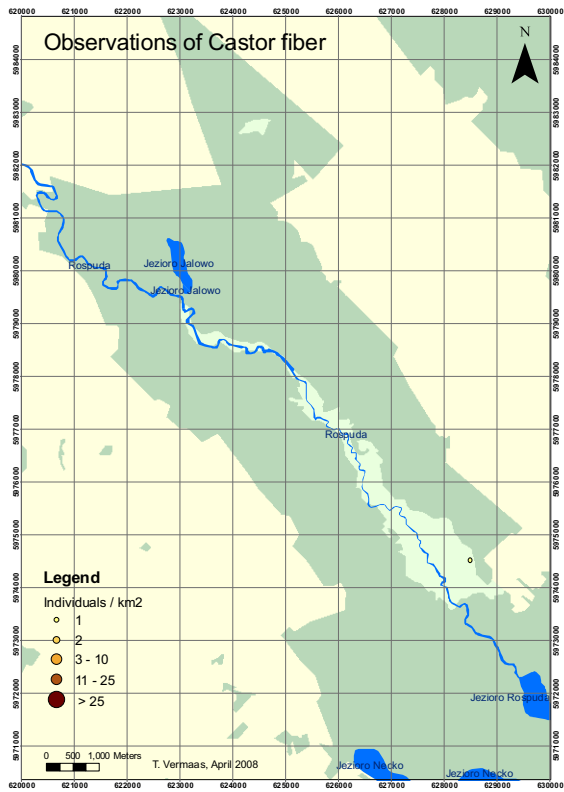
13.3 List of Authors

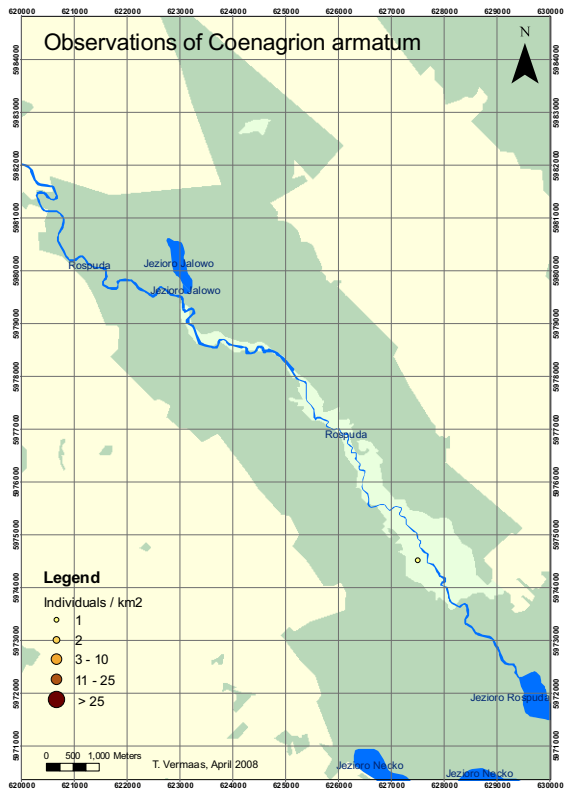
| name | e-mail |
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| André van Nieuwenhuijzen | andre at waterbeetles.org |
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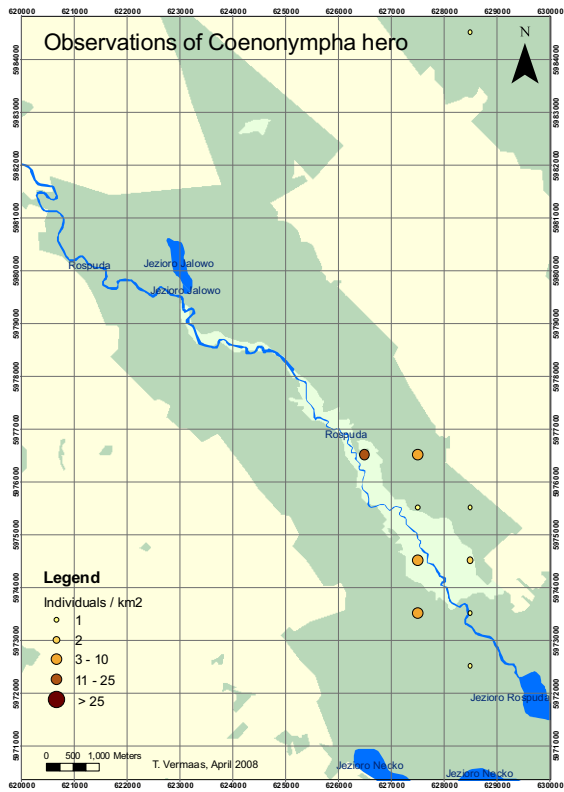
13.4 Distribution maps of species protected under the Habitats Directive

