

OCCURRENCE OF *ERGATES FABER* (LINNAEUS 1761) (COLEOPTERA, CERAMBYCIDAE) AND A PROPOSAL FOR PROTECTIVE MEASURES IN MANAGED FORESTS TO PRESERVE THE SPECIES*

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Abstract. This paper presents a proposal for commercial measures aiming at protecting the *Ergates faber* (Linnaeus 1761). *Ergates faber* is a beetle species (Coleoptera) from the longhorn beetles' family, Cerambycidae, and remained protected in Poland since 2001 following the Regulation of the Minister of the Environment of 26th September 2001 (Journal of Laws 2001, no. 130, item 1456), while it was never listed in any exhibit to the Habitats Directive. In order to protect the *Ergates faber* in Poland it was necessary to draft a new set of principles for commercial forestry that would best facilitate the preservation of the species. The paper also indicates sites of this beetle's occurrence never published before.

Key words: *Ergates faber*, *Cerambycidae*, longhorn beetles, insects, principles of species preservation in commercial forests

INTRODUCTION

Ergates faber (Linnaeus 1761), known in Poland as *borodziej próchnik* and *borodziej cieśla*, is a large longhorn beetle from the Cerambycidae family, reaching up to 50 mm [Zahradnik 2001], 55 mm [Brauns 1975], and even 60 mm in length [Hürka 2005]. In Poland, in terms of size, it is only surpassed by the great capricorn beetle *Cerambyx cedio*. In the Czech Republic and Slovakia it is considered the largest representative of native Cerambycidae [Hürka 2005]. It is similar in appearance to the Mediterranean

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Rhesus serricollis Motsch. Some similarity to the *Prinobius myardi* (Muls.) inhabiting the wood of deciduous trees growing in Southern Europe is also observed.

The range of this beetle covers mainly the central and eastern parts of Europe, the Caucasus and the Mediterranean (Northern Africa, Asia Minor). The insect was recorded in southern regions of Sweden [Burakowski et al. 1990, Bense 1995] and in the British Isles, where it had been transported together with timber [Dominik and Starzyk 2004, after Sama 2002]. It is currently at risk of extinction in some countries (Czech Republic and Slovakia) [Hůrka 2005].

For many years the longhorn beetle was treated as a timber pest in conifers [Michalski and Mazur 2001, Mazur 2003, Dominik and Starzyk 2004]. It was seen as the originator of damage observed in i.a. wooden utility poles (telecommunication, lighting), railway sleepers and other wooden structures – including houses, deer stands, or fire observation towers. However, with time its positive role in forest ecosystems began to be recognised – as a factor accelerating decay and mineralization of stumps [Brauns 1975, Dominik and Starzyk 2004].

In Poland the subject species remained protected only since 2001 (Rozporządzenie... 2001 – Regulation of the Minister of the Environment of 26th September 2001, Journal of Laws 2001, no. 130, item 1456). It was entered into the Red List of Threatened Animals in Poland [Pawłowski et al. 2002] under category VU (vulnerable species). Currently, by virtue of the Regulation of the Minister of the Environment of 6th October 2014 (Rozporządzenie... 2014 – Journal of Laws 2014, item 1348), protection of this species has been withdrawn.

Despite of the protection established in 2001 resulting from national law, the insect was not included in the list of protected species within the European network of protected areas Nature 2000. This resulted in the insect not being listed in the inventory of Nature 2000 species conducted by the State Forests in 2006-2007. For this reason researchers have been able to publish information about only a handful of occurrence sites of *Ergates faber*, which makes its population difficult to assess. Due to the above foresters were faced with the challenge to preserve the species in Polish forests. Elaborating new principles of commercial forestry allowing for the development and presence of *Ergates faber* in stands of trees became a necessity and as such constitutes the purpose of this study.

