

# REVISED LIST OF STRICTLY PROTECTED INSECTS (LEPIDOPTERA, COLEOPTERA, ORTHOPTERA AND DIPTERA) SPECIES IN NORTH MACEDONIA

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## Abstract

After the reviewed literature data and its revision, a valorization of the proposed lists of strictly protected species was carried out, whereby 24 species of the order of butterflies - Lepidoptera (Suborder Rhopalocera) are proposed for list I - strictly protected species of the North Macedonian fauna. Of them, 4 species belong to the family Skippers - Hesperidae; 4 species from the Swallowtails family - Papilionidae; 3 from the family Whites & Sulphurs - butterflies Pieridae; 7 taxa (5 species and 2 subspecies); from the family of Blue, Hairstreaks and Copper butterflies - Lycaenidae and 6 taxa (4 species and 2 subspecies) from the family of Nymphalids & Browns - Nymphalidae.

From the Moths (Suborder Heterocera) we propose 1 strictly protected species for List I.

From the Order Beetles - Coleoptera, for List I - strictly protected species, we propose 4 species: 3 species of the family Cerambycidae and 1 species of the family Scarabidae.

From the Order Grasshoppers, Locusts and Crickets - Orthoptera we propose 18 taxa (16 species and 2 subspecies) for List I - strictly protected species. From the Tettigoniidae family we propose 11 taxa (9 species and 2 subspecies); from the family Raphidophoridae 2 species; from the family Acrididae 5 species.

From the Order Flies - Diptera for List I - strictly protected species, we propose 7 species from the family of flies - Syrphidae.

For list I - strictly protected species from the Macedonian fauna, we propose a total of 54 taxa (48 species and 6 subspecies).

*Keywords:* strictly protected species, North Macedonia

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## Introduction

The Republic of North Macedonia is one of the few countries in Europe that has not established official red lists of invertebrate organisms. Thanks to the large amount of literary data that was critically analyzed, as well as the data from the collections in the Natural History Museum of Macedonia - Skopje, the collection of the Institute of Ecology and Technology, as well as information from our field research, a list of strictly protected invertebrates' species in North Macedonia was compiled.

Two goals were set:

(1) to define a list of species that will be subject to regular research in the coming years. Only the data related to the Republic of North Macedonia were taken into account;

(2) to enable the short-term protection of some species, through the protection of their habitats.

When preparing the list of species, the following criteria were taken into account: legal protection of the species; threat status; their geographical distribution/endemism, national interest, previous protection categorization and current species protection category.

The resulting list of strictly protected species of insects is made according to the two defined objectives, set in accordance with the recommendation for determining the threat status of the species taking into account the threats at the global level, the European level and the national level. In doing so, the given guidelines on the threat of species at the global, European level (IUCN, 2003) were used, as well as regional red lists, taking into account the legal status of protection using data from: the Habitats Directive (92/43/EEC); Bern and Bonn Convention, as well as the list of species subject to trade (CITES).

During the creation of the list, the limited geographical distribution of the species (endemism; national interest and the current status of protection) is taken into account.

## **Material and methods**

First of all, we collect all available literature information about each species, regarding their distribution in the Republic of North Macedonia (Chobanov, D. P. 2009a; Council Directive 92/43/EEC of 21 May 1992; Ellis, S., et al. 2023; Guéorguiev B. 2007; IUCN, 2001; IUCN, 2014; IUCN, 2016; IUCN, 2020; IUCN, 2022; Krpač, V., 2003; Krpač, V., 2006; Krpač, V., Darcemont, C., 2012; Krpač, V., et al. 2008; Krpač, V., et al. 2013; Lemonnier Darcemont, M., Chobanov, D., Krpač, V., 2014; Nieto, A., Alexander, K.N.A. 2010; Radenković, S., et al., 2017; Ramme, W. 1931; Speight, M.C.D., 2001; Szövényi, G., et al., 2016; Thurner, J., 1964; Van Swaay, et al. 2008; Vié, J.-C., (eds.) 2009; Vujić, A., et al., 2023, Yunakov, N., et al., 2023; data from the Natural History Museum in Skopje (SKO); the collection from the Institute of Ecology and Technology of Popova Shapka (IET) and others.

