









PAWEŁ BUCZYŃSKI^{1*} , MAREK PRZEWOŹNY² , ROBERT ANGUS³, FRANCK BAMEUL⁴, DAVID BILTON⁵ , EDYTA BUCZYŃSKA⁶ , GARTH FOSTER⁷ , SUE L. FOSTER⁷, JOJA GEIJER⁸, RAOUL GEREND⁹, RAFAŁ GOSIK¹ , LARS HENDRICH¹⁰ , CELINA HERBIG¹¹, JONAS KÖHLER¹², ANDRES N. NILSSON¹³, KEVIN SCHEERS¹⁴ , MATT SMITH¹⁵, ADAM TARKOWSKI¹, CLIVE TURNER^{16, 17}, WILLIAM R.C. WATSON¹⁸

Beetles (Coleoptera) of wetlands and other aquatic habitats in the Polish part of the Polesie region found during the Balfour-Browne Club Meeting 2016

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¹ Department of Zoology, Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland, e-mail: pawbucz@gmail.com, cossonus@gmail.com, tarkowski890@gmail.com

² Department of Systematic Zoology, Adam Mickiewicz University, Umultowska 89, 61-614 Poznań, Poland, e-mail: hygrotus@amu.edu.pl

³ 58 Middle Hill, Egham, Surrey TW20 0JJ, England, UK, e-mail: R.Angus@rhul.ac.uk

⁴ 124 avenue des Pyrénées F-33140 Villenave-d'Ornon, France, e-mail: fbameul@wanadoo.fr

⁵ Marine Biology and Ecology Research Centre, School of Biological and Marine Sciences, University of Plymouth, Drake Circus, Plymouth, Devon, PL4 8AA, e-mail: d.bilton@plymouth.ac.uk

⁶ Department of Zoology and Animal Ecology, University of Life Sciences in Lublin, Akademicka 13, 20-033 Lublin, Poland, e-mail: edyta.buczynska@gmail.com

⁷ The Aquatic Coleoptera Conservation Trust, 3 Eglinton Terrace, Ayr KA7 1JJ, Scotland, UK, e-mail: latissimus@btinternet.com

⁸ Arby 151, 38894 Vassmolösa, Sweden, e-mail: jojageijer@hotmail.com

⁹ Museum of Natural History, 25 re Munster, 2160 Luxembourg, e-mail: raedwulf68@gmail.com

¹⁰ Bavarian State Collection of Zoology, Münchhausenstraße 21, 81247 Munich, Germany, e-mail: hendrich@snsb.de

¹¹ Rochusstraße 82, 53123 Bonn, Germany

¹² Institute for Integrated Natural Sciences, University of Landau, Universitätsstraße 1 56070 Koblenz, Germany, e-mail: jonas.koehler@online.de

¹³ Mullsjö 258, SE-91490 Nordmaling, Sweden, e-mail: andersnnilsson258@gmail.com

¹⁴ Research Institute for Nature and Forest, Havenlaan 88, bus 73, 1000 Brussels, Belgium, e-mail: aquatic.adephaga@gmail.com

¹⁵ Bees, Wasps & Ants Recording Society, 121 Wood Lane, Newhall, Swadlincote, Derbyshire DE11 0LX, England, UK, e-mail: matsmith1@compuserve.com

¹⁶ Coleoptera Section, Department of Life Sciences, Natural History Museum, London, SW7 5BD, England, UK, e-mail: clive.turner@excite.com

¹⁷ Plymouth Marine Laboratory, Prospect Place, The Hoe, Plymouth, PL1 3DH, England, UK

¹⁸ Rose Cottage, Docklow Manor, Leominster, Herefordshire HR6 0RX, England, UK, e-mail: w.r.c.watson@btinternet.com

Abstract: A total of 27 sites in the Polish part of the Polesie region were investigated for aquatic and wetland-associated beetles during the field sessions of the Balfour-Browne Club

Meeting (23-30.05.2016). These comprised a mixture of fens and *Sphagnum* peat bogs, ditches draining fens, oxbow lakes of the Bug River, and sand excavations. A total of 408 species, belonging to all three sub-orders of beetle and 34 families were captured, including 351 species related to the aquatic environment (true water beetles – 157, phytophilous water beetles – 32, facultative water beetles – 1, false water beetles – 156, shore beetles – 157). Numerous rare, protected, species and those endangered in Poland or neighbouring countries were found. Information on three species (*Agabus pseudoclypealis*, *Hygrotus polonicus* and *Berosus geminus*) is important for our understanding of their geographical range limits. In the case of *B. geminus*, new data, in conjunction with information from Ukraine, points to the existence of an isolated island of occupancy in Polish and Ukrainian Polesie. Analysis of the material collected also reveals the high value of the study area, both nationally and internationally, for the protection of wetland beetle biodiversity.

Key words: Poland, Polesie, beetles, Coleoptera, aquatic habitats, wetlands, faunistics, records, biodiversity, rare species, threatened species.

INTRODUCTION

Balfour-Browne Club Meetings (BBCMs) are organised annually in different, environmentally interesting regions of the world – as shared scientific expeditions aimed at gaining an insight into the environment of a given area through intensive collection of beetles (particularly aquatic taxa). Not surprisingly, they result in quantitatively and qualitatively rich collections of the insects, often making a substantial contribution to knowledge on the distribution and ecology of a wide range of species.

In 2016, the BBCM was held in central-eastern Poland. The collective results are presented below. The studied region is very interesting for many reasons, at least two deserving particular attention. Firstly, it is located on the geographic border between West and East Europe, i.e. on the boundary of the North European Plain and East Baltic-Belarusian Lowland. Secondly, it is amongst the parts of Poland and the European Union that is least degraded by human activity (KONDRACKI 2002, HERBICH 2004). Nevertheless, the occurrence of water beetles has not been investigated systematically in this region. The last decade of the 20th century has seen an increase in the amount of recording, but research needs remain substantial today (BUCZYŃSKI & PRZEWOŹNY 2006). Data from the area are important for the assessment of its role as a haven of biological diversity of European importance. They are also important for our understanding of the size and structure of geographical ranges of many species of beetles, particularly given the region's position.

MATERIAL AND METHODS

Study area and research sites

The study area (50°45'44" – 51°29'11" N, 23°06'25" – 24°04'24" E) covered central-eastern Poland in the Lublin District (Universal Transverse Mercator wg84, 10x10 square km grids: FB49, 77, 79, 86, 88, 96, 97, FC70, KS92, 94). A total of 27 sites were analysed (Fig. 1):

1. Gotówka (reserve Bagno Serebryskie) (N 51°10'22", E 23°32'03", UTM FB 77), fen with peat diggings.
2. Gotówka (N 51°10'57", E 23°33'17", UTM FB 77), peat excavation in a fen.
3. Ignatów-Kolonia (N 51°08'19", E 23°36'23", UTM FB 86), drainage canal.

4. Olenówka (N 51°08'49", E 23°36'53", UTM FB 86), fen.
5. Olenówka (N 51°08'50", E 23°36'53", UTM FB 86), drainage canal at fen (4).
6. Olenówka (N 51°08'50", E 23°37'01", UTM FB 86), puddle in a dirt-track.
7. Kolonia Brzeźno (N 51°08'58", E 23°37'46", UTM FB 86), fen.
8. Olenówka (N 51°08'39", E 23°37'58", UTM FB 86), fen with peat diggings.
9. Pławanice-Las (N 51°07'45", E 23°40'56", UTM FB 86), fen.
10. Roskosz (reserve Roskosz) (N 51°08'19", E 23°40'58", UTM FB 86), fen.
11. Garbatówka (N 51°21'55", E 23°06'25", UTM FB 49), fen with peat digging.
12. Bukowski Las (N 51°23'18", E 23°27'59", UTM FB 79), transitional peat bog with permanent water bodies.
13. Bukowski Las (N 51°23'43", E 23°28'12", UTM FB 79), drainage ditch in a forest.
14. Okuninka (N 51°29'11", E 23°30'59", UTM FC 70), transitional peat bog.
15. Bytyń (N 51°20'45", E 23°38'33", UTM FC 70), oxbow of the River Bug.
16. Bytyń (N 51°20'24", E 23°38'49", UTM FC 70), oxbow of the River Bug.
17. Bytyń (N 51°20'26", E 23°38'11", UTM FC 70), oxbow of the River Bug.
18. Bytyń (N 51°20'11", E 23°38'24", UTM FC 70), oxbow of the River Bug.
19. Hniszów (N 51°15'58", E 23°42'25", UTM FB 88), oxbow of the River Bug.
20. Stare Okopy (N 51°11'32", E 23°45'44", UTM FB 97), oxbow of the River Bug.
21. Dorohusk-Osada (N 51°10'12", E 23°48'08", UTM FB 97), oxbow of the River Bug.
22. Dorohusk-Osada (N 51°10'13", E 23°48'25", UTM FB 97), oxbow of the River Bug.
23. Dorohusk (N 51°09'36", E 23°49'26", UTM FB 97), oxbow of the River Bug.
24. Dorohusk (N 51°08'57", E 23°48'23", UTM FB 97), sand excavation.
25. Turka (N 51°08'35", E 23°48'59", UTM FB 96), sand excavation.
26. Janki (N 50°52'59", E 24°04'24", UTM KS 94), fen.
27. Ślipcze near Czumów (N 50°45'44", E 24°01'19", UTM KS 92), temporary small water body.