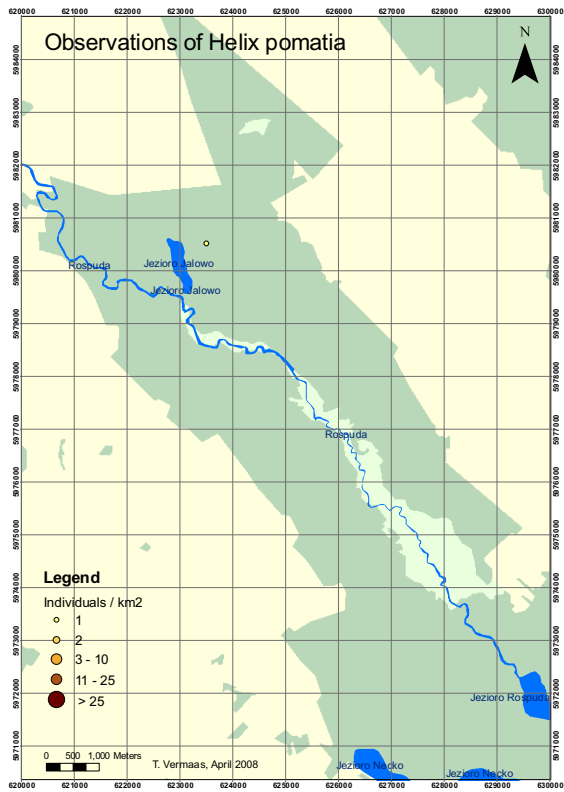


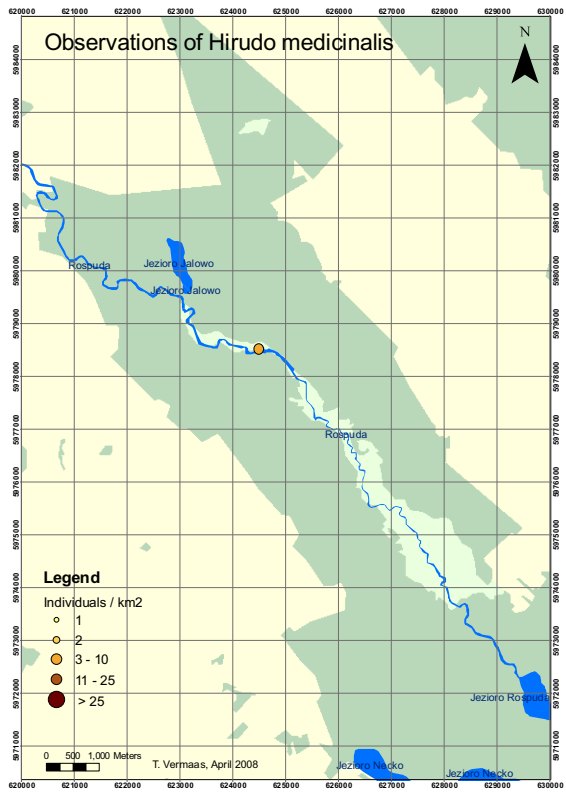


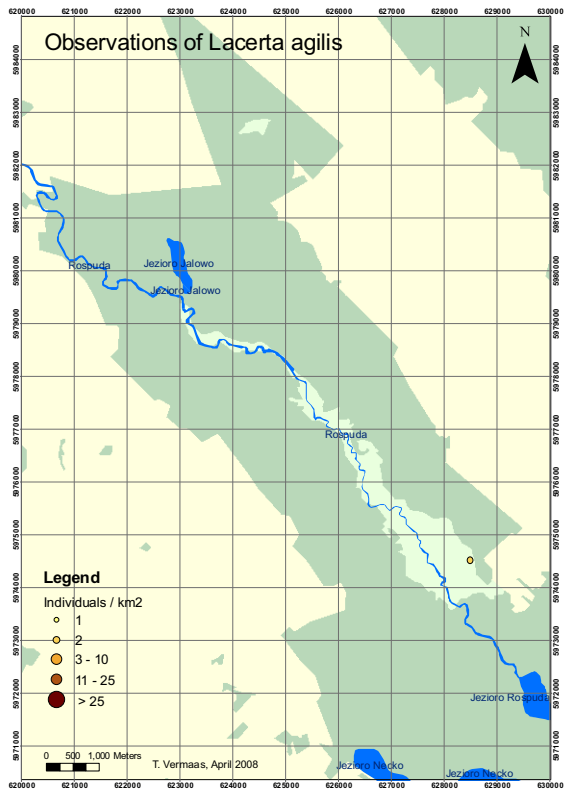