An analysis of the information regarding the status of populations within North Macedonia was made (Sheljuzhko, 1962a; 1962b; Krpač, 2006; Verovnik et al., 2010) as well as an evaluation of the potential threats to the habitats related to the species and the possible transformation of the habitats. in the future, using some agricultural and pastoral practices that can be implemented using the experience of other countries in Europe that have a similar climate.

By applying the criteria for species selection in the country, a list was made according to three considerations:

**(1) IUCN Criteria.** The criteria are very well and strictly defined and the application of these criteria is simple, if we have adequate data on the status of the populations in the country.

Abbreviations of IUCN Red List categories used in the text are as follows:

Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Regionally Extinct (RE), Data Deficient (DD) and Not Assessed (NE).

The criteria used are summarized as follows:

A1c: Population decline observed or estimated over the last 10 years by decreasing population prevalence.

A2c: Projected population decline over the next 10 years with population area reduction.

B1: Degree of occurrence of reduced and severely fragmented population distribution in the area.

B2a: Degree of occurrence of reduced and severely fragmented distribution of populations which continues to decline in the area.

B2c: Degree of reduced occurrence of populations by reducing their habitats.

C2a: Reduced population size, which is in decline, with a severely fragmented population structure.

C2b: The population size is reduced, declining, and is in a subpopulation.

D: The population size is extremely reduced.

**(2) Endemism** for the Republic of Macedonia, expanding the consideration slightly beyond the borders.

**(3) Notion of limit of distribution in the country.** The limits of distribution of species populations should be taken into account.

The results of the Red lists established in nearby countries such as Bulgaria (Abadjiev, S., Beshkov, S., 2007.); Serbia (Jakšić, P., 2003, 2008) as well as the list of North Macedonia (Krpač and Darcemont, 2012 and Lemonnier Darcemont, M., Chobanov, D., Krpač, V.T., 2014) are compared with the IUCN list (Van Swaay et al., 2010), corresponding to Europe and Europe27. Through these comparisons, the discrepancy, if any, can be understood and explained.

Then, for the selected priority species, the need for their immediate protection and management of the risk of threats to their habitats with research in the coming years was indicated.

The systematic affiliation is made according to the Fauna of Europe, with the errors and synonymies of the species corrected. Binominal and trinominal nomenclature was used for the species that are represented in the Republic of North Macedonia.

To define the size of the species distribution sites, we used the reporting methodology under Article 17 of the Habitats Directive 92/43/EEC.

## **Results and discussion**

### **Selected species of insects - List I.**

It should be noted that the IUCN assessment in the table is not a value for IUCN Europe or IUCN E27, but the assessment resulting from the application of the IUCN criteria, which is also limited within the territory of the Republic of North Macedonia.

The high number of species in the list shows the high entomological interest of the Republic of North Macedonia, consisting of a great variety of different biotopes, but also indicates a potential threat to these species in the future.

The purpose of the list is to prioritize the protection, active management and monitoring of actions:

1. Species and their associated biotopes must be strictly protected in the short term, with the highest priority being to ensure that their biotopes are not threatened by lack of information. Legal protection is a short-term response and must be coupled with monitoring and management activities, and this last point is most important for endemic species.

2. Priority species should be monitored through regular surveys in the coming years. Some of them could be subject to legal protection, in the medium term, depending on the conclusions of the monitoring.

**LIST I – Strictly protected wild species (Butterflies - Lepidoptera; Moths - Nocturna; Beetles – Coleoptera; Grasshoppers, Locusts and Crickets, – Orthoptera; Flies – Diptera;) in the Republic of North Macedonia**

**Table for the evaluation of species according to their right of protection, threat status, geographical distribution/endemism, current protection category according to the Law on Nature Protection and National Interest, with a revised proposed protection category.**

No.	Taxonomic Group/Species		Legal protection					Threat Status			Geographic distribution / Endemism	National interest	Current Protection Category (List)	Proposed category of protection (List)	
	Vernacular name	Latin name	92/43/EEC	2000/147/EC	Bern	Bonn	CITES	Hunting Law	Global level	European level	National level				
Butterflies (Insecta: Lepidoptera)															
1.	Spinose Skipper	<i>Favria cribrillum</i> (Eversmann, 1841) (= <i>Muschampia cribrillum</i> ; <i>Syrictus cribrillum</i> )								NT B2a	EN B1 B2a				I