The aforementioned sites were located in Polesie Wołyńskie (Nos. 1-10, 19-27) and West Polesie (Nos. 11-18). Both macroregions are on the western boundary of the East Baltic-Belarusian Lowland, with Polesie within its range (KONDRACKI 2002).

Polesie (Palesse, Polissya) is an extensive plain in the catchment of the Rivers Prypeć (Pripyat') and Bug, on the border of Poland, Ukraine, Belarus and Russia. Numerous rivers occur here, and among wetlands – locally somewhat higher moraine and fluvio-glacial plains and stabilised dunes. Groundwaters help the development of shallow lakes and extensive wetlands. Together with the accompanying peat bog complexes, such habitats once occupied almost half of the region. Today, they have been subject to amelioration in many areas. Vegetation is rich in glacial relics as well as riparian and alder forests. Elevated areas are overgrown by pine forests and mixed forests. Polesie Wołyńskie is distinguished by the presence of numerous low hills of Cretaceous marls and Tertiary sandstones, frequently with considerable height (up to 240-260 m a.s.l.). In West Polesie such features are scarcer, but Cretaceous bedrock is equally common here, underlying a part of the fens – including site No. 11 here. Karst phenomena are frequent in this region, related to the formation of numerous closed-drainage depressions and lakes (CHMIELEWSKI 1997, KONDRACKI 2002).

According to the Catalogue of Polish fauna (BURAKOWSKI *et al.* 1976), the sites studied were located in two faunistic regions: on the Lublin Upland (Nos. 1-13, 15-27) and in Podlasie (No. 14).

The research in 2016 covered three types of habitats and landscape (CHMIELEWSKI 1997, DOMBROWSKI *et al.* 2002, KONDRACKI 2002, WILK *et al.* 2010):

– carbonate fens near Chełm (sites Nos. 1-10) – in the undulating landscape of the Chełm Hills, fens developed in the spring zones of small rivers and in karst depressions, fed by precipitation and waters flowing from the surrounding hills. Their peat deposits contain very high amounts of calcium carbonate. The study also investigated canals draining these fens;

– fens and transitional peat bogs on the plains of the Łęczna-Włodawa Lakeland (sites Nos. 11-14), located in former lake basins filled with peat deposits;

– valley of the River Bug (sites Nos. 15-27) – one of the last unregulated large rivers of the European Union. This slow-flowing, meandering, annually flooding river has formed a valley in sandy and loess formations with a width of up to 10 km, with a flood terrace with a width of up to 5 km, rich in small water bodies and oxbows, and locally also fens. The study covered oxbow lakes at different stages of succession, and sand excavations. The River Bug itself was not sampled, as it was almost dry at the time, with the steep banks making access to the river practically impossible.

According to the Institute of Meteorology and Water Management – National Research Institute (<http://klimat.pogodynka.pl>), in the study area, mean multiannual air temperature from the period 1971-2000 was 7-8 °C, and precipitation total was 500-600 mm. The climate of the area is strongly continental. Annual amplitudes of mean air temperatures are high (21-21.5 °C), summer is long and warm, and winters are long and severe. Moreover, the study area is characterised by one of the highest number of sunny days per annum recorded in Poland (OKOŁOWICZ & MARTYN 1999), something which has intensified in recent years (<http://klimat.pogodynka.pl>).

FIELD STUDIES

The research was conducted on 23-30.05.2016. The study area was visited by a number of sampling teams, each composed of several persons. At each site visited, all available microhabitats inhabited by water beetles were systematically investigated, with sampling typically finishing when no further new species could be found.

The primary research method was collection of qualitative samples, using a hand net. At some of the sites (Nos. 7, 15, 17, 19, 21-23), bottle traps were also set for a period of several days (2-5 per site). At the margins of water bodies, beetles were captured by means of an entomological net or scoop. Larvae were also sought in water and on near-shore plants.

Beetles were preserved in ethyl alcohol for laboratory analyses. Species which are possible to identify in the field, particularly those protected and/or captured in nature reserves, were released to the environment after recording their presence and in some cases the number of captured individuals. The material collected comprises 14,598 specimens and 285 observations of occurrence of particular species. Collected specimens remain in the reference collections of the authors.

RESULTS

A total of 408 species were recorded from three sub-orders and 34 families; a small part of the material (larvae and females of some species) were identified only to genus. Due to some

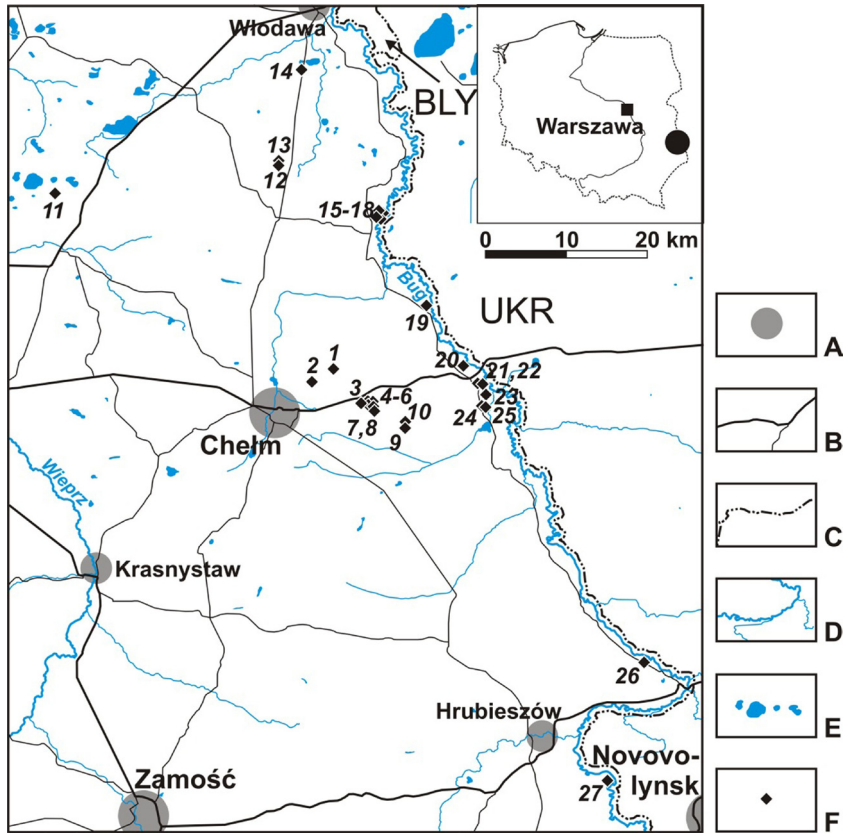


Fig. 1. Study area and research sites. A – large cities, B – main roads, C – national borders, D – rivers, E – larger lakes and ponds, F – sites sampled (numbered as in text), BLY – Belarus, UKR – Ukraine.

Ryc. 1. Teren badań i stanowiska. A – największe miasta, B – główne drogi, C – granice państwowe, D – rzeki, E – większe jeziora i stawy, F – stanowiska (numeracja jak w tekście), BLY – Białoruś, UKR – Ukraina.

doubts about the diagnostic features available in the literature, the species recently isolated from *Hydrobius fuscipes* (L.) sensu lato (see FOSSEN *et al.* 2016) were given a question mark.

Information on the occurrence of the collected species is presented in Table 1.¹

In carbonate fens near Chełm, 221 species of beetles were recorded, in the Łęczna-Włodawa Lakeland – 143, and in the valley of the River Bug – 287. The low number of species from the Łęczna-Włodawa Lakeland largely results from the relatively small number analysed sites. The species richness of particular sites was about the same everywhere: in the first of the analysed areas, 9-114 species were reported (mean = 57), in the second one – 4-127 (mean = 58), and in the third one – 11-121 (mean = 54).

Taking into consideration the division of the study area into faunistic regions, a total of 405 species were recorded from the Lublin Upland, and 66 species at the only site in Podlasie (No. 14).

¹ The classification of sub-orders and families as well as species nomenclature were adopted after the catalogue of the beetles of the Palearctic (LÖBL & SMETANA 2003, 2007, 2008, 2010, 2011, 2013, LÖBL & LÖBL 2015, 2016), with further supplementations and updates for family Dytiscidae (NILSSON & HÁJEK 2019) and superfamily Hydrophiloidea (PRZEWOŹNY 2019). Genera and species within families are ordered alphabetically.