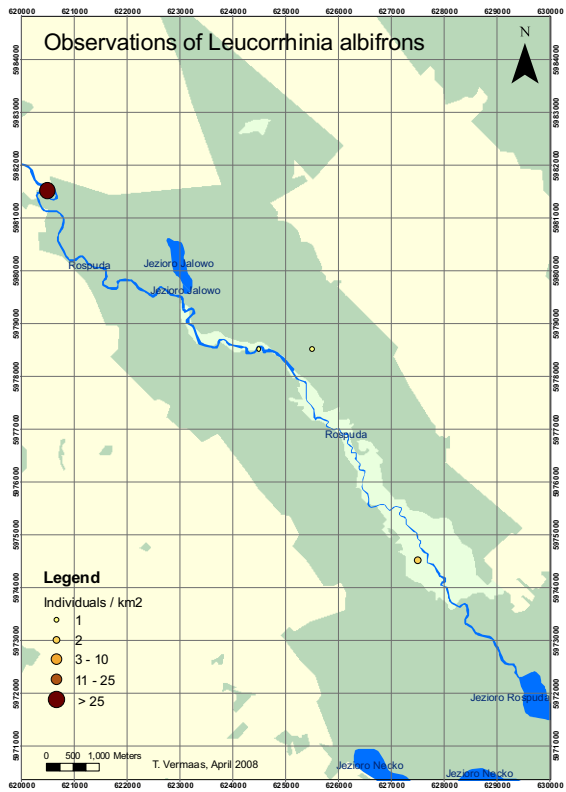


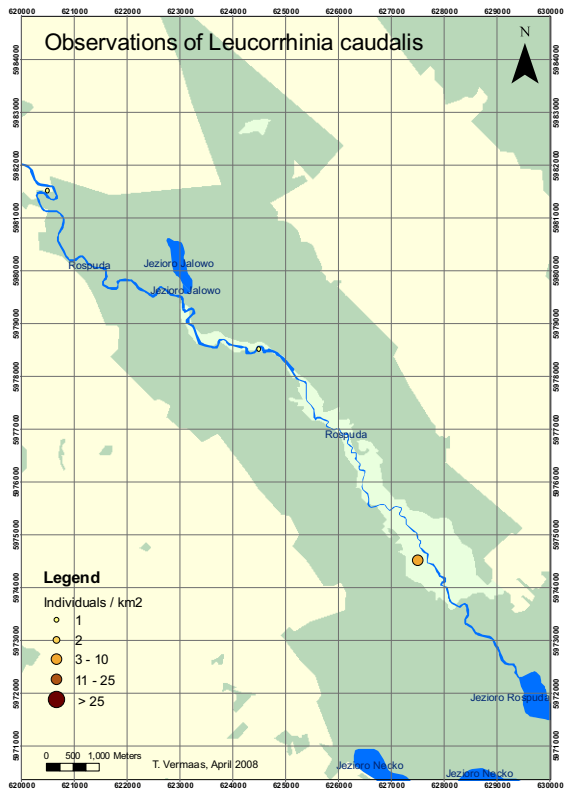


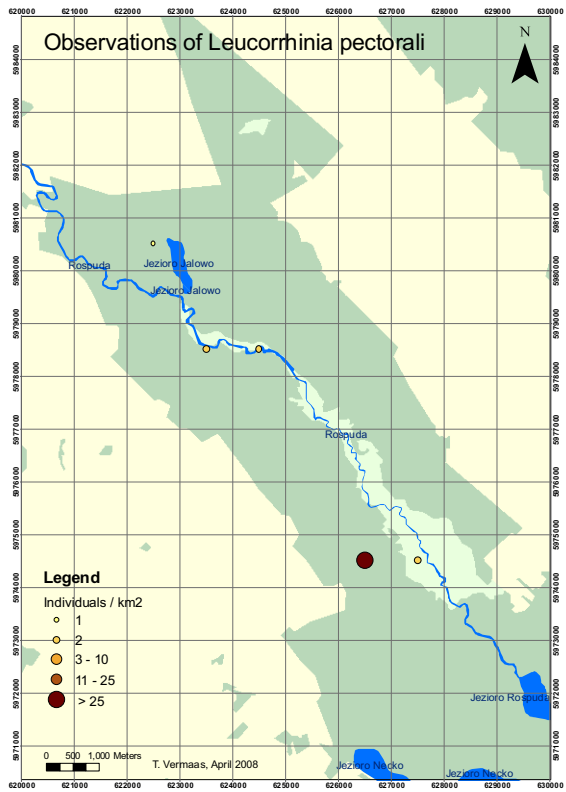


