

# A REVIEW OF LATVIAN SAPROXYLIC BEETLES FROM THE EUROPEAN RED LIST

**Uldis Valainis, Arvīds Barševskis, Maksims Balalaikins, Raimonds Cibulskis, Sakine Serap Avgin**

Valainis U., Barševskis A., Balalaikins M., Cibulskis R., Serap Avgin S. 2014. A review of Latvian saproxylic beetles from the European Red List. *Acta Biol. Univ. Daugavp.*, 14 (2): 217 – 227.

Saproxylic beetles are a functional group of Coleoptera that depend on wood decay and therefore play an important role in decomposition processes and thus for recycling nutrients in natural ecosystems. There is the European Red List of Saproxylic Beetles published by International Union for Conservation of Nature. This paper gives an overview of the saproxylic beetle species found in Latvia and included in the European Red list. The aim of this work was to analyse the composition and conservation status of these species, as well as to provide suggestions for updating list of specially protected species.

Key words: saproxylic beetles, conservation, Latvia

*Uldis Valainis, Arvīds Barševskis, Maksims Balalaikins, Raimonds Cibulskis. Institute of Life Sciences and Technology, Daugavpils University, Vienības 13, Daugavpils, LV-5400, Latvia, e-mail: uldis.valainis@biology.lv, arvids.barsevskis@du.lv, raimonds.cibulskis@biology.lv, maksims.balalaikins@biology.lv*

*Sakine Serap Avgin. Faculty of Education, Division of Science Education, and Faculty of Art and Science, Department of Biology, Avşar Campus, 46100, Kahramanmaraş, Turkey, e-mail: serapavgin@hotmail.com*

## INTRODUCTION

The order Coleoptera with more than 350 000 - 400 000 species is the largest order in the animal world, and comprises about 40% from all known insect species and about 30% from all known animal species (Bouchard et al. 2009, Hammond 1992, Liebherr et al. 2003).

The precise number of saproxylic beetle species is not known, but in Europe without doubt there are several thousands of saproxylic species (Nieto & Alexander 2010). Beetle species inhabiting decaying wood are dependent on specific tree

species, light and moisture regimes, wood decay stage, microorganisms and other factors (Alexander 2008). Saproxylic beetles have important interactions with other organisms which are significant for ecosystem and economy (Nieto & Alexander 2010).

Saproxylic beetles of Europe are more endangered than many other ecological groups of beetles. The most important habitat for these beetles are old-growth hollow trees, woody debris and other kinds of dead wood, unfortunately amount of such dead wood is decreasing due to intensive forestry. Management of forests which controls

the amount of dead wood and the age of forest sites is the main influence on species richness (Simila et al. 2003, Irmiler et al. 2010). There is the European Red List of Saproxyllic Beetles (ERLSB) published by International Union for Conservation of Nature (IUCN) (Nieto & Alexander 2010). The Red List provides taxonomy, conservation status, distribution, main threats and conservation measures on taxa that have been evaluated using the IUCN Red List Categories and Criteria: Version 3.1 (IUCN 2001). This system is designed to determine the relative risk of extinction, with the main purpose of cataloguing and highlighting those taxa that are facing a higher risk of extinction. The Categories are based on a set of quantitative criteria linked to population trends, population size and structure and geographic range (Fig. 1).

## MATERIAL AND METHODS

The aim of this research was to estimate representation of species included in the ERLSB in the fauna of Latvia and number of species in different categories of threatened species according classification of IUCN, and to compare these data for development of concrete suggestions for protection of these species.

## RESULTS AND DISCUSSION

131 species (30%) of the saproxyllic beetle species assessed by the ERLSB are present in Latvia (Table 1). Five species found in Latvia are threatened at the European level. One of them, *Cucujus haematodes* Erichson, 1845 (Fig. 2), refers to “Critically Endangered” species, two species, *Lacon lepidopterus* (Panzer, 1801) and *Hylochares cruentatus* (Gyllenhal, 1808) (Fig. 3), are included in the category “Endangered” but two other species, *Boros schneideri* (Panzer, 1795) (Fig. 4) and *Ampedus hjorti* (Rye, 1905) (Fig. 5) - in the category “Vulnerable” species. 17 of species are considered as “Near Threatened” at the European level. The species in this group are very dependent on the dynamics of tree aging and wood decay processes. The major threat to this

group is logging and wood harvesting therefore these beetles require sensitive conservation management of tree populations irrespective of their situation (Nieto & Alexander 2010). There was not enough scientific information about 7 species to evaluate their risk of extinction in Europe level and they were classified as “Data Deficient”. Full list of species distributed in Latvia within each category of threat is shown in Table 2.