Table 1. Beetles recorded in June 2016 in central-eastern Poland during the BBCM. W – associations with aquatic habitats (“twb” – true water beetles, “fwb” – false water beetles, “pwb” – phytophilous water beetles, “cwb” – facultative water beetles, “sb” – shore beetles, “_” – no association; cf. JACH 1998), N – number of specimens collected (“o” – observation only). The numbering of sites follows text and Fig. 1. Pl-Pr – protected by law in Poland, Pl-rs – rare in Poland, Pl-RI – on Polish Red List, Ge-RI – on German Red List, Cz-RI – on Czech Red List, Rl-Sl – on Slovakian Red List, IUCN – on IUCN Red List. Abbreviations: vrm – very rare, rm – rare, loc – local, EX (=0) – extinct, RE – regionally extinct, CR (=1) – critically endangered, EN (=2) – endangered, VU (=3) – vulnerable, NT – near threatened, DD (=D) – data deficient, LR:cd – lower risk: conservation dependent, V – early warning, R – extremely rare.

Tabela 1. Chrząszcze stwierdzone w czerwcu 2016 r. w Polsce środkowo-wschodniej podczas BBCM. W – powiązania ze środowiskiem wodnym („twb” – właściwe chrząszcze wodne, „fwb” – fałszywe chrząszcze wodne, „pwb” – fitofilne chrząszcze wodne, „cwb” – fakultatywne chrząszcze wodne, „sb” – chrząszcze nabrzeżne, „_” – brak powiązań; patrz JACH 1998), N – liczba zebranych osobników („o” – tylko obserwacje). Numeracja stanowisk jak w tekście i na Ryc. 1. Skróty: vrm – bardzo rzadki, rm – rzadki, loc – lokalny, EX (=0) – wymarły, RE – regionalnie wymarły, CR (=1) – krytycznie zagrożony, EN (=2) – silnie zagrożony, VU (=3) – zagrożony, NT – bliski zagrożenia, DD (=D) – dane niewystarczające, LR_cd – niskie ryzyko: zależność od ochrony, V – wczesne ostrzeżenie, R – skrajnie rzadki.

Species	W	N	Sites	Pl-Pr	Pl-rs	Pl-RI	Ge-RI	Cz-RI	Sl-RI	IUCN
Subordo: Myxophaga										
Familia: Sphaeriusidae										
<i>Sphaerius acaroides</i> WALTL	sb	35	4, 8, 25				V			
Subordo: Adephaga										
Familia: Gyrimidae										
<i>Gyrinus caspius</i> MÉN.	twb	1	18		rm	EN	R			
<i>G. substriatus</i> STEPH.	twb	2	4, 10							
Familia: Halipidae										
<i>Halipus flavicollis</i> STURM	twb	1	25							
<i>H. fluvitilis</i> AUBÉ	twb	3	23, 25							
<i>H. fulvicollis</i> ER.	twb	52	4, 9, 12, 16		rm	VU	1	CR		
<i>H. fulvus</i> (FABR.)	twb	1	8		rm		V	VU		
<i>H. fuscatus</i> SEIDL.	twb	162	1, 4, 8-10, 12, 15, 16, 26		rm	VU	2	CR	VU	
<i>H. heydeni</i> WEHN.	twb	16	4, 5							
<i>H. immaculatus</i> GERH.	twb	2	23		rm					
<i>H. ruficollis</i> (DE G.)	twb	74	1, 2, 4, 8, 9, 11, 12, 15-19, 22, 23, 25							
<i>H. sibiricus</i> MOTSCH.	twb	2	3							

Species	W	N	Sites	Pl-Pr	Pl-rs	Pl-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>H. variegatus</i> STURM	twb	9	1, 2, 4, 8-11, 18		rm	NT	2	CR		
<i>Haliplus</i> sp. (larvae)	twb	3	4							
<i>Pelodytes caesus</i> (DUFT.)	twb	11	3, 4, 17, 25							
Familia: Noteridae										
<i>Noterus clavicornis</i> (DE G.)	twb	7	4, 16, 17, 23, 25							
<i>N. crassicornis</i> (MÜLL.)	twb	179	2-5, 7, 8, 10-12, 14-21							
Familia: Dytiscidae										
<i>Acilius canaliculatus</i> (NIC.)	twb	20	7, 15, 17, 23							
<i>Agabus affinis</i> (PAYK.)	twb	48	12, 14				V			
<i>A. biguttulus</i> (THOMS.)	twb	3	12, 14							
<i>A. bipustulatus</i> (L.)	twb	1+0	3, 26							
<i>A. clypealis</i> (THOMS.)	twb	8	3, 9		rm	VU	R			EN
<i>A. congener</i> (THUNB.)	twb	8	12, 13							
<i>A. fuscipennis</i> (PAYK.)	twb	24	3, 9, 12, 15, 17				2	CR	LR:CD	
<i>A. paludosus</i> (FABR.)	twb	5	3							
<i>A. pseudoclypealis</i> SCHOLZ	twb	66	3		rm					
<i>A. sturmi</i> (GYLL.)	twb	0	26							
<i>A. uliginosus</i> (L.)	twb	337	3, 9, 10, 12, 15, 17							
<i>A. undulatus</i> (SCHR.)	twb	48	3, 4, 9, 12, 15-18, 20, 23, 25							
<i>A. unguicularis</i> (THOMS.)	twb	30	1, 4, 5, 7, 8, 12				3			
<i>Bidessus grossepunctatus</i> VORBR.	twb	84	1, 2, 4, 5, 7-12, 14				3	CR		
<i>B. unistriatus</i> (SCHR.)	twb	16	2, 4, 8-10, 16, 17					EN		
<i>Bidessus</i> sp. (larvae)	twb	4	4							
<i>Clemmis decoratus</i> (GYLL.)	twb	334	1, 2, 4, 5, 7-12, 14-17, 22, 26							
<i>Colymbetes fuscus</i> (L.)	twb	221	1, 17, 19, 20, 22, 23, 25							

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>C. striatus</i> (L.)	twb	50	17, 19, 21-23				V	CR		
<i>Cybister lateralmarginalis</i> (DE G.)	twb	156	10, 11, 15, 17-23, 25, 26					CR		
<i>Dytiscus circumcinctus</i> L.	twb	724	7, 17, 19, 21-23				V	NT		
<i>D. dimidiatus</i> BERGSTR.	twb	53	3, 7, 11, 18-23							
<i>D. marginalis</i> L.	twb	53	15, 17, 21, 22, 25							
<i>Graphoderus austriacus</i> (STURM)	twb	24	15, 17, 19, 22		rm				VU	
<i>G. bilineatus</i> (DE G.)	twb	24	7, 17-23	+			3	CR	VU	VU
<i>G. cinereus</i> (L.)	twb	31	1, 4, 5, 7, 10-12, 14, 15, 17-23						VU	
<i>G. zonatus</i> (HOPPE)	twb	5	12, 15, 17				3	NT	VU	
<i>Graptodytes bilineatus</i> (STURM)	twb	66	1, 4, 9, 15				3	NT		
<i>G. granularis</i> (L.)	twb	129	1-5, 7-12, 16, 26					NT		
<i>G. pictus</i> (FABR.)	twb	3	4							
<i>Hydaricus continentalis</i> BALF.-BROWNE	twb	148	15, 17-19, 21-23					NT		
<i>H. seminiger</i> (DE G.)	twb	93	1, 3, 7, 9-12, 14, 15, 17-19, 23, 26							
<i>H. transversalis</i> (PONT.)	twb	402	1, 2, 4, 7-9, 11, 12, 15-23, 26							
<i>Hydroglyphus geminus</i> (FABR.)	twb	7	6, 24, 25							
<i>Hydroporus angustatus</i> STURM	twb	130	1-5, 7-12, 14, 18, 20, 26							
<i>H. dorsalis</i> (FABR.)	twb	17	1, 7, 10, 12, 18				D			
<i>H. elongatulus</i> STURM	twb	30	1, 5, 7-9, 11, 12			VU	2	RE		
<i>H. erythrocephalus</i> (L.)	twb	12	5, 8, 11, 12, 14, 15							
<i>H. figuratus</i> (GYLL.)	twb	1	9				D			
<i>H. fuscipennis</i> SCHAUM	twb	32	1, 3, 4, 7, 8, 9, 10, 26				2	CR		
<i>H. glabriusculus</i> AUBÉ	twb	11	1				1			
<i>H. incognitus</i> SHARP	twb	3	4, 10, 23		rm					
<i>H. melanarius</i> STURM	twb	1	12							
<i>H. neglectus</i> SCHAUM	twb	23	1, 4, 9, 12							