DISTRIBUTION IN POLAND

In Poland *Ergates faber* is most common in lowland pine forests growing on poor soils [Dominik et al. 1998]. It is most numerous in the forest of Puszcza Kurpiowska, in the dune part of the Puszcza Biała forest, in the coniferous forests around Toruń, Włocławek and Bydgoszcz, as well as in the Lubuskie Lakeland and the coniferous forests of Bolesławiec and Żagań [Burakowski et al. 1990, Dominik and Starzyk 2004].

BIOLOGY

The beetles can be observed from late June to mid August, sometimes even in early September (Phot. 1). They are active during evening-night time, spending most of the day hiding. Mating and egg-laying takes place during warm nights at a temperature of



male
samiec



female
samica

Phot. 1. The beetles
Fot. 1. Postacie imaginalne



Phot. 2. The pupae stage
Fot. 2. Poczwarzka

no less than 22°C [Dominik and Starzyk 2004]. The female uses a retractable ovipositor to lay the eggs (one by one, or a few at a time) in cracks and crevices of wood by attaching them with glue. In total up to 320 eggs may be laid [Brauns 1975, Dominik and Starzyk 2004].

The development of *Ergates faber* is varied and depending on trophic and climate conditions it may take from 3 to 12 years. One of the factors determining the development of larvae is wood humidity. For newly hatched larvae a wood humidity of 14% is the lower limit for development [Dominik and Starzyk 2004].

Larvae generally feed on sapwood, the outer layers of which are most nutritious. Heartwood is only used by larvae in rotten stumps [Dominik and Starzyk 2004]. According to other authors [Hůrka 2005] larvae may also chose heartwood for development.

Ecdysis takes place from late June to early July. The pupae stage (Phot. 2) last about 2-4 weeks. Imagines, depending on temperatures, live up to 40 days [Dominik and Starzyk 2004].

BIOTOPE

Ergates faber is a species connected with coniferous tree stands, preferring intensely sunlit areas [Dominik 1968, Brauns 1975, Dominik and Starzyk 2004]. Stands of trees most suitable for this insect include older single-species and even-aged pine forests of soil class III-IV [Dominik 1984].

Research conducted by Dominik [2000] revealed a similarity in habitat requirements of *Ergates faber* and the pine tree lappet. Both insects occur usually in areas characterized by low precipitation (less than 600 mm) and deep levels of ground waters. They tend to occur in pine forests with no understorey, such as sites of dry pine forests and poor fresh pine forests [Dominik 2000].

Ergates faber is found mainly in pines, rarely in other coniferous trees (spruce, fir). Occasionally it might develop in deciduous trees such as alder and poplar [Dominik and Starzyk 2004]. It is an exclusively hygrophilous species [Dominik and Starzyk 2004]. In forests it occupies stumps, coarse woody debris, butt parts of dead and dying trees, stumps of freshly cut trees and thicker fallen branches [Dominik et al. 1998, Dominik and Starzyk 2004, Hůrka 2005]. The eggs, however, may also be laid in crevices of larch stumps [Brauns 1975]. In some cases the beetle will attack healthy trees [Dominik, Starzyk 2004, after Plavilščíkov 1936]. It also colonises and damages structure wood, e.g. wooden poles, railway sleepers, wooden elements of civil structures, wooden fire observation towers and deer stands [Brauns 1975, Dominik et al. 1998, Dominik and Starzyk 2004].

MATERIAL

The paper is conceptual in character. The forestry management model applied in stands of trees owned by the State Forests was contrasted with the species' ecological requirements [Zasady hodowli lasu 2012]. The study is the result of a task assigned

to the authors by PGL LP [the State Forests] in order to establish principles of silviculture that must be implemented into the current model of forestry management.

Although the wildlife habitat inventory conducted for both fauna and flora (in line with the Habitat Directive) in forest areas administered by the State Forests in 2006-2007 (Decision no. 61 of the General Director of the State Forests dated 25.07.2006) did not include *Ergates faber*, the protection of this insect, resulting from domestic law, required the drafting of principles that would allow for protection equal to that granted to species covered in Exhibits II and IV of the Habitat Directive.