About 4% from more than 3400 beetle species distributed in Latvia are included in the ERLSB (Telnov 2004). These saproxyllic species belong to 14 families and are shown in Fig. 6. Most species-rich families are Cerambycidae (38 species), Elateridae (35 species), Eucnemidae (11 sugas) and Mycetophagidae (11 species).

Most of the species that are threatened at the European level are present in Latvia. Therefore, Latvia is responsible for protecting these species in its territory. Most of the species included in the ERLSB have no official conservation status in Latvia. Only 18 of 131 saproxyllic species are protected in Latvia. 16 species are woodland key habitat specialists (WKH (S)) - threatened species that are dependent on a certain level of quality in specific woodland habitats and will become extinct if these habitats will be subjected to destructive treatment. Whereas, 4 species are characterized as woodland key habitats indicator species (WKH (IS)) - species that have high demands on its living conditions but not as high as those of a habitat specialist (Ek et al. 2002).

Risks of biodiversity loss in Europe have guided European Union to develop new biodiversity strategy (EU biodiversity strategy to 2020) that was confirmed on May 2011 (European Union 2011, European Commission 2012). The aim of this new and extensive strategy is to stop exhaustion of biodiversity and ecosystem services in European Union until 2020. Latvia as an EU Member State has committed to halt biodiversity loss by 2020 but urgent action is needed to achieve this target. There is urgent need to revise official protected species lists in order to include the ERLSB species as well as other local endangered species. It is necessary to include saproxyllic

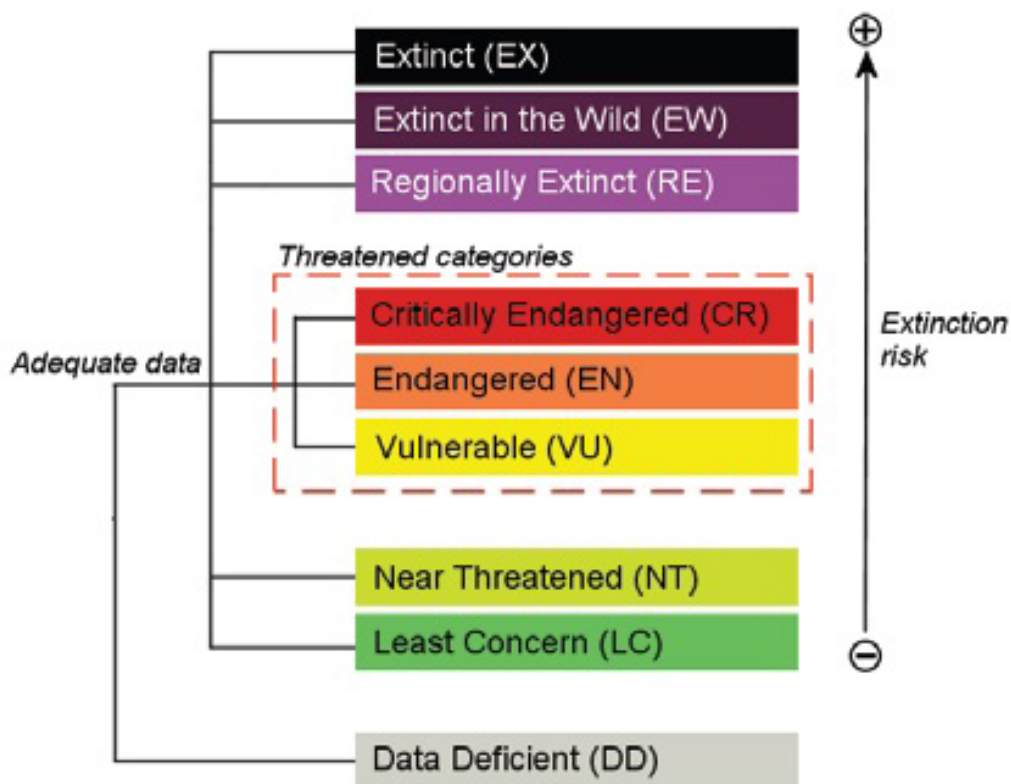


Fig.1. Red List Categories taken from International Union for Conservation of Nature (IUCN) (Nieto & Alexander 2010).