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>H. notatus</i> STURM	twb	6	1, 7, 8, 11				1	RE		
<i>H. obscurus</i> STURM	twb	30	12, 14				V			
<i>H. palustris</i> (L.)	twb	9	3, 11, 20, 26							
<i>H. planus</i> (FABR.)	twb	11	3-5, 9, 10, 25							
<i>H. pubescens</i> (GYLL.)	twb	12	3, 9, 10							
<i>H. rufifrons</i> (MÜLL.)	twb	21	9-11, 13, 17, 18				2	EN		
<i>H. scaberrimus</i> STEPH.	twb	117	4, 5, 7-9, 11, 12				2	CR	VU	
<i>H. striola</i> (GYLL.)	twb	81	1, 2, 4, 5, 9, 10, 12							
<i>H. tristis</i> (PANK.)	twb	259	1, 2, 4, 5, 9, 10, 12, 14, 15							
<i>H. umbrosus</i> (GYLL.)	twb	122	1, 2, 4, 5, 7-12, 14							
<i>Hydrovatus cuspidatus</i> (KUNZE)	twb	8	2, 4, 5, 10		rm			EN		
<i>Hygrotus impressopunctatus</i> (SCHALL.)	twb	49	1, 3-5, 8-10, 12, 15-18, 25, 26							
<i>H. inaequalis</i> (FABR.)	twb	52	2-5, 7-10, 12, 15-18, 22, 23, 25, 26							
<i>H. polonicus</i> (AUBÉ)	twb	2	25							
<i>H. versicolor</i> (SCHALL.)	twb	67	17, 20, 23, 25							
<i>Hyphydrus ovatus</i> (L.)	twb	34	1, 4, 10, 12, 15, 17, 18, 20, 22, 23, 25							
<i>Ilybius aenescens</i> THOMS.	twb	17	12, 14				V			
<i>I. ater</i> (DE G.)	twb	34	3-5, 9, 11, 12, 14, 15, 17, 18, 26							
<i>I. chalconatus</i> (PANZ.)	twb	9	3							
<i>I. erichsoni</i> (GERM. et HAR.)	twb	2	3							
<i>I. fenestratus</i> (FABR.)	twb	45	1, 17, 18, 20, 23, 25							
<i>I. fuliginosus</i> (FABR.)	twb	1+0	3, 12							
<i>I. guttiger</i> (GYLL.)	twb	27	1, 4, 5, 9, 12, 14				V			
<i>I. neglectus</i> (ER.)	twb	20	3, 15, 17, 18, 23, 26					NT		
<i>I. quadriguttatus</i> (LACORD.)	twb	31	1, 3-5, 7, 9, 10, 12, 15, 26							
<i>I. subaeneus</i> ER.	twb	1	22							

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>I. subtilis</i> (ER.)	twb	6	9, 13, 14					NT		
<i>Laccophilus hyalinus</i> (DE G.)	twb	18	17, 25							
<i>L. minutus</i> (L.)	twb	11	23, 25							
<i>L. poecilus</i> KLUG	twb	12	2, 11, 12, 23, 25					VU		
<i>Laccornis oblongus</i> (STEPH.)	twb	27	1, 4, 5, 7-9, 11				3	CR	VU	
<i>Liopterus haemorrhoidalis</i> (FABR.)	twb	118	1-5, 7-12, 14-18, 20							
<i>Nebriporus airumilus</i> (KOL.)	twb	2	25							
<i>N. depressus</i> (FABR.)	twb	11	25							
<i>Platambus maculatus</i> (L.)	twb	1	4							
<i>Porhydrus lineatus</i> (FABR.)	twb	48	2, 5, 9, 11, 12, 15, 16, 18, 20, 23, 26							
<i>Rhantus bistrictus</i> (BERGSTR.)	twb	19	3, 9, 15, 17, 23				3			
<i>R. exsoletus</i> (FORST.)	twb	18	3, 15, 19, 21-23, 26							
<i>R. grapii</i> (GYLL.)	twb	27	1, 3-5, 7-10, 12							
<i>R. latitans</i> SHARP	twb	118	15-20, 23, 25					VU		
<i>R. notaticollis</i> (AUBE)	twb	1	17				1	EN		
<i>R. suturalis</i> (MACL.)	twb	4	9, 17							
<i>R. suturellus</i> (HARR.)	twb	7	12, 14				V	NT		
Family: Carabidae										
<i>Acupalpus exiguus</i> DEJ.	sb	1	12			VU				
<i>A. flavicollis</i> (STURM)	sb	7	4, 12							
<i>Agonum fuliginosum</i> (PANZ.)	sb	1	14							
<i>A. gracile</i> STURM	sb	12	9, 12, 14, 16				V			
<i>A. lugens</i> (DUFT.)	sb	2	8, 15				3	VU		
<i>A. piceum</i> (L.)	sb	2	15, 16				3			
<i>A. thoreyi</i> DEJ.	sb	6	4, 9, 12							
<i>A. viridicupreum</i> (GOEZE)	sb	1	12		rm		3	VU		

Species	W	N	Sites	Pl-Pr	Pl-rs	Pl-RI	Ge-RI	Cz-RI	Sl-RI	IUCN
<i>Anisodactylus signatus</i> (PANZ.)	-	2	24				V			
<i>Anthraxus consputus</i> (DUFT.)	sb	2	4, 17				V			
<i>Badister bullatus</i> (SCHR.)	sb	1	19							
<i>B. collaris</i> MOTSCH.	sb	14	4, 8, 9, 15, 16		rm					
<i>B. dilatatus</i> CHAUD.	sb	1	4							
<i>B. peltatus</i> (PANZ.)	sb	7	19				3	VU		
<i>B. sodalis</i> (DUFT.)	sb	1	14							
<i>Bembidion arcticulatum</i> (PANZ.)	sb	23	4, 17, 24							
<i>B. assimile</i> GYLL.	sb	41	4, 8, 9, 15, 16, 19, 22		loc					
<i>B. azureus</i> D.T.	sb	20	24				V			
<i>B. dentellum</i> (THUNB.)	sb	1	17							
<i>B. doris</i> (PANZ.)	sb	24	4, 9, 12, 14				V			
<i>B. femoratum</i> STURM	sb	1	24							
<i>B. octomaculatum</i> (GOEZE)	sb	23	9, 14-17, 22, 23				3			
<i>B. quadrimaculatum</i> (L.)	sb	1	17							
<i>B. ruficollis</i> (PANZ.)	sb	39	24					CR		
<i>B. semipunctatum</i> (DONOV.)	sb	1	17							
<i>B. varium</i> (OL.)	sb	1	9							
<i>Carabus clathratus</i> L.	cwb	5	15, 17, 19, 23	+			2	CR	EN	
<i>Cicindela hybrida</i> L.	-	4	25							
<i>Clivina fossor</i> (L.)	sb	7	12, 17							
<i>Demetrias imperialis</i> (GERM.)	sb	2	4, 16						VU	
<i>D. monostigma</i> SAM.	-	2	9, 17							
<i>Diachromus germanus</i> (L.)	-	2	5							
<i>Dyschirius aeneus</i> (DEI.)	sb	21	17, 24							
<i>D. agnatus</i> MOTSCH.	sb	35	24		rm		2			VU

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>D. arenosus</i> STEPH.	sb	22	24, 25							
<i>D. globosus</i> (HERBST)	sb	30	15, 17, 19							
<i>D. nitidus</i> (DEJ.)	sb	15	17				2	VU		
<i>D. tristis</i> STEPH.	sb	10	17							
<i>Elaphrus riparius</i> (L.)	-	1	24							
<i>Odacantha melanura</i> (L.)	sb	5	3, 9, 15, 16, 20							
<i>Omophron limbatum</i> (FABR.)	sb	15	24, 25			NT	V		VU	
<i>Oodes gracilis</i> VILLA & VILLA	sb	1	8		rm	EN	3	VU		
<i>O. helopioides</i> (FABR.)	sb	14	8, 9, 12, 16, 19, 26			VU				
<i>Oxypselaphus obscurus</i> (HERBST)	sb	1	12							
<i>Panagaeus cruxmajor</i> (L.)	sb	1	15							
<i>Pterostichus anthracinus</i> (ILL.)	sb	2	19							
<i>P. aterrimus</i> (HERBST)	sb	3	14				1	EN		
<i>P. diligen</i> (STURM)	sb	10	9, 12, 14, 19							
<i>P. gracilis</i> (DEJ.)	sb	3	19				V			
<i>P. minor</i> (GYLL.)	sb	36	4, 8, 9, 12, 14, 19							
<i>P. rhaeticus</i> HEER	sb	9	12, 14							
<i>Stenolophus mixtus</i> (HERBST)	sb	24	9, 12, 15, 17, 19							
<i>S. teutomus</i> (SCHR.)	sb	10	24							
<i>Tachys bisstrigatus</i> (DUFT.)	sb	24	4, 24		rm					
Subordo: Polyphaga										
Familia: Helophoridae										
<i>Helophorus aequalis</i> THOMS.	twb	2	9		rm					
<i>H. aquaticus</i> (L.)	twb	2	9, 26							
<i>H. granularis</i> (L.)	twb	5	8, 9							
<i>H. minutus</i> FABR.	twb	33	4, 6, 8, 9							

