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SUGGESTED METHODS FOR PROTECTIVE AND COMMERCIAL MANAGEMENT IN THE FORESTS WITH STANDS OF *OXYPORUS MANNERHEIMI* GYLL., 1827 (COLEOPTERA, STAPHYLINIDAE)

PROPOZYCJA POSTĘPOWANIA OCHRONNEGO I GOSPODARCZEGO W LASACH ZE STANOWISKAMI WYSTĘPOWANIA POGRZYBNICY MANNERHEIMA (*OXYPORUS MANNERHEIMI* GYLL., 1827) (COLEOPTERA, STAPHYLINIDAE)

Summary. The *Oxyporus mannerheimi* Gyll., 1827 is a species of beetle belonging to the family of rove beetles (Staphylinidae) included in the list of invertebrate species protected under Natura 2000 – European network of protected areas. In Poland, this species has been under legal protection since 2004. This paper contains the list of hitherto known locations of *O. mannerheimi* in Poland and characterizes new locations in the Białowieża and Starachowice Forest Districts. The data concerning new locations have been obtained in the course of research of wild fauna and flora (within the meaning of the Habitat Directive of the EU) carried out within the areas under administration of PGL Lasy Państwowe (State Forests) in 2006-2007. The research study revealed that *O. mannerheimi* occurred in 50 clusters in the Białowieża Forest District and in two clusters in the Starachowice Forest District. For all locations, the forest type and habitat conditions have been specified based on which the analysis of species preference was determined as to the type of forest habitats and solutions are proposed for protection of this species within managed forest areas.

Key words: *Oxyporus mannerheimi*, Natura 2000, distribution in Poland, habitat preference, environmental preference, conservation activities

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Introduction

The *Oxyporus mannerheimi* Gyllenhal, 1827 is the only representative of rove beetles family (Staphylinidae) entered into the list of species protected under Natura 2000 – European network of protected areas.

The occurrence range of this species is limited to the north-eastern part of Europe and Siberia (BURAKOWSKI et AL. 1979, KUBISZ 2004). In Europe, its range extends from northern Russia and Karelia, through Finland, Estonia, Latvia, Lithuania, Poland, Belarus and reaches the Ukraine in Volhynia region (FERENCA et AL. 2002, KUBISZ 2004, LÖBL and SMETANA 2004, ALEKSANDROWICZ and TSINKEVICH 2006, SHULAEV 2008).

Poland demarks the south-western border of the insect's European occurrence range. Its hitherto locations in Poland include the region of Podlaskie – Białowieża Forest and Knyszyn Forest as well as the area of Kraśnik in the region of Lubelskie (KUBISZ and SZWAŁKO 1991, DERUNKOV and MELKE 2001, KUBISZ 2004, SZUJECKI 2008).

The species has been entered in the "Polish red book of endangered species" (PAWŁOWSKI et AL. 2002) and currently holds a VU status – vulnerable and is subject to legal protection as of 2004 (Regulation of the Minister of the Environment – ROZPORZĄDZENIE... 2004).

The biological characteristics of this species is poorly known. The beetles were observed in late spring and in summer – between June and September. The larvae develop in piletes of cap mushrooms (among others, boletes, birch boletes, oyster mushrooms, champignons). They bore the passages in the hymenophore and pulp of the mushroom which extend from the bottom to the base of the stem. The larvae and the beetles inhabit the passages. The larvae most probably spend the winter in soil.

The observations of related species from the genus *Oxyporus* Fabr. (SZUJECKI 2008) indicate that the larvae are mycetophages, since no traces of Diptera or their larvae have been found. However, it seems that facultative intake of animal food, particularly by very active beetles with strong mandibles is very probable.

Oxyporus mannerheimi is a forest species which inhabits the boreal zone. It is present in cool, shaded places in deciduous and mixed forests. Its environmental requirements should be, in first line, associated with the characteristics and requirements of the mushrooms they feed on and, secondarily, with a specific type of forest environment.

Methods

This paper has been developed on the basis of the data obtained as a result of research on natural habitats and wild flora and fauna (within the meaning of the Habitat Directive of the European Union) carried out within the framework of the project named "Rules of conservation of protected invertebrate species in Natura 2000 areas under conditions of sustainable forest management" ordered by the General Directorate of State Forests in Warsaw from the editorial team.

The research of the forest areas administered by PGL Lasy Państwowe was carried out in 2006-2007 (Decision no. 61 of the General Director of State Forests of 25.07.2006).

The plant and animal habitats found during the environmental research were assigned to sub-sets (sub-divisions). The existing taxonomic data from each sub-division (including the characteristics of the soil, vegetation, undergrowth and habitual type of the forest) allows to obtain precise characteristics of the habitat and vegetation conditions of species occurrence locations. The research was carried out in all forest districts in Poland, whereas the data was subsequently aggregated at regional directorates of State Forests, where the verification by specialist teams was conducted, and was submitted to the General Directorate of State Forests in Warsaw. This allowed to obtain the information on the presence of plant and animal species on the area of 7.060 million ha which accounts for ca. 78.1% of forested land in Poland. The data concerning the presence of invertebrates in state forests were provided to the team of authors for further analyses. The established invertebrate presence sites have been used to develop graphical representation in the form of maps. Further analyses referred to the preference of the species as to the habitat conditions. It has been adopted that an established presence site of occurrence of a given species shall be a sub-division with species' systematic data.