Table 1. Number of saproxylic beetle species in Europe and Latvia within each category of threat

	IUCN Red List categories	Number of species in Europe*	Number of species in Latvia
<b>Threatened categories</b>	<b>Critically Endangered (CR)</b>	<b>2</b>	<b>1</b>
	<b>Endangered (EN)</b>	<b>27</b>	<b>2</b>
	<b>Vulnerable (VU)</b>	<b>17</b>	<b>2</b>
	<b>Near Threatened (NT)</b>	<b>56</b>	<b>17</b>
	<b>Least Concern (LC)</b>	<b>207</b>	<b>102</b>
	<b>Data Deficient (DD)</b>	<b>122</b>	<b>7</b>
	<b>Total number of species assessed</b>	<b>431</b>	<b>131</b>

\*According to Nieto & Alexander (2010)



Fig. 2. *Cucujus haematodes* Erichson, 1845.



Fig. 3. *Hylochares cruentatus* (Gyllenhal, 1808).



Fig. 4. *Boros schneideri* (Panzer, 1795).



Fig. 5. *Ampedus hjorti* (Rye, 1905).

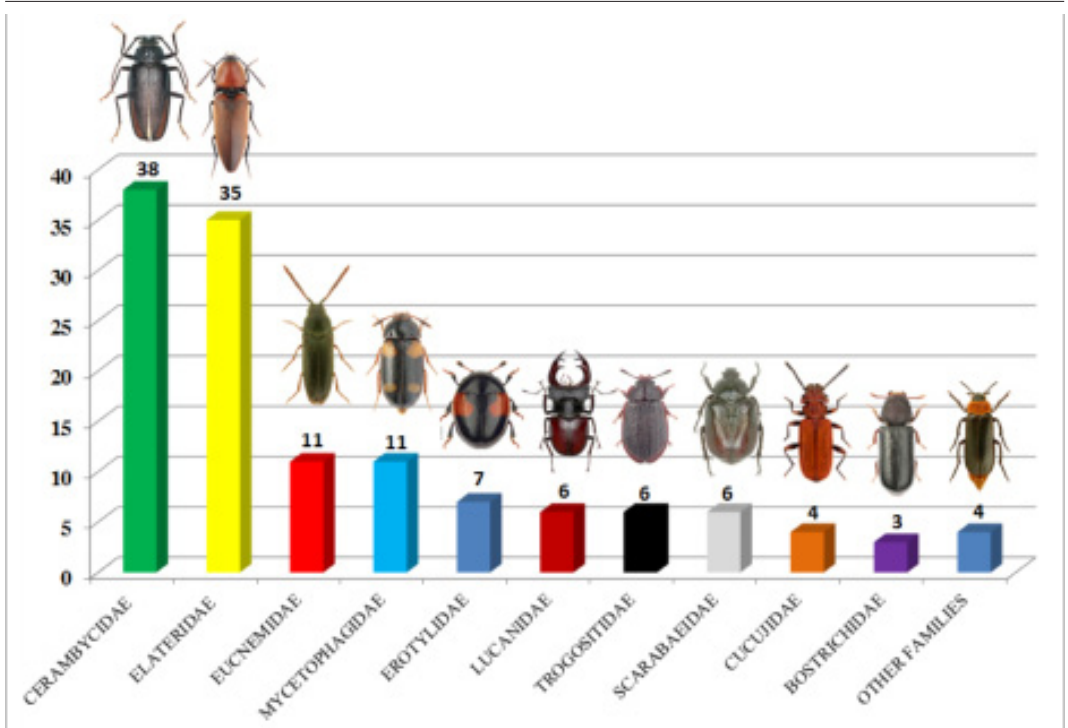


Fig.6. ERLSB saproxylic beetle families (x-axis) distributed in Latvia. y-axis shows number of saproxylic beetle species in each family.