Original data on sites of occurrence of the species were referenced in UTM and subsequently a map of habitats was created.

RESULTS

For proper assessment of protection opportunities for the studied species it is necessary to obtain information on its occurrence. Due to the lack of an adequate inventory researchers are left with relatively little knowledge on the habitats of *Ergates faber*. In literature, due to the insect being under protection, usually only estimated locations are referenced. For example, in the Cedyński Landscape Park the beetle was recorded in 2001-2004 and its occurrence was referenced in UTM [Żmihorski and Barańska 2006]. The authors of this paper resolved to supplement the data available concerning the beetle's sites of occurrence with recently observed locations (Table 1), not published in literature before (Fig. 1).

Adding new entries to the information available on the species' occurrence will enable the preparation of a distribution map for this beetle in Poland.

Table 1. Sites of occurrence of *Ergates faber* identified in 1993-2012

Tabela 1. Stanowiska występowania borodzieja cieśli stwierdzone w latach 1993-2012

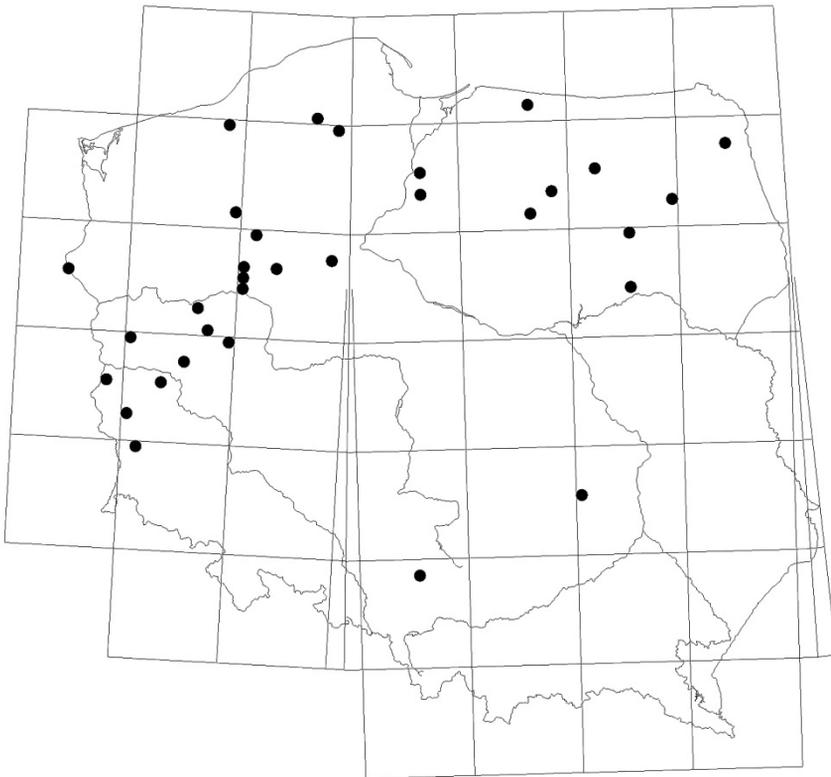
Lp. No.	Miejsce występowania Site of occurrence UTM	Podstawa stwierdzenia stanowiska Basis for stating occurrence	Rok Year
1	2	3	4
1.	CE63	feeding grounds żerowiska	1993; 1998
2.	WU62	imagines chrząszcze	1993
3.	XU36	feeding grounds, imagines żerowiska, chrząszcze	1994; 1997; 2001
4.	DF61	feeding grounds, imagines żerowiska, chrząszcze	1994; 1998
5.	CA58	imagines chrząszcze	1995
6.	EE92	feeding grounds, imagines żerowiska, chrząszcze	1995; 2004

Table 1 cont. – Tabela 1 cd.