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>H. nanus</i> STURM	twb	87	1, 4, 7-10, 15, 16, 19, 22, 23, 26							
<i>H. nubilus</i> FABR.	sb	1	4							
<i>H. obscurus</i> MULS.	twb	6	9							
<i>H. cf. paraminutus</i> ANGUS	twb	1	9							
Familia: Gerissidae										
<i>Georissus crenulatus</i> (ROSSI)	sb	3	4, 17		rm	DD	3	CR		
Familia: Hydrochidae										
<i>Hydrochus brevis</i> (HERBST)	twb	21	2, 4, 7-10							
<i>H. crenatus</i> (FABR.)	twb	398	1, 2, 4, 7-12, 14-16, 18, 22-24							
<i>H. elongatus</i> (SCHALL.)	twb	13	16, 17, 23		rm					
<i>H. ignicollis</i> MOTSCH.	twb	5	15, 23		vrn			VU		
<i>H. megaphallus</i> BERGE HENEGOUWEN	twb	18	1, 2, 7, 9, 16		vrn		D	EN		
Familia: Spercheidae										
<i>Spercheus emarginatus</i> (SCHALL.)	twb	7	1, 2, 15, 17, 18		vrn	CR			VU	
Familia: Hydrophilidae										
<i>Anacaena limbata</i> (FABR.)	twb	200	1, 3-5, 7-9, 11, 14-17, 26							
<i>A. lutescens</i> (STEPH.)	twb	99	1, 4, 7-9, 11, 12, 14-16, 18, 26, 27							
<i>Berosus geminus</i> REICHE & SAULCY	twb	19	4, 9, 15, 16				1	EN		
<i>B. luridus</i> (L.)	twb	68	1, 2, 4, 9-12, 14-16, 18, 23							
<i>B. signaticollis</i> (CHARP.)	twb	7	15, 17, 25		loc					
<i>Ceryon comexiusculus</i> STEPH.	twb	585	2, 4, 8, 9, 12, 14-17, 19, 23, 26, 27							
<i>C. marinus</i> THOMS.	twb	6	9, 17, 26, 27							
<i>C. pygmaeus</i> (ILL.)	-	0	27							
<i>C. quisquilius</i> (L.)	-	1	27							
<i>C. sternalis</i> SHARP	sb	196	1, 4, 7-9, 14-16, 19, 26, 27		rm					
<i>C. tristis</i> (ILL.)	sb	97	12, 16, 19, 22			LC				

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>C. ustulatus</i> (PREYSSL.)	sb	10	4, 17, 26					VU		
<i>Chaetarthria seminulum</i> (HERBST)	twb	50	4, 7, 11, 14, 24, 25							
<i>Coelostoma orbiculare</i> (FABR.)	twb	167	1, 2, 4, 7-9, 11, 12, 14, 15, 19, 22-24, 26							
<i>Cryptopleurum crenatum</i> (PANZ.)	-	1	27		loc			VU		
<i>C. minutum</i> (FABR.)	-	2	27							
<i>Cymbiodyta marginella</i> (FABR.)	twb	133	1, 2, 4, 7-12, 14-16, 22, 24, 26, 27							
<i>Enochrus affinis</i> (THUNB.)	twb	146	2, 12, 14, 15, 22							
<i>E. bicolor</i> (FABR.)	twb	3	7, 8		loc	EN				
<i>E. coarctatus</i> (GREDL.)	twb	158	1, 2, 4, 7-12, 14-16, 22, 26							
<i>E. melanocephalus</i> (OL.)	twb	7	25		loc					
<i>E. ochropterus</i> (MARSH.)	twb	19	7-9, 11, 12, 14							
<i>E. quadripunctatus</i> (HERBST)	twb	12	9, 15, 18							
<i>E. testaceus</i> (FABR.)	twb	9	9, 15, 17, 22							
<i>Helochares obscurus</i> (MÜLL.)	twb	273	2, 4, 6-12, 14-17, 22-25, 27							
<i>Hydrobius fuscipes</i> (L.)	twb	38	2-4, 7-9, 12, 14, 26							
<i>H. roitenbergi</i> GERH. (?)	twb	1+0	13, 14							
<i>H. subrotundus</i> STEPH. (?)	twb	6	3, 4, 8, 9, 18							
<i>Hydrochara caraboides</i> (L.)	twb	758	3, 6-9, 11, 12, 14, 15, 17-20, 22, 23, 25							
<i>Hydrophilus aterrimus</i> (ESCH.)	twb	61	2, 4, 5, 7, 9-11, 15, 17-20, 22, 23		loc	VU	V	CR	VU	
<i>H. piceus</i> (L.)	twb	1	15		rm	NT	V	CR	VU	
<i>Laccobius albipes</i> KUW.	twb	16	4, 24, 25		rm		0	RE		
<i>L. bipunctatus</i> (FABR.)	twb	134	3-5, 17, 23, 24, 26							
<i>L. minutus</i> (L.)	twb	19	11, 17, 25							
<i>L. striatulus</i> (FABR.)	twb	1	17		loc					
Family: Hydraenidae										
<i>Aulacothibius narentinus</i> (REITT.)	twb	136	4, 17		vrn		1	EN		

Species	W	N	Sites	Pl-Pr	Pl-rs	PJ-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>Hydraena palustris</i> ER.	twb	161	1, 2, 4, 5, 8-12, 15, 16, 22, 26				V			
<i>Hydraena</i> sp. (larvae)	twb	2	26							
<i>Limnebius aluta</i> BEDEL	twb	293	1, 2, 4, 7-12, 15, 16, 19, 23		vrn		V			
<i>L. atomus</i> (DUFT.)	twb	122	2, 4, 6-10, 15-18, 25, 26							
<i>L. parvulus</i> (HERBST)	twb	8	4, 9, 12, 15				V			
<i>Ochthebius flavipes</i> D.T.	twb	82	12, 17, 23		vrn		3			
<i>O. minimus</i> (FABR.)	twb	90	2, 4, 9, 17, 22, 23, 25, 26							
<i>O. pusillus</i> STEPH.	twb	18	4, 8, 9, 12, 17		vrn		3		VU	
Familia: Staphylinidae										
<i>Acylophorus glaberrimus</i> (HERBST)	sb	3	4, 24		rn		3	EN		
<i>A. wagenschieberi</i> KIESW.	sb	60	12, 14		rn	VU	3	CR		
<i>Atanygnathus terminalis</i> (ER.)	sb	63	12		rn		2			
<i>Biblopectus ambiguis</i> (REICHB.)	sb	2	9							
<i>Bledius cribricollis</i> HEER	sb	28	17							
<i>B. gallicus</i> (GRAV.)	sb	17	17							
<i>B. pusillus</i> (DENNY)	sb	10	12				3			
<i>B. subterraneus</i> ER.	sb	82	17, 24					VU	VU	
<i>Brachyluta fossulata</i> (REICHB.)	-	3	1, 5							
<i>Bryaxis bulbifer</i> (REICHB.)	-	5	4, 9, 12							
<i>Erichsonius cinerascens</i> (GRAV.)	sb	31	4, 9, 12, 14							
<i>Euaesthetus laeviusculus</i> MANNH.	sb	9	12, 14							
<i>E. ruficapillus</i> (LACORD.)	sb	17	8, 9, 12, 15							
<i>Eucornus hirticollis</i> (ILL.)	-	6	8			EN				
<i>Fagnietzia impressa</i> (PANZ.)	sb	50	2, 4, 8, 9, 12, 15, 16							
<i>Gabrius</i> sp.	sb	1	9							
<i>Hygronoma dimidiata</i> (GRAV.)	sb	2	9, 15					VU		

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>Lathrobium impressum</i> HEER	sb	2	12, 15							
<i>L. longulum</i> GRAV.	sb	1	8							
<i>L. rufipenne</i> GYLL.	sb	12	9, 12, 14, 15, 19					EN	VU	
<i>Myllaena dubia</i> (GRAV.)	sb	1	4							
<i>Neobisnius procerulus</i> (GRAV.)	sb	12	17							
<i>Ochtheophilum fracticorne</i> (PAYK.)	sb	2	8							
<i>Oxytelus rugosus</i> (FABR.)	-	1	12							
<i>Paederus riparius</i> (L.)	-	29	4, 8, 9, 12, 14-17, 22, 23							
<i>Philonthus fumarius</i> (GRAV.)	sb	2	19							
<i>P. micans</i> (GRAV.)	sb	72	8, 9, 17, 19							
<i>P. nigrita</i> (GRAV.)	-	6	12, 14						VU	
<i>P. punctus</i> (GRAV.)	sb	3	17					VU		
<i>P. quisquiliarius</i> (GYLL.)	sb	9	9, 17							
<i>P. rubripennis</i> STEPH.	sb	4	17, 24							
<i>Pselaphaulax dresdensis</i> (HERBST)	-	2	8, 12				3			
<i>Pseudomedon obscurellus</i> (ER.)	-	1	12							
<i>P. obsoletus</i> (NORD.)	sb	1	19							
<i>Rybaxis longicornis</i> (LEACH)	-	4	4, 15, 16							
<i>Stenus argus</i> GRAV.	sb	2	12, 16		vmm					
<i>S. bifoveolatus</i> GYLL.	sb	4	12						VU	
<i>S. binotatus</i> LJUNGH	sb	4	15, 16							
<i>S. boops</i> LJUNGH	sb	21	17, 24							
<i>S. carbonarius</i> GYLL.	sb	1	9							
<i>S. cicindeloides</i> (SCHALL.)	sb	12	12, 15, 23, 24							
<i>S. circularis</i> GRAV.	sb	1	4							
<i>S. comma</i> LEC.	sb	30	24							