For a protected species, the types of forest habitats were specified, occurrence frequency was determined as contribution of habitats of a given type per cent of total sum of all habitats. Besides, the contribution per forest stands with a given type of tall trees was determined.

Associating the biological characteristics of each analysed invertebrate species, in the subject case – *O. mannerheimi*, with the existing type of forest habitat, adopted manner of commercial use of the forest and manner of forest management at the established and recorded sites allowed to indicate potential risks from forest management and, primarily, to develop a concept for parallel commercial use and possibility of maintaining protection and species preservation.

Results

During said survey works, *O. mannerheimi* was found in two forest districts – the Białowieża and Starachowice. In the Białowieża Forest District, the information on presence of *Oxyporus* is based on direct observation of survey personnel and such records are ascribed to 50 sub-divisions. The surface area of the sub-divisions in which this species was found equals in total 246.73 ha of which 113.09 ha is located in partial reserve zone. The characteristics of forest stands with sites of *Oxyporus* are shown in Table 1.

These sites were represented by three types of forest habitats: fresh coniferous forest (BMśw), fresh mixed forest (LMśw) and fresh deciduous forest (Lśw). The most numerous records of *Oxyporus* are in the fresh mixed forest (44%), followed by fresh deciduous forest (34%) and fresh coniferous forest (22%). It should be noted that spruce-only or spruce-dominated forest (often in the form of interruptions) account for the largest area per cent among the sites listed above.

In the Starachowice Forest District, the species was found by direct observation at two sites where the beetles were found on 23.08 and 30.08.2007 on the fruiting body of *Leccinum aurantiacum*. These sites are located in buffer-zone, pine and pine-oak forest aged 116 and 100 years, in a fresh mixed forest habitat (LMśw).

Table 1. Characteristics of forest types at the sites of occurrence of *Oxyporus mannerheimi* Gyll. in the Białowieża Forest District
Tabela 1. Charakterystyka drzewostanów na stanowiskach występowania *Oxyporus mannerheimi* Gyll. w Nadleśnictwie Białowieża

Forest habitat type Typ siedliskowy lasu	Area: total / protected Powierzchnia: ogółem / chroniona (ha)	Occurrence rate Częstość występowania (%)	Type of forest stand Typ drzewostanu	Average age (years) Średni wiek (lata)	Contribution of tree stands with the forest type Udział stanowisk z danym typem drzewostanu (%)
Fresh mixed coniferous forest BMśw	83,34 / 17,11	22	With interruptions of oak, spruce, pine, birch Z przestojami Db, Św, So, Brz	148	63,6
			With prevalent of oak Z przewagą Db	88	10
			With prevalent of pine Z przewagą So	48	45,5
			With prevalent of spruce Z przewagą Św	107	45,5
Fresh mixed forest LMśw	100,54 / 43,58	44	With prevalent of birch Z przewagą Brz	73	1,0
			With prevalent of oak Z przewagą Db	101	3,4
			With prevalent of pine Z przewagą So	79	54,5
			With prevalent of spruce Z przewagą Św	124	41,1
Fresh forest Lśw	62,85 / 52,4	34	Birch with interruptions of pine and spruce Brz z przestojami So i Św	135	3,4
			Old forest: oak-pine-spruce--birch Starodrzew: Db-So-Św-Brz	180	9,1
			Old forest: hornbeam-oak-pine--spruce Starodrzew: Gb-Db-Św-So	174	31,1
			With prevalent of pine Z przewagą So	103	12,2
			With prevalent of spruce Z przewagą Św	112	43,8

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Discussion

The survey of rare species of plants and animals together with their habitats carried out in PGL Lasy Państwowe has provided new data on presence of *O. mannerheimi* in Poland. This species has not been found in the area of Starachowice so far (Fig. 1) whereas numerous sites from the Białowieża Forest District indicate that the population in the Białowieża Forest is relatively numerous.

The obtained data may point to the preference of this species to reside in fresh forest habitats, including mixed forest with prevalent coniferous contribution (spruce, pine). The sites where *Oxyporus* was recorded include the tree stands with interruptions of many other tree species. The old trees surely enrich the spatial structure of forests and may beneficially affect the conditions, promoting the occurrence of mushrooms that act as presence and development sites of Polish rove beetles from the *Oxyporus* genus.