1	2	3	4
7.	XU87	feeding grounds, imagines żerowiska, chrząszcze	1996; 1999; 2006
8.	WT57	feeding grounds, pupae żerowiska, poczwarki	1996; 2001; 2007
9.	XU19	pupae, feeding grounds poczwarki, żerowiska	1997
10.	VU45	feeding grounds, larvae, pupae żerowiska, larwy, poczwarki	1997; 2002
11.	WT02	feeding grounds, imagines żerowiska, chrząszcze	1998; 1999; 2000
12.	WS19	feeding grounds, pupae, imagines żerowiska, poczwarki, chrząszcze	1999; 2000; 2003
13.	WV89	feeding grounds, larvae, pupae żerowiska, larwy, poczwarki	1999; 2003
14.	XU04	imagines chrząszcze	2000
15.	WU62	feeding grounds żerowiska	2000; 2006
16.	CE65	feeding grounds, larvae żerowiska, larwy	2001; 2002; 2003
17.	FE47	feeding grounds żerowiska	2001; 2004; 2009
18.	WU70	numerous imagines liczne chrząszcze	2001; 2003; 2005; 2007; 2009
19.	WV91	active feeding grounds czynne żerowisko	2002
20.	ED54	feeding grounds żerowiska	2002; 2003
21.	XA60	feeding grounds żerowiska	2002; 2006
22.	WT99	numerous imagines and feeding grounds liczne chrząszcze i żerowiska	2002-2012
23.	XV89	feeding grounds żerowiska	2003
24.	EE25	feeding grounds, pupae żerowiska, poczwarki	2003
25.	VT85	imagines chrząszcze	2004
26.	ED59	feeding grounds, pupae żerowiska, poczwarki	2004; 2008
27.	XU05	imagines chrząszcze	2007

Table 1 cont. – Tabela 1 cd.

1	2	3	4
28.	XU06	feeding grounds with pupae żerowiska z poczwarkami	2007
29.	WT09	feeding grounds żerowiska	2008
30.	WT35	larvae and feeding grounds larwy i żerowiska	2008-2012
31.	DE61	feeding grounds żerowiska	2009
32.	EB05	imagines chrząszcze	2012
33.	DE83	feeding grounds żerowiska	2012

Fig. 1. Site distribution of *Ergates faber*Rys. 1. Stwierdzone stanowiska występowania *Ergates faber*

THREATS

Among risk factors endangering the species are biotic factors – such as insectivorous birds preying on beetles. Larvae and pupae are prey to woodpeckers (great spotted woodpecker, black woodpecker, European green woodpecker) and wild boars. The parasitic Hymenoptera of the family Ichneumonidae are a limiting factor, too.

It has to be noted that also human activity is certainly a threat to *Ergates faber*. Insect collecting and trading may be contributing to the decrease in the species' population [Gwiazdowicz 2005].

The current model of forestry management is also having a direct impact on the beetle's occurrence in stands of trees. It may, indeed, constitute a direct threat to the insect – through the removal of dead trees and wood from forest, milling and grubbing stumps, destroying stumps when pulverizing logging residues. Applying chemical measures to limit the population of harmful forest insects during the imago activity period may have an adverse effect on *Ergates faber*. Additionally, it has to be stressed that the current and growing trend of criticising the clearcut harvest method, supported by opinions of the method having an adverse effect on forest habitats, may result in it being abandoned altogether and therefore contribute to the decrease in the population of *Ergates faber* for which clearcut harvested areas are favourable development locations. As Dominik [1968] states, the *Ergates faber* beetle is most numerous in highly sunlit parts of the forest. Stumps located in shaded clearcut areas are inhabited less frequently and in smaller numbers.

Conducting chemical control of harmful insects by using contact and stomach poison insecticides may bear negative impact on *Ergates faber* in cases when the prospective action coincides with the beetle's activity period.