Species	W	N	Sites	Pl-Pr	Pl-rs	Pl-RI	Ge-RI	Cz-RI	Sl-RI	IUCN
<i>S. formicetorum</i> MANNH.	sb	11	12					VU	VU	
<i>S. formicatus</i> STEPH.	sb	11	15, 16, 22, 23							
<i>S. geniculatus</i> GRAV.	-	11	19							
<i>S. incrassatus</i> ER.	sb	18	2, 16, 22, 23							
<i>S. juno</i> (PAYK.)	sb	7	12							
<i>S. latifrons</i> ER.	sb	5	4, 12, 15							
<i>S. melanarius</i> STEPH.	sb	10	12, 14, 15						VU	
<i>S. morio</i> GRAV.	sb	4	9, 12							
<i>S. opticus</i> GRAV.	sb	6	12, 15, 16						VU	
<i>S. palposus</i> ZETT.	sb	1	24				2	EN		
<i>S. palustris</i> ER.	sb	3	12							
<i>S. solutus</i> ER.	sb	2	8, 9		rm	NT	3			
<i>Stenus</i> sp.	?	12	3, 8, 9, 14, 15, 20, 24							
<i>Tachyponus transversalis</i> GRAV.	sb	16	9, 12, 14					EN		
<i>Tachyusa coarctata</i> ER.	-	36	17, 24							
<i>Tetartopeus rufomitidis</i> (REITT.)	sb	1	15							
<i>T. terminatus</i> (GRAV.)	sb	9	9, 12, 14							
<i>Zyrus collaris</i> (PAYK.)	sb	1	12							
Familia: Scarabaeidae										
<i>Maladera holosericea</i> (SCOP.)	-	1	24				3			
<i>Melolontha hippocastani</i> FABR.	-	1	19							
<i>Tropinota hirta</i> (PODA)	-	2	25							
Familia: Scirtidae										
<i>Contacyphon padi</i> (L.)	fwb	4	2, 12, 14							
<i>C. pubescens</i> (FABR.)	fwb	2+0	4, 11, 12							
<i>C. variabilis</i> (THUNB.)	fwb	5	12, 14							

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>Microcara testacea</i> (L.)	fwb	10	9, 12							
Familia: Buprestidae										
<i>Chalcophora mariana</i> (L.)	-	3	12, 14		loc		3	NT	VU	
Familia: Byrrhidae										
<i>Lamprobyrrhulus nitidus</i> (SCHALL.)	-	1	24							
<i>Morychus aeneus</i> (FABR.)	-	1	24					VU		
Familia: Dryopidae										
<i>Dryops anglicanus</i> EDW.	twb	532	1-4, 7-9, 15				2	CR		
<i>D. auriculatus</i> (GEOFFR.)	twb	506	1-5, 7-10, 12, 15-18, 22-25		rm					
<i>D. ernesti</i> DE GOZIS	twb	1	3							
<i>D. griseus</i> (ER.)	twb	24	3-5, 8, 11, 12, 15				2	EN		
Familia: Linnichidae										
<i>Linnichus sericeus</i> (DUF.)	sb	110	17, 24		rm					
<i>Pelochares versicolor</i> (WALTL)	sb	21	4, 24		rm		2	CR		
Familia: Heteroceridae										
<i>Augyles hispidulus</i> (KIESW.)	sb	26	24, 25		rm					
<i>Heterocerus fenestratus</i> (THUNB.)	sb	190	6, 9, 14, 17							
<i>H. fusculus</i> KIESW.	sb	1	9							
<i>H. marginatus</i> (FABR.)	sb	20	17		rm					
Familia: Elateridae										
<i>Selatosomus cruciatus</i> (L.)	-	1	19					VU	EN	
<i>Synaptus filiformis</i> (FABR.)	-	1	20							
Familia: Malachidae										
<i>Cerapheles terminatus</i> (MÉN.)	-	1	1							
Familia: Nitidulidae										
<i>Meligethes symphytii</i> (HEER)	-	2	20							

Species	W	N	Sites	Pl-Pr	Pl-rs	P1-RI	Ge-RI	Cz-RI	SI-RI	IUCN
Familia: Cryptophagidae										
<i>Telmatophilus brevicollis</i> AUBÉ	sb	200	15				3			
<i>T. caricis</i> (OL.)	sb	15	15							
<i>T. sparganii</i> (AHR.)	sb	15	15				3			
<i>T. typhae</i> (FALL.)	sb	2	2							
Familia: Coccinellidae										
<i>Anisosticta novemdecimpunctata</i> (L.)	sb	36	15, 16, 23							
<i>Coccidula rufa</i> (HERBST)	-	19	7, 12, 14, 15, 16							
<i>C. scutellata</i> (HERBST)	-	6	2, 16, 19, 24							
<i>Harmonia quadripunctata</i> (PONT.)	-	1	12							
<i>Hippodamia tredecimpunctata</i> (L.)	sb	4	15, 23							
<i>Propylea quatuordecimpunctata</i> (L.)	-	1	9							
<i>Scymnus haemorrhoidalis</i> HERBST	-	2	14							
Familia: Corylophidae										
<i>Corylophus cassidoides</i> (MARSH.)	-	26	4, 12, 15, 16, 24							
Familia: Tenebrionidae										
<i>Pseudocistela ceramboides</i> (L.)	-	1	23				2			
<i>Stenomax aeneus</i> (SCOP.)	-	1	12							
Familia: Anthicidae										
<i>Cordicomus gracilis</i> (PANZ.)	-	9	8, 16, 19				1	VU		
Familia: Cerambycidae										
<i>Agapanthia intermedia</i> GANGLBAUER	-	1	1							
Familia: Chrysomelidae										
<i>Agelastica alni</i> (L.)	-	1	19							
<i>Altica lythri</i> AUBÉ	-	9	24							
<i>Aphthona lutescens</i> (GYLL.)	sb	42	15							

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>Bruchus brachialis</i> FAHR.	-	1	24		vrm	DD		CR		
<i>Chrysolina graminis</i> (L.)	-	1	19							
<i>Chrysomela collaris</i> L.	-	1	7							
<i>C. saliceti</i> SUFFR.	-	2	19							
<i>Cryptocephalus octopunctatus</i> (SCOP.)	-	8	19				3	EN		
<i>Donacia cinerea</i> HERBST	pwb	3	5, 24, 26							
<i>D. clavipes</i> FABR.	pwb	1	1							
<i>D. impressa</i> PAYK. (?)	pwb	1	20						LC	
<i>D. marginata</i> HOPPE	pwb	12	15, 16						LC	
<i>D. obscura</i> GYLL.	pwb	1	12				3	EN	VU	
<i>D. semicuprea</i> PANZ.	pwb	35	15, 18, 20, 22, 23, 26						LC	
<i>D. vulgaris</i> ZSCHACH	pwb	1	15						VU	
<i>Galerucella californiensis</i> (L.)	sb	2	15							
<i>G. griseocens</i> (JOANN.)	sb	4	12, 14							
<i>G. nymphalaeae</i> (L.)	sb	4	22, 23							
<i>Gastrophysa viridula</i> (DE G.)	-	3	3							
<i>Longitarsus melanocephalus</i> (DE G.)	-	1	23							
<i>L. nigerrimus</i> (GYLL.)	-	15	7, 8, 14				3	RE		
<i>Pachnophorus pilosus</i> (ROSSI)	-	1	22				2			
<i>Phaedon armoraciae</i> (L.)	sb	11	2, 16, 17							
<i>P. cochleariae</i> (FABR.)	sb	105	2, 15-17, 24							
<i>Phaedon</i> sp.	sb	2	3, 5							
<i>Phyllotreta exclamatoris</i> (THUNB.)	-	1	4							
<i>P. tetrastigma</i> (COM.)	-	1	23							
<i>P. undulata</i> (THUNB.)	-	2	25							
<i>Plateumaris discolor</i> (PANZ.)	pwb	6	12							