This is a local species, restricted to semi-natural areas. A decrease in distribution or population size of 6-30% has been observed in North Macedonia (data provided by Butterfly Conservation Europe's national partners). The species' range is estimated to be less than 20,000 km <sup>2</sup> , and estimates indicate at least two severely fragmented populations, or known to exist in no more than 10 locations.														
2.	Marbled Scipper	<i>Muschampia lavatherae</i> (Esper, [1783]) syn. <i>Carcharodus lavatherae</i>								NT A2c	VU A2c		II	I
This is a local species, restricted to (semi) natural areas. It is extinct in Slovakia and Turkey (European part). There has been a sharp decline in population distribution or size by more than 30% (noted for Germany, Hungary and Ukraine). Reductions in distribution or population size of 6-30% have been observed in Austria, Moldova, Romania, Slovenia and Switzerland (data provided by Butterfly Conservation Europe's national partners). This species is threatened by changes in the management of semi-natural grasslands and the abandonment of traditional agricultural practices. The population of this species has decreased by 30% in the last 10 years or three generations.														
3.	Alpine Grizzled Scipper	<i>Pyrgus andromedae</i> (Wallengren, 1853)*								LC	EN; B1; C2b		II	I
This is a European endemic species. It occurs in widely dispersed areas in the Pyrenees (very rarely), the Alps (from the French Alps to the Julian, Camnecian and Karavanki mountains), and in the Balkans: in southwestern Bosnia and southwestern Serbia. The species is in the endangered category in the Republic of North Macedonia. It is also found in Northern Europe on the border between Norway and Sweden and in Lapland. It has recently been observed in the Romanian Carpathians, in Switzerland at an altitude of 1,000-2,700 m and in Spain at 1,500-2,000 m. Although this species is showing decline in part of its European range, it is not believed to face major threats at the European level.														
4.	Tessellated Scipper	<i>Muschampia tessellum</i> (Hübner, [1803])								LC	VU A2c		II	I
This species is listed as Least Concern in the European Union, as it is assessed against all IUCN criteria and does not meet, nor is it close to meeting, the population decline of more than 25% in the past 10 years for any category of a threat. Within the Republic of North Macedonia, the species is assessed as vulnerable.														
5.	Appolo	<i>Parnassius apollo</i> (Linnaeus, 1758)	IV		II		+		LC	NT A2c	NT A2c			I
It belongs to animal and plant species that are of interest to the community, which require strict protection. At the European level and at the level of the EU27 member states, there is a decline in the number of exemplars in the population of almost 30%, and it falls within the limits of its uncertainty about the future. Therefore, this species is considered near threatened. However, it should be noted that both the distribution and the population size of this species in many lowland places have significantly decreased by 30% in the last 10 years of the 20th century. The species is also subject to trade.														
6.	Clauded Appolo	<i>Parnassius mnemosyne</i> (Linnaeus, 1758)	IV		II				LC	NT LC	NT A2c			I

It belongs to animal and plant species that are of interest to the community, which require strict protection. At the European level, the decline of populations by more than 25% falls within the limits of uncertainty for the future of this species. Therefore, this species is considered near threatened.												
7.	Sauthern Feston	<i>Zerynthia polyxena</i> ([Denis & Schiffermüller],1775)	IV		II					LC	NT A2c	I
It belongs to animal and plant species of community interest, which require strict protection. It is listed as a species of least concern in the European Union, as it is assessed according to all the IUCN criteria and does not meet them, nor is it close to meeting them on the condition that the population has not decreased by more than 25% in the past 10 years for any category of threat.												
8.	Sauthern Swallowtail	<i>Papilio alexanor</i> Esper, 1777	IV		II					LC	NT B1 B2c	I
It belongs to animal and plant species that are of interest to the community, which require strict protection. This is a local species, limited to semi-natural areas. The sharp drop in the distribution or size of the population of more than 30% is observed in North Macedonia. 6-30% has been recorded in Croatia and France (data provided by national partners of Butterfly Conservation Europe).												
9.	Eastern Orange Tip	<i>Anthocharis damone</i> Boisduval, 1836								LC	VU A2c	I
This species is listed as Least Concern in Europe, as it has been assessed against all IUCN criteria and does not meet, nor is it close to meeting, the conditions for the population to have declined by more than 25% in the past 10 years for any category of a threat. In North Macedonia, the population has decreased by 30% in the last 10 years or three generations. The reasons for the reduction may not be accidental or may not be understood or may be reversible from (a) to (g) under A1.												
10.	Estern Grenish Blek-tip	<i>Euchloe penia</i> (Freyer, 1851)								LC	VU B1	I
This species is listed as Least Concern in Europe, as it has been assessed against all IUCN criteria and does not meet, nor is it close to meeting, the criteria of a population decline of more than 25% in the past 10 years for any threat category . The extent of occurrence is estimated to be less than 20,000 km2, and estimates indicate at least two severely fragmented populations, or are known to exist in no more than 10 locations. In the Republic of North Macedonia, the species is assessed as vulnerable.												
11.	Small Bath White	<i>Pontia chloridice</i> (Hübner, [1813])								LC	VU B1 D	I
This species has been assessed as a species of least concern, because according to all IUCN criteria it does not meet, nor is it close to meeting, the conditions for the population to decrease by more than 25% in the past 10 years for any threat category. Extent of occurrence estimated to be less than 20 km2, estimates indicate at least two severely fragmented populations, or known to exist in no more than 5 locations. A very												