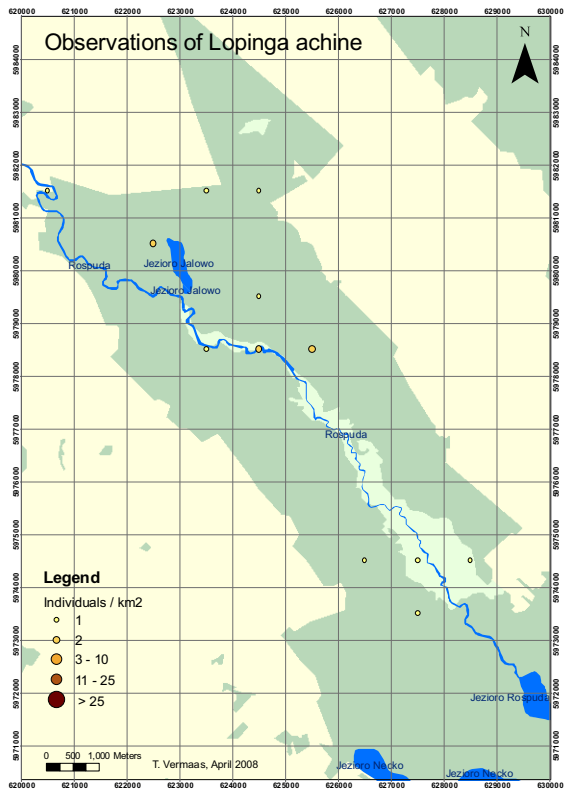


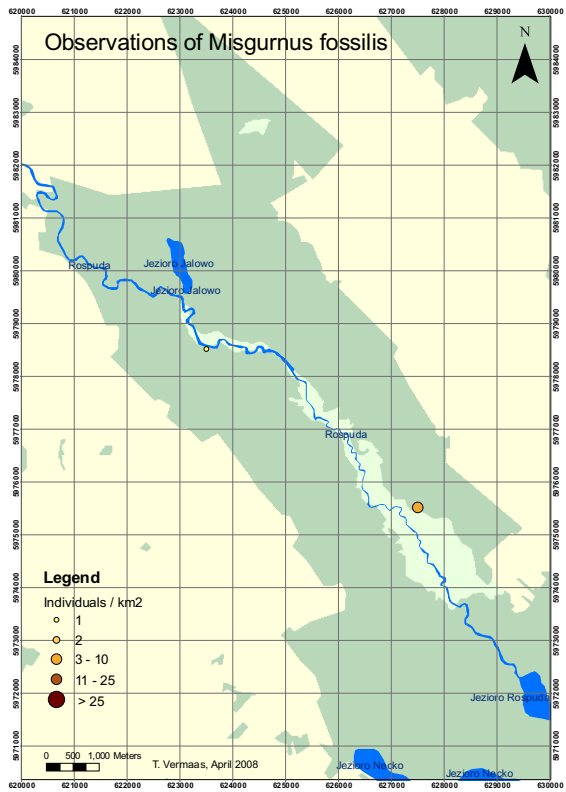


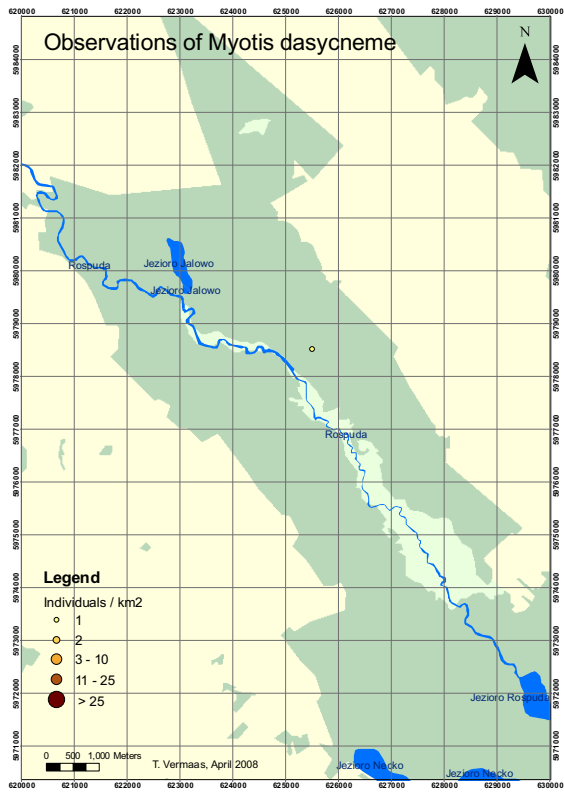