Table 2. Latvian saproxylic beetle species and their conservation status in Europe and Latvia

No	Species	IUCN Category (Europe)	Status in Latvia
<b>BORIDAE</b>			
1.	<i>Boros schneideri</i> (Panzer, 1795)	VU	PS; WKH (S)
<b>BOSTRICHIDAE</b>			
2.	<i>Bostrichus capucinus</i> (Linnaeus, 1758)	LC	
3.	<i>Stephanopachys linearis</i> (Kugelann, 1792)	LC	PS
4.	<i>Stephanopachys substriatus</i> (Paykull, 1800)	LC	PS
<b>CERAMBYCIDAE</b>			
5.	<i>Anaglyptus mysticus</i> (Linnaeus, 1758)	LC	
6.	<i>Aromia moschata</i> (Linnaeus, 1758)	LC	
7.	<i>Axinopalpis gracilis</i> (Krynicky, 1832)	LC	
8.	<i>Callidium aeneum</i> (DeGeer, 1775)	LC	
9.	<i>Callidium coriaceum</i> Paykull, 1800	LC	
10.	<i>Callidium violaceum</i> (Linnaeus, 1758)	LC	
11.	<i>Cerambyx cerdo</i> Linnaeus, 1758	NT	PS

No	Species	IUCN Category (Europe)	Status in Latvia
12.	<i>Chlorophorus figuratus</i> (Scopoli, 1763)	LC	
13.	<i>Chlorophorus herbstii</i> (Brahm, 1790)	LC	
14.	<i>Clytus arietis</i> (Linnaeus, 1758)	LC	
15.	<i>Cyrtoclytus capra</i> (Germar, 1824)	LC	
16.	<i>Ergates faber</i> (Linnaeus, 1761)	LC	PS; WKH (S)
17.	<i>Glaphyra umbellatarum</i> (Schreber, 1759)	LC	
18.	<i>Hylotrupes bajulus</i> (Linnaeus, 1758)	LC	
19.	<i>Leioderus kollari</i> Redtenbacher, 1849	LC	
20.	<i>Molorchus minor</i> (Linnaeus, 1758)	LC	
21.	<i>Monochamus galloprovincialis</i> (Germar, 1818)	LC	
22.	<i>Monochamus rosenmuelleri</i> (Cederhjelm, 1798)	LC	WKH (S)
23.	<i>Monochamus saltuarius</i> Gebler, 1830	LC	
24.	<i>Monochamus sutor</i> (Linnaeus, 1758)	LC	
25.	<i>Obrium brunneum</i> (Fabricius, 1792)	LC	
26.	<i>Obrium cantharinum</i> (Linnaeus, 1767)	LC	
27.	<i>Phymatodes testaceus</i> (Linnaeus, 1758)	LC	
28.	<i>Plagionotus arcuatus</i> (Linnaeus, 1758)	LC	
29.	<i>Plagionotus detritus</i> (Linnaeus, 1758)	LC	
30.	<i>Poecilium alni</i> (Linnaeus, 1767)	LC	
31.	<i>Prionus coriarius</i> (Linnaeus, 1758)	LC	PS
32.	<i>Ropalopus clavipes</i> (Fabricius, 1775)	LC	
33.	<i>Ropalopus femoratus</i> (Linnaeus, 1758)	LC	
34.	<i>Ropalopus macropus</i> (Germar, 1824)	LC	
35.	<i>Saperda perforata</i> (Pallas, 1773)	LC	WKH (S)
36.	<i>Saperda punctata</i> (Linnaeus, 1767)	NT	
37.	<i>Saperda scalaris</i> (Linnaeus, 1758)	LC	
38.	<i>Semanotus undatus</i> (Linnaeus 1758)	LC	
39.	<i>Stromatium unicolor</i> (Olivier, 1795)	LC	
40.	<i>Tragosoma depsarium</i> (Linnaeus, 1767)	NT	PS; WKH (S)
41.	<i>Xylotrechus arvicola</i> (Olivier, 1795)	LC	
42.	<i>Xylotrechus rusticus</i> (Linnaeus, 1758)	LC	
<b>SCARABAEIDAE</b>			
43.	<i>Gnorimus nobilis</i> (Linnaeus, 1758)	LC	PS; WKH (S)