small and restricted population or restricted to any population size estimated to be less than 1000 mature individuals. In the Republic of North Macedonia, which is the border of the distribution of the species, it is rated as vulnerable.													
12.	Large Copper	<i>Lycaena dispar</i> ( <b>Haworth</b> , 1802)	IV	II						LC	VU A1c		I
It includes living and plant species that are of interest to the community and whose conservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. A suspected decrease in population size of $\geq 50\%$ over the last 10 years or three generations has been observed and estimated. The reasons for the reduction are reversible and based on a decline in the quality of the habitat. In the Republic of North Macedonia, which is the border of the distribution of the species, it is rated as vulnerable.													
13.	Grecian Copper	<i>Lycaena ottomanus</i> ( <b>Lefèbvre</b> , 1831)							VU	LC	VU A2cB1		I
This species is listed as vulnerable globally. In Europe the species is rated according to all IUCN criteria as Least Concern and does not meet, nor is it close to meeting, the conditions for the population to decline by more than 25% in the past 10 years for any threat category. But recent observations of the species show a suspected decrease in population size by $\geq 30\%$ over the last 10 years or three generations and longer, and the reasons for the decrease may not be random or may not be reversible, have an abundance index appropriate to the taxon; reduction of the distribution area with reduced habitat quality; with actual or potential levels of exploitation; effects of introduced taxa, hybridization, pathogenicity, pollution, competitors or parasites. In the Republic of North Macedonia, which is the border of the distribution of the species, it is rated as vulnerable.													
14.	Cranberry Blue	<i>Agriades optilete</i> ( <b>Knoch</b> , 1781) ( <i>Plebejus</i> ; <i>Vacciniina</i> )								LC	VU A2c		II I
It is estimated that this species does not face major threats at the European level. In its range it is threatened with population reduction by draining the wetlands in which it lives. Although the population is sometimes extremely small, they can also have significant numbers of butterflies. In the Republic of North Macedonia, which is the border of its distribution, the species is assessed as vulnerable.													
15.	False eros Blue	<i>Polyommatus eros eroides</i> ( <b>Frivaldcki</b> , 1836)	II IV							NT A2c	VU A2c		II I
At the European level and at the level of the EU 27 member states, the population decline of almost 30% falls within the limits of its uncertain future. Therefore, this species is considered near threatened. <i>P. eros eroides</i> is found in scattered populations in Eastern Europe and the Balkans. Its global distribution area is outside Europe. It is an endangered species due to the abandonment of traditional agricultural practices of land cultivation. In the Republic of North Macedonia, the species is assessed as vulnerable.													
16.	Bavius Blue	<i>Pseudophilotes bavius</i> ( <b>Eversmann</b> , 1832)	II IV							LC	VU B1		I