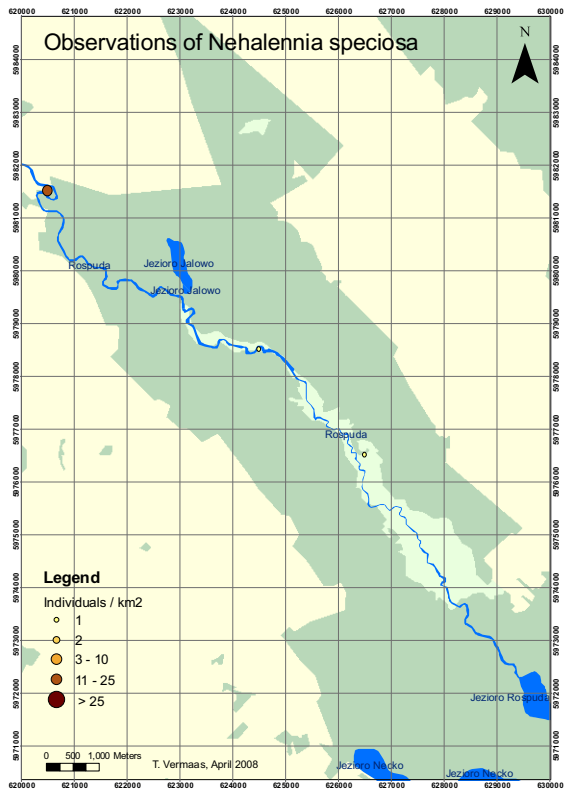


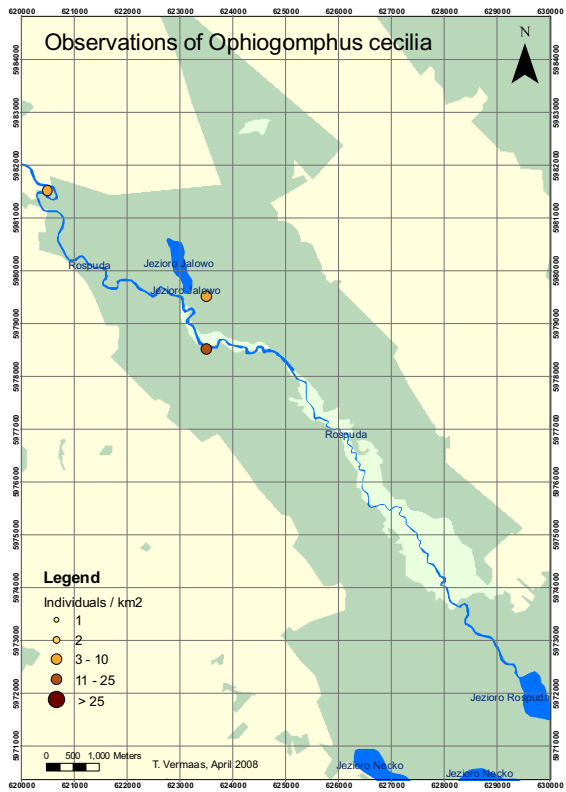


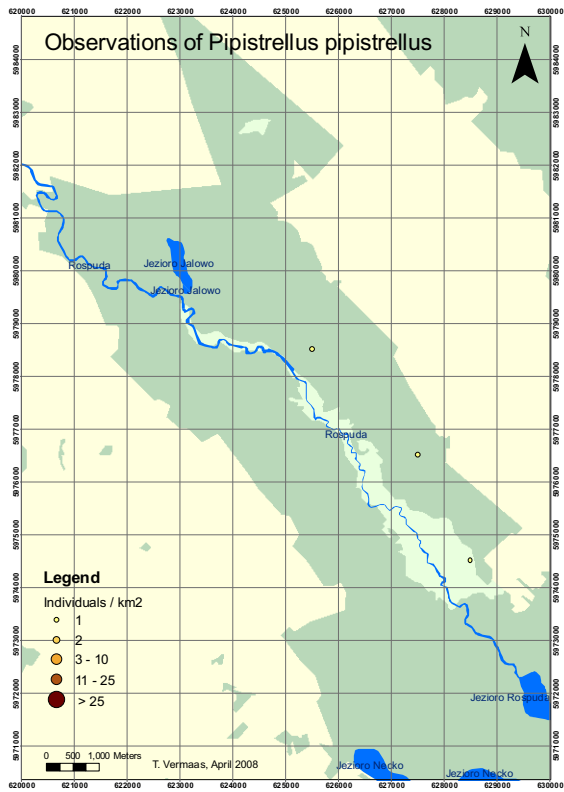