CONCLUSIONS

All of the available information on the occurrence of *Ergates faber* is still not sufficient to assess the size of its population. In most cases its occurrence is stated based on observation of either imagines or remains thereof, or feeding grounds. This, however, gives us not more than an estimated picture of the species' possible distribution, while it does not inform about the count of its population. Of course, voices may be raised that *Ergates faber* is not endangered in Poland, since it managed to survive years of declining trees being removed from forests and their material used up completely. However, as noted previously in this paper, granting the subject insect statutory species protection (in 2001-2014) meant a change of perspective and implied that adequate conditions were to be ensured for the beetle's development.

Due to its size (beetles count among the largest insects in Poland) the species is potentially subject to exploitation by collectors and people involved in insect trading [Gwiazdowicz 2005]. The long development cycle can also be seen as a risk factor. It is probable that inhabited material will be used as firewood and cut together with the larvae dwelling inside – especially in cases when the first generation of beetles had still not left the wood and there are no exit openings visible.

Conducting logging activities in pine forests during the mating period may result in eggs being laid in material intended for collection and industrial purposes, which means

the population of the species might decrease. On the other hand, completing timber collection directly prior to the mating period provides a large amount of fresh stumps – an ideal mating base for *Ergates faber*.

Despite many factors negatively impacting the *Ergates faber*, its future presence seems to be secure. Due to this insect being primarily connected with the pine tree (Poland's main forest-building species) and pine habitats, suitable biotopes will always be readily available. Intentionally leaving dead wood on the forest bed to ensure natural decay, as well as stumps remaining after logging works are supportive factors that provide sufficient locations that may be potentially used for breeding. Limitations in applying insecticides in forests, resulting from European Union regulations and guidelines issued by certification bodies are additionally benefiting the species. Common awareness, especially among forestry service members, of threats to *Ergates faber* is also important and education on applying silvicultural measures possibly least adverse to the species is not without significance. Further, the insect is able to develop as a typical timber pest by inhabiting worn material, wooden structures or firewood – which significantly increases its potential development base (the paper's authors noticed the beetle to inhabit and develop in a fragment of a pine trunk ca. 60 cm in length that has been used for years as a stump for splitting wood).

The results of the study are a proposition of silvicultural measures aiming at the protection of *Ergates faber*.

Proposed silvicultural measures

Understanding the threats resulting from the currently applied model of forestry management the authors propose the following silvicultural principles, favourable in terms of the species' protection. The mentioned principles have been divided as follows:

Silvicultural activities aiming at preserving the species:

- Maintaining clearcut harvest in pine forests: clearcut harvest is beneficial considering the species' biology. Clearcut areas provide *Ergates faber* with sufficient amounts of properly sunlit pine stumps, which serve as a potential breeding base.
- Protecting saproxylophagous species: due to the need to protect saproxylophagous species, including *Ergates faber*, the following measures are advised:
 - inhabited trees must remain in the forest, unconditionally, until their biological decay
 - it may be beneficial to leave slightly higher pine stumps in the most sunlit parts of clearcut areas to improve development conditions for *Ergates faber*
 - old trees with scorched fragments, declining, dead trees and bulk-sized logging residues should be left in sunlit areas of tree stands
 - avoid milling and grubbing stumps, if necessary leave ca. 10% of the stumps; choose the bulkiest above surface, or leave those located in the most sunlit part of the area, i.e. Southern side – the latter being most recommended
 - for pulverising logging residues technologies allowing to leave the thickest stumps undamaged on the surface should be used
 - whenever possible, obtaining wood from pine tree stands during the mating season should be avoided, while cut material should be collected from the forest before mating starts.

Activities related to fighting harmful insects: it is recommended to avoid, whenever possible, applying chemical insecticides for fighting harmful insects throughout the activity period of imagines.