At European and EU27 level, this species is rated as Least Concern according to all IUCN criteria and does not meet, nor is close to meeting, the criteria for the population to have declined by more than 25% in the past 10 years for any threat category. The extent of occurrence is estimated to be less than 20,000 km <sup>2</sup> , this estimated by direct observation where the abundance index is appropriate to the taxon. Strictly protected species according to European law: EU Directive on Fauna-Flora and Habitats (FFH), Annex IV (species of community interest that require strict protection. In the Republic of North Macedonia, which is the distribution limit of the species, it is assessed as vulnerable.														
17.	Large Blue	<i>Phengaris arion</i> (Linnaeus, 1758) (= <i>Maculinea arion</i> )	II IV		II					EN	EN A2bc	NT A2c		I
It includes living and plant species that are of interest to the community, which require strict protection. In this species, a strong reduction of the population by more than 30% was observed. Based on the European Grassland Butterfly Indicator (Van Swaay et al., 2008), this species declined by more than 90% in European grasslands, one of its main habitats, in 1990, as well as in the last ten years in in the EU27 countries the decline is even more than 97%. Therefore, it is estimated that the decline in population qualifies this species in the endangered category. In the Republic of North Macedonia, it is assessed as near-threatened.														
18.	Gavarnie Blue	<i>Agriades pyrenaicus dardanus</i> (Freyer, [1843])*									NT B1a	VU B1		I
Although this is a European endemic with a limited range, the species is not believed to face major threats at the European level. In the Republic of North Macedonia, which is the border of the distribution of the species, it is rated as vulnerable.														
19.	Freye's Purple Emperor	<i>Apatura metis</i> Freyer, 1829	IV		II						LC	NT B1		I
It includes living and plant species that are of interest to the community, which require strict protection. This species is listed as Least Concern as it has been assessed against all IUCN criteria and does not meet, nor is it close to meeting, the criteria of a population decline of more than 25% in the past 10 years for any threat category. Although this species is showing decline in part of its European range, it is not believed to face major threats at the European level. It is almost an endangered species in the Republic of North Macedonia.														
20.	Scarce Fritillary	<i>Euphydryas maturna</i> (Linnaeus, 1758) syn. <i>Hypodryas maturna</i>	II IV		II					DD	VU A2c/LC	VU A2c		I
It includes living and plant species that are of interest to the community and whose conservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. This is a typical species of open forests and ridges, mainly threatened by changes in forest management or logging or deforestation. A suspected decrease in population size of $\geq 30\%$ over the last 10 years or three generations has been observed and estimated, where the causes of the decrease may not be random or may not be reversible; the abundance index is appropriate to the taxon and the area of distribution, the quality of the habitat; potential levels of exploitation; the effects														

of introduced taxa, hybridization, pathogenicity, pollution, competitors or parasites. The Republic of North Macedonia is the southern limit of distribution of this vulnerable species.														
21.	False Comma	<i>Nymphalis vaualbum</i> ([Denis & Schiffermüller], 1775)*	II*IV							LC/VU	DD		II	I
It occurs in the lowlands of Eastern Europe, in deciduous or mixed forests. It prefers moist forests and clearings or on the edge of forests. He is a migrant. Because of its migratory behavior, it is difficult to determine whether populations are permanent or temporary. It is not clear what are the reasons for the decline of populations in the western part of its European range. They may be part of natural fluctuations, but little is known about the population dynamics of this species. In the Republic of North Macedonia, this species is registered in only one locality, which is insufficient for a correct assessment of the species, although in Europe it is assessed as a vulnerable species.														
22.	Dryad	<i>Minois dryas</i> (Scopoli, 1763)								LC	VU A2cB1		II	I
This is a species from southern and central Europe: it occurs in France (except the northwest and the extreme south), in the north in Italy and Switzerland, in the south from Germany and Poland through the Balkans to the northern part in Greece. In Spain, it is limited to the Cantabrian Mountains and the Pyrenees. It is found in Turkey, western and central temperate Asia, Mongolia and Japan. The global distribution area of the species is outside Europe. Although this species is showing decline in part of its European range, it is not believed to face major threats at the European level. In the Republic of North Macedonia, the species is assessed as vulnerable.														
23.	Macedonian Grayling	<i>Pseudochazara cingovskii</i> (Gross, 1973)*							CR	CR* B1ab (iii,v)+ 2ab(iii,v)	VU B1 D			I
This species is found only in one location, near Pletvar in North Macedonia and nowhere else in the world. Steno endemic. The total distribution area is less than 1.5 km <sup>2</sup> . The population size is probably below 10,000 specimens in bad years. The population is in decline due to habitat destruction by marble mining. Therefore, this species is considered critically endangered at the European level. It is absent from the EU27 member states and is therefore rated as Unrated at EU27 level. Estimates indicate at least two severely fragmented populations or are known to exist in no more than 10 locations. Continued decline is observed, or projected, in any of the following criteria: area, volume, habitat quality, and number of mature individuals.														
24.	Grecian Grayling	<i>Pseudochazara graeca</i> (Staudinger, 1870)*							LC	LC	VU B1			I
A local species, restricted to semi-natural areas. It is found in Greece from 1,000-2,200 m above sea level, and a doubtful report from the south of North Macedonia. This is a European endemic species. It is also a Mediterranean endemic species. It is believed that this species does not face major threats. The Republic of North Macedonia is the distribution border of this vulnerable species.														
Moths (Insecta: Lepidoptera - Nocturna)														