Species	W	N	Sites	Pl-Pr	Pl-rs	Pt-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>Prasocuris marginella</i> (L.)	sb	97	12, 16, 17							
<i>P. phellandrii</i> (L.)	sb	55	2, 12, 15, 17							
<i>Pyrrhalta viburni</i> (PAVK.)	sb	1	24							
Familia: Rhynchitidae										
<i>Byctiscus betulae</i> (L.)	-	1	19							
<i>Involutus pubescens</i> (FABR.)	-	1	16		rm		3	EN		
Familia: Dryophoridae										
<i>Sphenophorus striatopunctatus</i> (GÖEZE)	sb	1	16		rm		2			
Familia: Eritrhinidae										
<i>Grypus brunnirostris</i> (FABR.)	sb	3	9, 22		rm				NT	
<i>Notaris acridulus</i> (L.)	sb	45	4, 9, 15, 16, 17, 19, 23							
<i>N. scirpi</i> (FABR.)	sb	36	8, 15, 16							
<i>Tanysphyrus ater</i> BLATCH.	pwb	36	2, 15		rm		3	NT	DD	
<i>T. lemnae</i> (PAVK.)	pwb	679	2, 4, 8, 12, 14-17, 19, 22-26							
<i>Thryogenes fiorii</i> ZUMPT	sb	1	16		rm		3			
<i>T. scirrhosus</i> (GYLL.)	sb	23	2, 8, 15, 16, 17		rm			NT	VU	
<i>Tournotaris bimaculata</i> (FABR.)	pwb	0	7, 26		rm			VU		
Familia: Curculionidae										
<i>Archarius crux</i> (FABR.)	-	1	19							
<i>Begous alismatis</i> (MARSH.)	pwb	4	15		rm					
<i>B. binodulus</i> (HERBST)	pwb	20	11, 22		loc		3	CR	VU	
<i>B. claudicans</i> BOH.	sb	1	12		rm		2			
<i>B. collignensis</i> (HERBST)	pwb	2	17		vrn		2		VU	
<i>B. frit</i> (HERBST)	pwb	1	11		vrn		2	EN	VU	
<i>B. frivaldszkvi</i> TOURN.	pwb	5	15, 16		vrn		2	RE	CR	
<i>B. glabrostris</i> (HERBST)	pwb	1+0	11, 12		rm			VU	LR:CD	

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>B. limosus</i> (GYLL.)	pw b	11	15-17		rm		3	VU	VU	
<i>B. longitarsis</i> THOMS.	pw b	4	2, 16, 20		rm		3	NT	LR:CD	
<i>B. lutulentus</i> (GYLL.)	pw b	15	8, 9, 12, 14, 17, 25					NT	VU	
<i>B. majzlani</i> (KODADA & al.)	pw b	26	15, 16, 18, 19		rm					
<i>B. nodulosus</i> GYLL.	pw b	1+0	11, 27		rm		3	VU	VU	
<i>B. petro</i> (HERBST)	pw b	6	2, 7, 8		rm		0	CR	EN	
<i>B. puncticollis</i> BOH.	pw b	21	12, 19		rm		2	VU	VU	
<i>B. robustus</i> BRIS.	pw b	21	15, 17, 18		rm		3	NT	EN	
<i>B. rotundicollis</i> BOH.	pw b	0	16		vr m	DD	0	CR		
<i>B. subcarinatus</i> GYLL.	pw b	107	2, 12, 15-20, 22-25		rm		3	NT		
<i>B. tempestivus</i> (HERBST)	pw b	107	15, 16		rm			VU		
<i>B. tubulus</i> CALDARA et O'BRIEN	pw b	1+0	15, 16							
<i>Bothynoderus affinis</i> (SCHRANK)	-	2	25							
<i>Ceutorhynchus obstrictus</i> (MARSH.)	-	11	15, 16, 23							
<i>Chlorophanus viridis</i> (L.)	sb	7	15, 18, 23							
<i>Datonychus arquatus</i> (HERBST)	sb	4	9, 15					VU		
<i>Eubrychius velutus</i> (BECK.)	pw b	13	2, 15, 16, 23		rm					
<i>Gymnetron beccabungae</i> (L.)	sb	1	15		rm					
<i>Hypera conmaculata</i> (HERBST)	sb	9	2, 12, 15, 23							
<i>Hypera</i> sp.	?	2	25							
<i>Larinus rusticus</i> GYLL.	sb	3	1, 5							
<i>L. sturnus</i> (SCHALL.)	sb	2	18					NT		
<i>L. turbinatus</i> GYLL.	sb	1	16		rm					
<i>Lepyrus palustris</i> (SCOP.)	-	6	16, 19, 24							
<i>Limnobaris dolorosa</i> (GOEZE)	sb	17	1, 4, 8, 12, 14							
<i>L. t-album</i> (L.)	sb	6	1, 2, 9, 14							

Species	W	N	Sites	PI-Pr	PI-rs	PI-RI	Ge-RI	Cz-RI	SI-RI	IUCN
<i>Linnobaris</i> sp.	sb	1	7							
<i>Lixus bardanae</i> (FABR.)	sb	2	20							
<i>L. myaqri</i> OUV.	sb	3	15		rm		3			
<i>L. paraplecticus</i> (L.)	sb	10	2, 15-18, 26, 27		rm		3	EN		
<i>Mecinus pascuorum</i> (GYLL.)	-	2	5							
<i>Mogulones raphani</i> (FABR.)	sb	1	15							
<i>Mononychus punctumalbum</i> (HERBST)	sb	1	16		rm					
<i>Neophytobius muricatus</i> (BRIS.)	sb	1	4		rm		3			
<i>Otiorhynchus ovatus</i> (L.)	-	1	16							
<i>O. tristis</i> (SCOP.)	-	2	19		rm			NT		
<i>Pelenomus canaliculatus</i> (FABR.)	pwb	4	2, 14		rm			VU		
<i>P. commari</i> (PANZ.)	sb	7	8, 9, 12, 15, 16							
<i>P. quadricorniger</i> (COLONN.)	sb	1	16					NT		
<i>Poophagus hopffgarteni</i> TOURN.	sb	3	15		vrm	EN				
<i>P. sisymbrii</i> (FABR.)	pwb	23	2, 15, 16, 18, 19, 23					VU		
<i>Rhinoncus albicinctus</i> GYLL.	sb	1	15		rm		3	VU		
<i>R. inconspetus</i> (HERBST)	sb	9	15, 16, 18, 19							
<i>R. perpendicularis</i> (REICHB.)	sb	4	15, 16							
<i>Tanymetus palliatus</i> (FABR.)	-	2	18							
<i>T. sellatus</i> (FABR.)	sb	4	2, 16, 17							
<i>Tychius schneideri</i> (HERBST)	-	3	1, 12							

Typical aquatic beetles in the Gyrinidae, Haliplidae, Noteridae, Dytiscidae, Helophoridae, Hydrochidae, Spercheidae, Hydrophilidae, Hydraenidae and Dryopidae were represented by a total of 162 species; Adephaga – by 101 species, and Polyphaga – by 61. Amongst these, 123 species were found in carbonate fens near Chełm (6-76 per site; averaging 43), 71 in the Łęczna-Włodawa Lakeland (4-62; averaging 33), and 115 in the Bug River valley (9-56; averaging 30).

Nineteen species were observed at more than half of the sites. The most common ones included *Hydaticus transversalis*, *Coelostoma orbiculare*, *Helochares obscurus*, and *Dryops auriculatus* (18 sites each), as well as *Hygrotus inaequalis* and *Liopterus haemorrhoidalis* (17 sites each). They were primarily common and eurytopic species, although they also included tyrphophiles: *Hydroporus angustatus*, *Clemnius* (formerly *Hygrotus*) *decoratus*, *Cymbiodyta marginella*, and *Enochrus coarctatus*. Stenotopes were usually less common, and were only recorded in some areas. This is particularly true of tyrphobionts and tyrphophiles, that mainly occurred in carbonate fens near Chełm and/or in the Łęczna-Włodawa Lakeland, but were sometimes captured in high abundance, such as *Hydroporus tristis* or *Dryops anglicanus*. The occurrence of rheophiles was variable, although these were found both in the valley of the Bug River and in the vicinity of Chełm, where they were abundant in canals draining some peat bogs.

DISCUSSION

Our data, including the relatively large number of species recorded in such a short time, confirm that this region is very important for wetland beetle biodiversity, and its continued conservation. The 162 typical aquatic beetle species found constitute 69% of the species known from central-eastern Poland (BUCZYŃSKI & PRZEWOŹNY 2006), and 50% of the Polish fauna (ANONYMUS 2004, PRZEWOŹNY 2004a, 2004b). Considering only species not confined to mountains or submontane areas, the recorded species constitute the great majority of the water beetle fauna of the Polish Lowland.