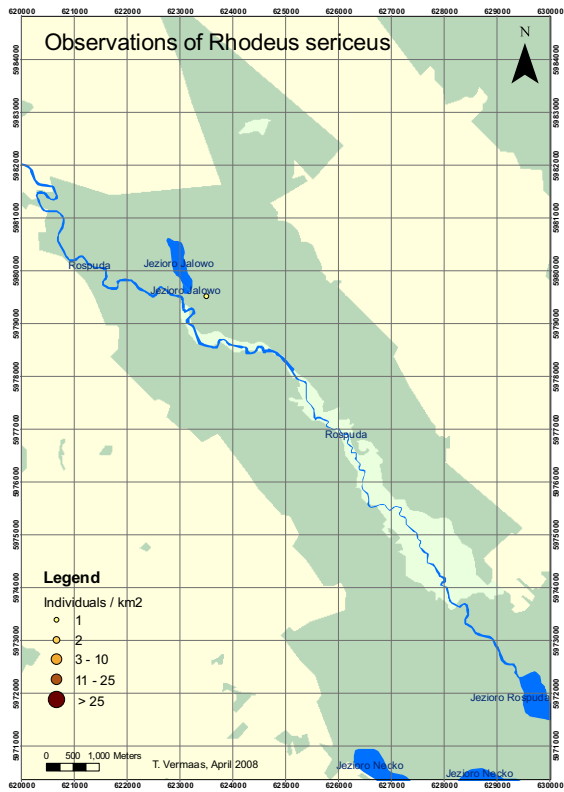


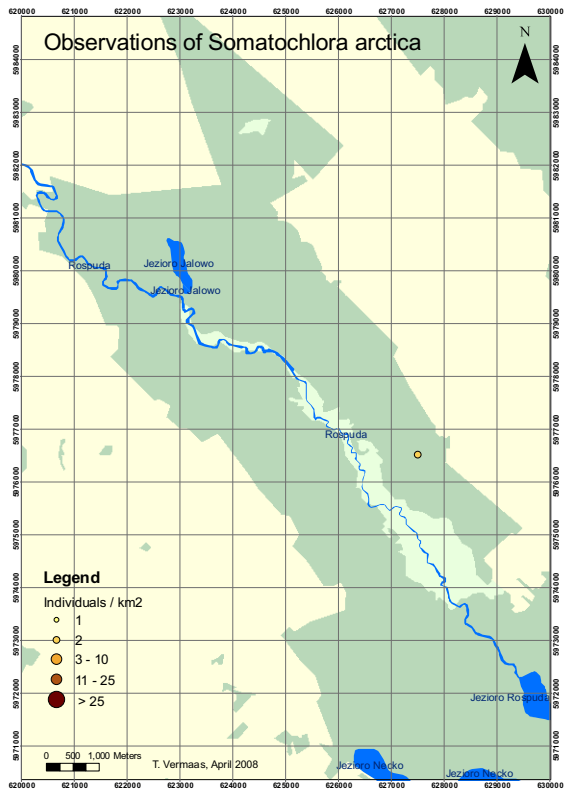


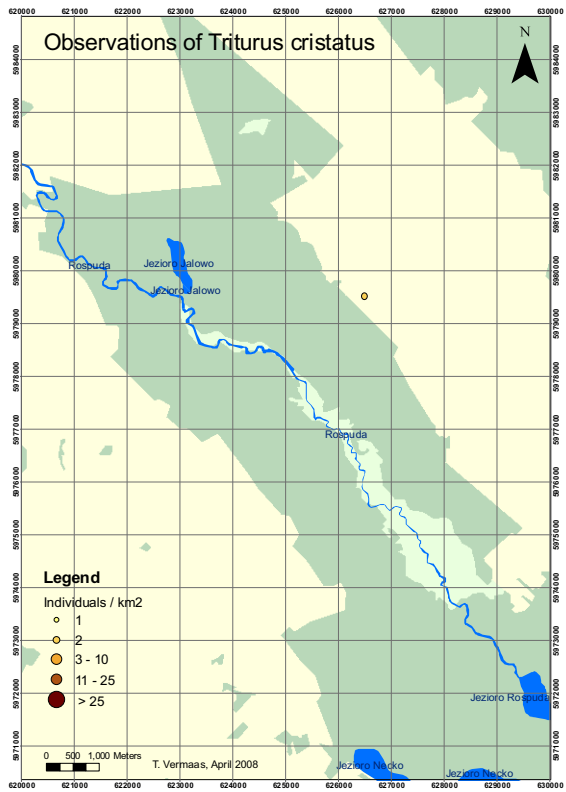