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REFERENCES

- Bense U., 1995. Longhorn beetles. Illustrated key to the Cerambycidae and Vesperidae of Europe. Margraf Weikersheim.
- Brauns A., 1975. Owady leśne [Forest insects]. PWRiL Warszawa [in Polish].
- Burakowski B., Mroczkowski M., Stefańska J., 1990. Chrzęszcze Coleoptera, Cerambycidae i Bruchidae. Katalog Fauny Polski, cz. 23, t. 15 [Beetles Coleoptera, Cerambycidae and Bruchidae. Catalogue of fauna of Poland. Part 23, vol. 15]. PWN Warszawa [in Polish].
- Decyzja nr 61 dyrektora generalnego Lasów Państwowych z 25 lipca 2006 r. w sprawie przeprowadzenia w roku 2006 i 2007 powszechnej inwentaryzacji siedlisk przyrodniczych oraz dzikiej fauny i flory, o których mowa w dyrektywach Rady Europejskiej [Decision no. 61 of the Director General of the State Forests of 25 July 2006 on the performance of general survey of nature habitats and wildlife in 2006 and 2007, as specified in the directives of the European Council]. Biul. Inf. LP 9, 10-12 [in Polish].
- Dominik J., 1968. Obserwacje nad składem gatunkowym i liczebnością występowania niektórych owadów niszczących drewno w lesie w zależności od nasłonecznienia wnętrza drzewostanu [Observations on the species composition and population size of selected wood-destroying insects in forests depending on insolation of stand interior]. Sylwan 2, 29-33 [in Polish].
- Dominik J., 1984. Próba wykorzystania pniaków sosnowych opanowanych przez borodzieja (*Ergates faber* L.) jako wskaźników potencjalnego zagrożenia sośnin przez niektóre ksylofagiczne i foliofagiczne owady [An attempt to use pine stumps colonised by (*Ergates faber* L.) as an indicator of potential threat for pine stands by certain xylo- and foliophagous insects]. In: III Sympozjum Ochrony Ekosystemów Leśnych. Rogów (20-21 XI 1985). Wyd. SGGW-AR Warszawa, 75-83 [in Polish].
- Dominik J., 2000. Zasiadanie pniaków sosnowych przez borodzieja (*Ergates faber* L.) jako wskaźnik potencjalnego zagrożenia drzewostanów przez barczatkę sosnowkę (*Dendrolimus pini* L.) [Colonisation of pine stumps by *Ergates faber* L. as an indicator of potential threat to stands by pine moth (*Dendrolimus pini* L.)]. Sylwan 144, 9, 109-111 [in Polish].
- Dominik J., Starzyk J.R., 2004. Owady uszkadzające drewno [Wood-destroying insects]. PWRiL Warszawa [in Polish].
- Dominik J., Starzyk J.R., Kinelski S., Dzwonkowski R., 1998. Atlas owadów uszkadzających drewno [An atlas of wood-destroying insects]. Mulico Warszawa [in Polish].
- Gwiazdowicz D.J., 2005. Ochrona bezkręgowców [Protection of invertebrates]. In: Ochrona przyrody w lasach. I. Ochrona zwierząt. Ed. D.J. Gwiazdowicz. Wyd. ORNATUS Poznań, 9-24 [in Polish].
- Hůrka K., 2005. Borouci České and Slovenské republiky [Beetles of the Czech and Slovak Republics]. Nakladatelství Kabourek Zlín [in Czech].