In the authors' view, *O. mannerheimi* is a rove beetle species whose biological characteristics and presence are not directly affected by forest management. However, it should be noted as follows:

– the biology of species (as well as species related to the *Oxyporus* genus) has not been the subject of precise studies and no research has been carried out in the

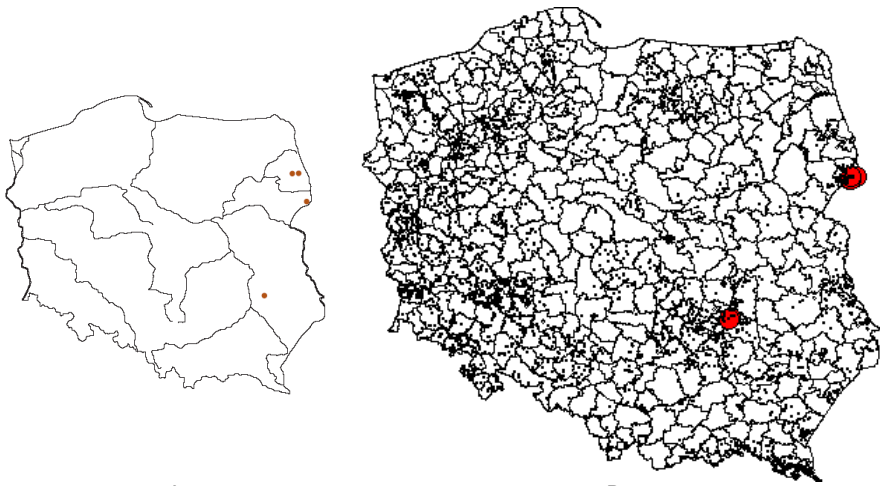

Fig. 1. Presence sites of *Oxyporus mannerheimi* in Poland: A – until 2004 (KUBISZ 2004), B – after research carried out by PGL Lasy Państwowe in 2006-2007 (a total of 52 sites in the Białowieża and Starachowice Forest Districts were recorded) shown on map with boundaries of forest districts

Rys. 1. Stanowiska występowania *Oxyporus mannerheimi* w Polsce: A – do roku 2004 (KUBISZ 2004), B – po inwentaryzacji w PGL Lasy Państwowe w latach 2006-2007 (łącznie 52 stanowiska w Nadleśnictwach Białowieża i Starachowice) na tle mapy z granicami nadleśnictw

scope of chemical treatments on the change of presence of fungi and rove beetles related to them,
– *Oxyporus mannerheimi* is a species present in Poland only in few locations which is connected with the general distribution and the boundary of the presence range of this beetle crossing Poland which determines the dispersed character of the population at the range boundaries.

The information contained in the work by KUBISZ (2004) even suggests that it is not necessary to take preservation activities for *Oxyporus*. However, in the light of data on species presence in forest environment, it seems purposeful to maintain the forest management model which assumes preservation of numerous interruptions of other tree species in fresh coniferous and fresh mixed forests in the areas of presence of *Oxyporus* which may be beneficial to this rare species, valuable across Europe.

Conclusions

1. *Oxyporus mannerheimi* is developmentally related to cap mushrooms throughout its entire development cycle. It therefore can be assumed that the activities promoting biodiversity of forest environment will be beneficial to this species.

2. Preservation of forest environments in which *Oxyporus* was noticed in unchanged state will surely help in preservation of the species population which is dispersed due to its presence at the boundary of its occurrence range.

3. Creating environmental corridors may prevent degenerative genetical processes that take place inside the population which is not sufficiently numerous.

This species requires further biological and ecological studies. Finding sites with abundant presence of this species will allow for better research of the species biology. No detailed data on species biology additionally obstructs the definition of protection measures to effectively preserve the population. On the *Oxyporus* occurrence sites, a periodical prohibition to collect cap mushrooms could be implemented between June and end of September. Besides, closer monitoring of this species could be carried out.

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Streszczenie. Pogrzybnica Mannerheima (*Oxyporus mannerheimi* Gyll., 1827) jest gatunkiem chrząszcza z rodziny kusakowatych (Staphylinidae) zamieszczonym na liście bezkręgowców chronionych w europejskiej sieci obszarów chronionych Natura 2000. W Polsce podlega ochronie prawnej od 2004 roku. W pracy zestawiono dotychczas znane stanowiska występowania *O. mannerheimi* w Polsce oraz scharakteryzowano nowe stanowiska z Nadleśnictw Białowieża i Starachowice. Dane o nowych stanowiskach uzyskano z inwentaryzacji dzikiej fauny i flory (w rozumieniu Dyrektywy Siedliskowej UE) przeprowadzonej na obszarach administrowanych przez PGL Lasy Państwowe w latach 2006-2007. Podczas inwentaryzacji stwierdzono występowanie *O. mannerheimi* w 50 wydzieleniach Nadleśnictwa Białowieża i dwóch wydzieleniach Nadleśnictwa Starachowice. Dla wszystkich stanowisk podano charakterystykę drzewostanu i warunków

siedliskowych, na podstawie których dokonano analizy preferencji gatunku w stosunku do typów środowisk leśnych, oraz zaproponowano postulaty ochrony gatunku na zagospodarowanych obszarach leśnych.

Słowa kluczowe: *Oxyporus mannerheimi*, Natura 2000, rozmieszczenie w Polsce, preferencje środowiskowe, postępowanie ochronne

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