No	Species	IUCN Category (Europe)	Status in Latvia
44.	<i>Gnorimus variabilis</i> (Linnaeus, 1758)	NT	PS; WKH (S)
45.	<i>Osmoderma barnabita</i> Motschulsky, 1845	NT	
46.	<i>Protaetia lugubris</i> (Herbst, 1786)	LC	PS; WKH (S)
47.	<i>Trichius fasciatus</i> (Linnaeus, 1758)	LC	
48.	<i>Valgus hemipterus</i> (Linnaeus, 1758)	LC	
<b>CUCUJIDAE</b>			
49.	<i>Cucujus cinnaberinus</i> (Scopoli, 1763)	NT	PS
50.	<i>Cucujus haematodes</i> Erichson, 1845	CR	
51.	<i>Pediacus fuscus</i> Erichson, 1845	LC	
52.	<i>Pediacus depressus</i> (Herbst, 1794)	LC	
<b>ELATERIDAE</b>			
53.	<i>Ampedus balteatus</i> (Linnaeus, 1758)	LC	
54.	<i>Ampedus bouweri</i> Schimmel, 1984	DD	
55.	<i>Ampedus cardinalis</i> (Schiödte, 1865)	NT	
56.	<i>Ampedus cinnabarinus</i> (Eschscholtz, 1829)	LC	
57.	<i>Ampedus elegantulus</i> (Schönherr, 1817)	LC	
58.	<i>Ampedus elongatulus</i> (Fabricius, 1787)	NT	
59.	<i>Ampedus erythrogonus</i> (P.W.J.Müller, 1821)	LC	
60.	<i>Ampedus hjorti</i> (Rye, 1905)	VU	
61.	<i>Ampedus nigrinus</i> (Herbst, 1784)	LC	
62.	<i>Ampedus nigroflavus</i> (Goeze, 1777)	LC	
63.	<i>Ampedus pomonae</i> (Stephens, 1830)	LC	
64.	<i>Ampedus pomorum</i> (Herbst, 1784)	LC	
65.	<i>Ampedus praeustus</i> (Fabricius, 1792)	LC	
66.	<i>Ampedus sanguineus</i> (Linnaeus, 1758)	LC	
67.	<i>Ampedus sanguinolentus</i> (Schrank, 1776)	LC	
68.	<i>Ampedus triangulum</i> (Dorn 1925)	LC	
69.	<i>Ampedus tristis</i> (Linnaeus, 1758)	LC	
70.	<i>Ampedus vandalitae</i> Lohse, 1976	DD	
71.	<i>Ampedus zieglerei</i> Zeising & Sieg, 1983	DD	
72.	<i>Calambus bipustulatus</i> (Linnaeus, 1767)	LC	
73.	<i>Cardiophorus gramineus</i> (Scopoli, 1763)	NT	
74.	<i>Cardiophorus ruficollis</i> (Linnaeus, 1758)	LC	

No	Species	IUCN Category (Europe)	Status in Latvia
75.	<i>Crepidophorus mutilatus</i> (Rosenhauer 1847)	NT	
76.	<i>Danosoma conspersus</i> (Gyllenhal, 1808)	LC	
77.	<i>Danosoma fasciata</i> (Linnaeus, 1758)	LC	
78.	<i>Denticollis borealis</i> (Paykull, 1800)	LC	WKH (S)
79.	<i>Denticollis linearis</i> (Linnaeus, 1758)	LC	
80.	<i>Denticollis rubens</i> Piller, Mitterpacher, 1783	LC	PS
81.	<i>Diacanthous undulatus</i> (DeGeer, 1774)	LC	WKH (S)
82.	<i>Elater ferrugineus</i> Linnaeus, 1758	NT	
83.	<i>Lacon lepidopterus</i> (Panzer, 1801)	EN	
84.	<i>Melanotus castanipes</i> (Paykull, 1800)	LC	
85.	<i>Melanotus villosus</i> (Geoffroy, 1785)	LC	
86.	<i>Procræus tibialis</i> (Lacordaire, 1835)	LC	
87.	<i>Stenagostus rufus</i> (DeGeer, 1774)	LC	PS
<b>EROTYLIDAE</b>			
88.	<i>Dacne bipustulata</i> (Thunberg, 1781)	LC	
89.	<i>Triplax aenea</i> (Schaller, 1783)	LC	
90.	<i>Triplax rufipes</i> Fabricius 1787	LC	
91.	<i>Triplax russica</i> (Linnaeus, 1758)	LC	
92.	<i>Triplax scutellaris</i> Charpentier 1825	LC	
93.	<i>Tritoma bipustulata</i> Fabricius, 1775	LC	
94.	<i>Tritoma subbasalis</i> (Reitter, 1896)	LC	
<b>EUCNEMIDAE</b>			
95.	<i>Clypeorhagus clypeatus</i> (Hampe, 1850)	DD	
96.	<i>Eucnemis capucinus</i> Ahrens, 1812	LC	
97.	<i>Hylis foveicollis</i> (Thomson, 1874)	LC	
98.	<i>Hylis olexai</i> (Palm, 1955)	LC	
99.	<i>Hylis procerulus</i> (Mannerheim, 1823)	LC	
100.	<i>Hylocharis cruentatus</i> (Gyllenhal, 1808)	EN	
101.	<i>Microrhagus lepidus</i> Rosenhauer, 1847	LC	
102.	<i>Microrhagus pygmaeus</i> (Fabricius, 1792)	LC	
103.	<i>Otho spondyloides</i> (Germar, 1818)	DD	
104.	<i>Rhacopus sahlbergi</i> (Mannerheim, 1823)	LC	
105.	<i>Xylophilus corticalis</i> (Paykull, 1800)	LC	