The fauna of individual areas studied is also diverse. For example, BUCZYŃSKI & PRZEWOŹNY (2010), analysing carbonate-rich sites around Chełm, reported 109 species from the families Gyrinidae, Haliplidae, Noteridae, Dytiscidae, Helophoridae, Hydrochidae, Spercheidae, Hydrophilidae, Hydraenidae, and Dryopidae. Our research considerably supplements this data, extending the list of reported species to 149, comparable to the faunal richness of much larger geographic regions, such as the nearby Roztocze Upland (BUCZYŃSKI *et al.* 2009). In the valley of the Middle Bug, 163 species have been recorded so far (including true water beetles – and additionally three species of Elmidae, including *Macronychus quadrituberculatus* P.J.W. MÜLL. and *Potamophilus acuminatus* (FABR.)) (PRZEWOŹNY *et al.* 2006, BUCZYŃSKI *et al.* 2011) which is already a high number. The new data have increased this count to 182 species. Therefore, describing these areas as biodiversity hotspots for aquatic insects (BUCZYŃSKI *et al.* 2011) is fully justified.

A number of water beetles found are here reported for the first time in the faunistic regions studied (BUCZYŃSKI & PRZEWOŹNY 2006). For Podlasie these include *Agabus biguttulus*, *Ilybius aenescens*, *Rhantus suturellus*, and *Hydrobius rottenbergii*, and for the Lublin Upland *Gyrinus caspius*, *Agabus biguttulus*, *Bidessus grossepunctatus*, *Helophorus aequalis*, *Georissus crenatulus*, *Hydrochus ignicollis*, *Hydrobius subrotundus*, *Ochthebius pusillus*, *Limnichus sericeus*, *Pelochares versicolor*, and *Heterocerus hispidulus*. Some terrestrial species also represent new records, including *Cryptopleurum crenatum* and *Morychus aeneus*, which were recorded for the first time on the Lublin Upland. Such discoveries emphasise the need for further faunistic research in these regions.

Many species recorded during the BBCM are interesting in zoogeographic terms; this paper discusses only three most interesting examples.

The canal at Ignatów-Kolonia (site No. 3) is close to the western boundary of the distributional area of *Agabus pseudoclypealis* in Europe. In Poland, in addition this locality it has been recorded only in the Augustów Primeval Forest (WIĘZŁAK 1980), the valley of the Middle Bug (PRZEWOŹNY *et al.* 2006), the valley of the Middle Wieprz (BUCZYŃSKI *et al.* 2012 – currently these are the most westerly sites in the species range), Białowieża Primeval Forest (NILSSON *et al.*, 2017) and in a drainage canal on a carbonate fen near Chełm (BUCZYŃSKI & PRZEWOŹNY 2010 – another site in the canal system draining the same fen as site No. 3 here). Our study shows that the occurrence of *A. pseudoclypealis* in this area is established. Outside Poland, the distribution of the species covers the Baltic States, Finland, Belarus, the European part of Russia, and the western part of Siberia in Asia (NILSSON *et al.* 2017, NILSSON & HÁJEK 2019).

The record of *Hygrotus polonicus* (site No. 25) is located near the western range boundary of this species, whose distribution extends from Kazakhstan and western Siberia to eastern Scandinavia and Poland (PRZEWOŹNY *et al.* 2016, NILSSON & HÁJEK 2019). At its western range edge, *H. polonicus* occupies isolated sites, located slightly to the west of the region sampled in 2016, on the Mazovian Lowland and Małopolska Upland.

Our records of *Berosus geminus* are also at the species range limits, but this time the north-eastern boundary of the main part of its distribution. *B. geminus* is a species scarce throughout its range, which extends from southern Europe (Serbia, Croatia, Italy) to Central and Central-East Europe (Germany, Poland, Ukraine); most sites being in Austria and Hungary. The species is also reported from the Caucasus, where its *locus typicus* is situated, although its current status in this region is unknown, as is whether the gap between the Caucasus and Poland is real or down to a shortage of records (PRZEWOŹNY & BUCZYŃSKI 2008, MESAROŠ & NOVAKOVIĆ 2015, PRZEWOŹNY 2019). In Poland, only one site for this species was known so far, namely a peat digging on a carbonate peat bog near Chełm, where two adult males were captured (PRZEWOŹNY & BUCZYŃSKI 2008). This paper reports another four sites, including two from the valley of the River Bug, suggesting that the species is well established in this region. Interestingly, it was also recently reported in western Ukraine, near the Polish border, in the Shatsk National Park (SHATROVSKIĀ & KRAVCHENKO 2016). Three sites from carbonate fens near Chełm (PRZEWOŹNY & BUCZYŃSKI 2008; new data), two from the valley of the River Bug near Bytyń (new data), and further three in the Shatsk National Park (SHATROVSKIĀ & KRAVCHENKO 2016) suggest the existence of at least an island area of occurrence in the Polish and Ukrainian part of Polesie. The closest known sites are located more than 300 km away, in the south of Slovakia and in Hungary (PRZEWOŹNY & BUCZYŃSKI 2008).

The collected material includes numerous rare, protected, or endangered taxa (Table 1). From the national perspective, we found two species under legal protection, 83 species considered very rare, rare, or occurring locally in Poland, as well as 24 species on the Polish Red List (PAWŁOWSKI *et al.* 2002, ANONYMOUS 2004, PRZEWOŹNY 2004a, 2004b, REGULATION 2016). These are high numbers, pointing to the importance of central-eastern Poland for the survival of a number of threatened beetles. This region is not only of national importance, but important at least at the central-eastern European scale. Although the lack of Red Lists of beetles for Ukraine, Belarus, Kaliningrad Oblast (Russia), and Lithuania does not allow complete evaluation of this aspect, reference can be made to information from the remaining countries neighbouring Poland. The BBCM participants recorded 101 species on the Red Lists of Germany (BINOT *et al.* 1998, SCHMIDT *et al.* 2016, SPITZENBERG *et al.* 2016), 92 on

that of the Czech Republic (FARKAČ *et al.* 2005), and 44 species on the Slovakian Red List (HOLECOVÁ & FRANČ 2001). Moreover, two species (*Agabus clypealis* and *Graphoderus bilineatus*) belong to the high-risk category on the IUCN Red List (FOSTER 1996a, 1996b).

It is also worth emphasising that *Graphoderus bilineatus* is a priority species of the Natura 2000 programme (PRZEWOŹNY 2012). It was recorded in one of the carbonate fens, but primarily at many sites in the valley of the River Bug – an observation which confirms the very high environmental value of the valley (DOMBROWSKI *et al.* 2002, BUCZYŃSKI 2006, GOSIK 2006, PRZEWOŹNY *et al.* 2006, BUCZYŃSKI *et al.* 2011).

In addition to particular species, the wider water beetle assemblages in this region are also very important from a biodiversity perspective. This is particularly evident from the discovery of well-preserved, habitat-specific assemblages of beetles in different types of fens and peat bogs in the area (see GALEWSKI & TRANDA 1978, KLAUSNITZER 1996). The fauna of small streams, as well as that of oxbow lakes in the valley of Middle Bug River, also deserve mention. In addition to interesting and diverse assemblages of true water beetles, the extraordinary species richness of phytophilous water beetles are worth emphasising, particularly that of genus *Bagous* GERMAR, 1817, including many very rare and endangered species, some of which have been lost from large parts of their former European ranges. In the Bug Valley, and on the peat bogs of the Łęczna-Włodawa Lakeland, the BBCM workers found almost 70% of Central European aquatic *Bagous* (KLAUSNITZER 1996) – a concentration of species which may be unique in the European Union.

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STRESZCZENIE

Chrząszcze (Coleoptera) siedlisk wodnych i podmokłych polskiego Polesia złowione podczas Balfour-Brown Club Meeting ‘2016

Podczas sesji terenowych Balfour-Brown Club Meeting (23-30.05.2016) spenetrowano 27 stanowisk w polskiej części Polesia: torfowisk niskich i sfągnowych, kanałów odwadniających torfowiska, starorzeczy Bugu, piaskowni. Badania koncentrowały się na chrząszczach wodnych. Złowiono 408 gatunków należących do wszystkich trzech podrzędów chrząszczy i 34 rodzin, w tym 351 gatunków związanych ze środowiskiem wodnym (właściwych chrząszczy wodnych – 157, fitofilnych chrząszczy wodnych – 32, fakultatywnych chrząszczy wodnych – 1, fałszywych chrząszczy wodnych – 156, chrząszczy nabrzeżnych – 157). Wykazano liczne gatunki rzadkie, chronione, zagrożone w Polsce lub krajach ościennych. Informacje o trzech gatunkach (*Agabus pseudoclypealis*, *Hygrotus polonicus*, *Berosus geminus*) okazały się istotne dla wiedzy o przebiegu granic ich arealów. W przypadku *B. geminus* nowe dane, w powiązaniu z informacjami z Ukrainy, wskazują na istnienie izolowanej wyspy zasięgu na Polesiu polskim i ukraińskim. Na podstawie analizy zebranego materiału wykazano też, że teren badań to obszar bardzo cenny dla ochrony chrząszczy w aspekcie ich różnorodności biologicznej, zachowania gatunków i ich zgrupowań.

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