- Mazur A., 2003. Owadzie szkodniki techniczne drewna [Insect pests damaging structural wood]. Przem. Drzew. 5, 28-29 [in Polish].
- Michalski J., Mazur A., 2001. Ochrona lasu przed owadzimi szkodnikami wtórnymi [Protection of forests against secondary pest insects]. In: Poradnik ochrony lasu. Ed. O. Łęski. Ofic. Edyt. Wyd. Świat Warszawa, 135-205 [in Polish].
- Pawłowski J., Kubisz D., Mazur M., 2002. *Coleoptera* Chrząszcze [Coleoptera Beetles]. In: Czerwona lista zwierząt ginących i zagrożonych w Polsce. Ed. Z. Głowaciński. Inst. Ochr. Przyr. PAN Kraków, 88-112 [in Polish].
- Plavišćikov N.N., 1936. Żuki drewoseki. Č. 1. In: Fauna SSSR. Nasekomye, žestkokrylye. T. 21. Izd. ANN SSSR Moskva-Leningrad.
- Rozporządzenie Ministra Środowiska z dnia 26 września 2001 r. w sprawie określenia listy gatunków zwierząt rodzimych dziko występujących objętych ochroną gatunkową ścisłą i częściową oraz zakazów dla danych gatunków i odstępstw od tych zakazów [Regulation of the Minister of the Environment of 26 September 2001 on the specification of the list of species of native animals found in the wild, covered by strict and partial protection and bans for specific species and exemptions from these bans]. 2001. Dz. U. nr 130, poz. 1456 [in Polish].
- Rozporządzenie Ministra Środowiska z dnia 12 października 2011 r. w sprawie określenia listy gatunków zwierząt rodzimych dziko występujących objętych ochroną gatunkową ścisłą i częściową oraz zakazów dla danych gatunków i odstępstw od tych zakazów [Regulation of the Minister of the Environment of 12 October 2011 on the specification of the list of species of native animals found in the wild, covered by strict and partial species protection and bans for specific species and exemptions from these bans]. 2011. Dz. U. nr 237, poz. 1419 [in Polish].
- Rozporządzenie Ministra Środowiska z dnia 6 października 2014 roku w sprawie ochrony gatunkowej zwierząt [Regulation of the Minister of the Environment of 6 October 2014 on the protection of the animals species]. 2014. Dz.U., poz. 1348 [in Polish].
- Sama G., 2002. Atlas of the *Cerambycidae* of Europe and the Mediterranean Area. Vol. 1: Northern, Western, Central and Eastern Europe, British Isles and Continental Europe from France (excl. Corsica) to Scandinavia and Urals. Nakł. Kabourek Zlin.
- Zahradnik J., 2001. Przewodnik kózkowate [A guide to long-horned beetles]. Mulico Warszawa [in Polish].
- Zasady hodowli lasu [Principles of Silviculture]. 2012. Centrum Informacyjne Lasów Państwowych Warszawa [in Polish].
- Żmihorski M., Barańska K., 2006. Stanowiska rzadkich chrząszczy [Insecta: Coleoptera] w Cedyńskim Parku Krajobrazowym [Localities of rare beetles [Insecta: Coleoptera] in the Cedyń Landscape Park]. Parki Narodowe i Rezerваты Przyrody 25, 3, 19-26 [in Polish].

**WYSTĘPOWANIE BORODZIEJA PRÓCHNIKA *ERGATES FABER*
(LINNAEUS 1761) (COLEOPTERA, CERAMBYCIDAE)
ORAZ PROPOZYCJA POSTĘPOWANIA OCHRONNEGO
W LASACH GOSPODARCZYCH
MAJĄCA NA CELU ZACHOWANIE GATUNKU**

Streszczenie. W pracy przedstawiono propozycję postępowania gospodarczego mającego na celu ochronę borodzieja próchnika *Ergates faber* (Linnaeus 1761). Borodziej jest gatunkiem chrząszcza (Coleoptera) z rodziny kózkowatych (Cerambycidae), który był objęty ochroną na terytorium Polski od 2001 roku w myśl Rozporządzenia Ministra Środowiska, z 26 września 2001 roku (Dz.U. 2001, nr 130, poz. 1456), natomiast nie był wymieniony w żadnym załączniku dyrektywy habitatowej. Objęcie tej kózki ochroną gatunkową

na terytorium Polski wymagało wypracowania takich zasad prowadzenia gospodarki leśnej, które były najbardziej właściwe dla zachowania tego gatunku. Podano również niepublikowane do tej pory stanowiska występowania opisywanego owada.

Słowa kluczowe: *Ergates faber*, *Cerambycidae*, borodziej, owady, zasady zachowania gatunków w lasach gospodarczych

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