No	Species	IUCN Category (Europe)	Status in Latvia
<b>LEIODIDAE</b>			
106.	<i>Agathidium pulchellum</i> Wankowicz, 1869	NT	PS
<b>LUCANIDAE</b>			
107.	<i>Ceruchus chrysomelinus</i> (Hochenwarth, 1785)	NT	PS; WKH (S)
108.	<i>Dorcus parallelipedus</i> (Linnaeus, 1758)	LC	PS; WKH (S)
109.	<i>Lucanus cervus</i> (Linnaeus, 1758)	NT	PS; WKH (S)
110.	<i>Platycerus caprea</i> (DeGeer, 1774)	LC	WKH (IS)
111.	<i>Platycerus caraboides</i> (Linnaeus, 1758)	LC	WKH (IS)
112.	<i>Sinodendron cylindricum</i> (Linnaeus, 1758)	LC	
<b>MELANDRYIDAE</b>			
113.	<i>Phryganophilus ruficollis</i> (Fabricius, 1798)	NT	PS
<b>MYCETOPHAGIDAE</b>			
114.	<i>Litargus connexus</i> (Geoffroy, 1785)	LC	
115.	<i>Mycetophagus ater</i> (Reitter, 1879)	DD	
116.	<i>Mycetophagus decempunctatus</i> Fabricius, 1801	LC	
117.	<i>Mycetophagus fulvicollis</i> Fabricius, 1793	LC	
118.	<i>Mycetophagus multipunctatus</i> Fabricius, 1792	LC	
119.	<i>Mycetophagus piceus</i> (Fabricius, 1776)	LC	
120.	<i>Mycetophagus populi</i> Fabricius, 1798	LC	
121.	<i>Mycetophagus quadriguttatus</i> P.W.J.Müller, 1821	LC	
122.	<i>Mycetophagus quadripustulatus</i> (Linnaeus, 1761)	LC	WKH (IS)
123.	<i>Mycetophagus tschitscherini</i> (Reitter, 1897 nec Semenov, 1898)	DD	
124.	<i>Triphyllus bicolor</i> (Fabricius, 1776)	LC	
<b>PYTHIDAE</b>			
125.	<i>Pytho depressus</i> (Linnaeus, 1767)	LC	
<b>TROGOSITIDAE</b>			
126.	<i>Calitys scabra</i> (Thunberg, 1784)	NT	WKH (S)
127.	<i>Grynocharis oblonga</i> (Linnaeus, 1758)	LC	WKH (S)
128.	<i>Nemozoma elongatum</i> (Linnaeus, 1761)	LC	
129.	<i>Ostoma ferrugineum</i> (Linnaeus, 1758)	LC	
130.	<i>Peltis grossa</i> (Linnaeus, 1758)	NT	WKH (IS)
131.	<i>Thymalus limbatus</i> (Fabricius, 1787)	LC	WKH (S)