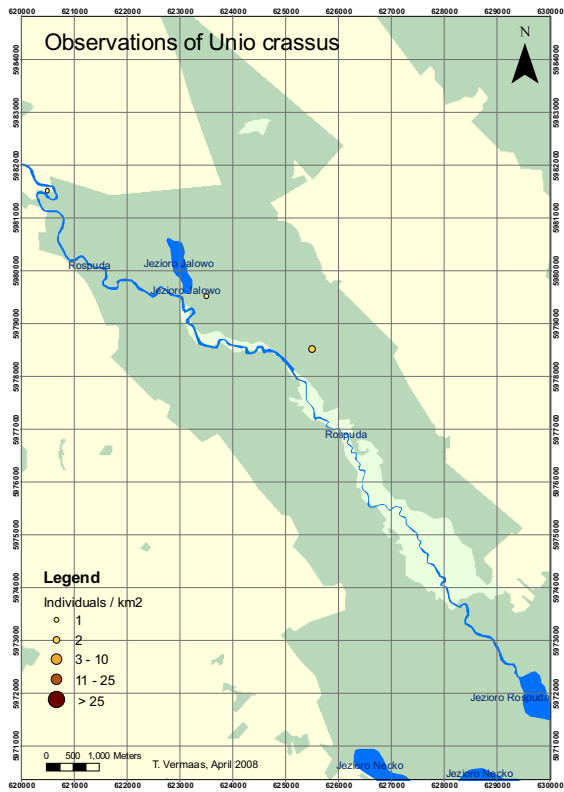












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