Abbreviations: **IUCN Categories** – **CR**- Critically Endangered, **EN** – Endangered, **VU** – Vulnerable, **NT** – Near Threatened, **LC** – Least Concern; **Species status in Latvia**: **PS** – Protected Species, **WKH (S)** - Woodland Key Habitats specialist; **WKH (IS)** – Woodland Key Habitats indicator species.

species from categories of threatened species in the lists of specially endangered species. From 5 species included in threatened species category, only one *Boros schneideri* is protected in Latvia. Updating protected species lists, it is necessary to take into account newest study results. One of the near threatened saproxylic species included in the protected species list of Latvia, *Osmoderma eremita* Scopoli, 1763, according to recent studies (Audisio et al. 2009, unpublished LIFE+ project EREMITA MEADOWS data) is not found in Latvia. However, other saproxylic and near threatened species, *Osmoderma barnabita* Motschulsky, 1845, is distributed in Latvia, but this species is not included in the protected species list of Latvia. In the updated list of protected species it is necessary to exclude *O. eremita* and to include *O. barnabita*.

## ACKNOWLEDGEMENTS

We thank our colleague Inese Kivleniece from Institute of Life Sciences and Technology, Daugavpils University for review and valuable comments on manuscript.

## REFERENCES

Alexander K.N.A. 2008. Tree biology and saproxylic Coleoptera: issues of definitions and conservation language. *Revue d'Ecologie (la Terre et la Vie)*, 63: 1–5.

Audisio P., Brustel H., Carpaneto G.M., Coletti G., Mancini E., Trizzino M., Antonini G., DeBiase A. 2009. Data on molecular taxonomy and genetic diversification of the European Hermit beetles, a species complex of endangered insects (Coleoptera: Scarabaeidae: Cetoniinae, *Osmoderma*). *Journal of Zoological Systematics and Evolutionary Research*, 47: 88–95.

Bouchard P., Grebennikov V.V., Smith A.B.T., Douglas H. 2009. Biodiversity of Coleoptera. In: *Insect Biodiversity: Science and Society* (eds. R.G. Foottit & P.H. Adler), pp.

265–301. Blackwell Publishing: Chichester, UK.

Ek T., Suško U., Auziņš R. 2002. Inventory of Woodland Key Habitats. Methodology. State Forest Service, Latvia, Regional Forestry Board, Östra Götaland, Sweden, Riga, Pp. 73.

European Commission. 2012. European Parliament Resolution of 20 April 2012 on Our Life Insurance, Our Natural Capital: An EU Biodiversity Strategy to 2020 (2011/2307(INI)), [http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/EP\\_resolution\\_april2012.pdf](http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/EP_resolution_april2012.pdf)

European Union. 2011. An EU Biodiversity Strategy to 2020. Publications Office of the European Union: Luxembourg, <http://ec.europa.eu/environment/nature/info/pubs/docs/brochures/2020%20Biod%20brochure%20final%20lowres.pdf>

Hammond P.M. 1992. Species inventory. In: *Global Biodiversity, Status of the Earth's Living Resources* (ed. B. Groombridge), Pp. 17–39. Chapman & Hall: London, UK.

IUCN Species Survival Commission. 2001. IUCN Red List Categories and Criteria: Version 3.1. World Conservation Union: Gland, Switzerland, Pp. 30.

Lachata T., Wermelingera B., Gossnerb M. M., Busslerc H., Isacsson G., Müllerb J. 2012. Saproxylic beetles as indicator species for dead-wood amount and temperature in European beech forests. *Ecological Indicators*, 23: 323–331.

Liebherr J.K., McHugh J.V. 2003. Coleoptera (Beetles, Weevils, Fireflies). In: *Encyclopedia of Insects* (eds. V.H. Resh & R.T. Carde). Academic Press: San Diego.

Nieto A., Alexander K.N.A. 2010. European Red List of Saproxylic Beetles. Luxembourg:

Publications Office of the European Union,  
45 p.

*Received: 24.10.2014.*

*Accepted: 28.11.2014.*

Simila M., Kouki J., Martikainen P. 2003. Saproxylic beetles in managed and seminatural Scots pine forests: quality of dead wood matters. *Forest Ecology and Management*, 174: 365–381.

Telnov D. 2004. Check-List of Latvian Beetles (Insecta: Coleoptera). In: *Compendium of Latvian Coleoptera* (ed. D. Telnov), Volume 1, Pp. 1-140. Riga.