1.	SPHINGIDAE <b>Willowherb hawkmoth</b>	<i>Proserpinus proserpina</i> <b>(Pallas, 1772)</b>	IV	II				DD	VU	NT C2c				I
It belongs to the group of animal and plant species that are of interest to the community, which require strict protection. The species is strictly protected under European law: EU Fauna-Flora and Habitats (FFH) Directive, Annex IV (species of Community interest requiring strict protection). It is almost an endangered species in the Republic of North Macedonia.														
Beetles (Insecta: Coleoptera)														
1.	CERAMBYCIDAE Great Capricorn Beetle	<i>Cerambyx cerdo</i> <b>Linnaeus, 1758</b>	II IV	II				VU A1c+ 2c	NT				II	I
It belongs to animal and plant species that are of interest to the community and whose preservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. This species is restricted to living in old trees. All activities that destroy these trees (eg cutting avenues) are highly harmful to the species. A decline in numbers in the area of its residence or reduced habitat quality has been observed with a suspected decrease in population size by 30% over the last 10 years. Reduction of causes may not cause a reversible process, based on specified A1 under (a) to (d).														
2.	CERAMBYCIDAE Rosalia Longicorn	<i>Rosalia alpine</i> <b>(Linnaeus, 1758)*</b>	II IV	II				VU	LC				II	I
It belongs to animal and plant species that are of interest to the community and whose preservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. A typical species that depends on grasslands, open beech forests, almost up to the mountains. Log removal is a major threat because the larvae have a long development phase of two or three years.														
3.	CERAMBYCIDAE Beech Longhorn Beetle	<i>Morimus asper funereus</i> <b>Mulsant, 1863</b>	II						VU A1c				II	I
It belongs to animal and plant species that are of interest to the community and whose preservation requires the determination of special areas for protection. It is found in Belgium, Czech Republic, Slovakia, Germany, Hungary, Moldova, Romania, Bulgaria, Bosnia and Herzegovina, Montenegro, Serbia, North Macedonia, Greece, Turkey and Ukraine. A continuous decline in the populations of adult individuals has been observed. Adults of this species can be observed in March-September, mainly active at dusk and at night, but can also be seen during the day, depending on the climatic conditions. Females lay eggs in the trunks of trees, with the larvae developing under the bark of decaying wood in the first stage, while in the final stage they develop in the heart of the trunk. Larvae have a long developmental stage that lasts three to five years.														

4.	SCARABAEIDAE Hermit Beetle	<i>Osmoderma eremita</i> (Scopoli, 1763)*	II IV	II				NT	NT			II	I
<p>It belongs to animal and plant species that are of interest to the community and whose preservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. In the extensive study of Europe, this species is noted for Macedonia (fig. 5)! Based on the literature data Mikšić (1955) we found one record of <i>O. eremita</i> from Tetovo, 1941. The specimen is preserved in the Natural History Museum of Belgrade (L. Protić, pers. comm.). This species is restricted to living in old trees. Any activity that destroys these trees (eg cutting avenues) is very harmful to the species. Larvae typically develop for two years or longer when conditions are not optimal.</p>													
Grsshoppers, Locusts and Cricets (Insecta: Orthoptera)													
1.	TETTIGONIIDAE <i>Ebner's Bright Bush-cricket</i>	<i>Poecilimon ebneri</i> <b>Ramme, 1933</b>						EN	EN B2ab (iii,iv,v)	NT A3c			I
<p>The species is known for Bulgaria, Greece, its disappearance is possible in North Macedonia, Romania and Serbia. Presence in Moldova is uncertain. Known subpopulations are usually small (up to about 5-10 males per hectare), and male numbers appear to clearly outnumber females. The species cannot fly and therefore there is no genetic exchange between subpopulations. These subpopulations may disappear, as there is a reduced probability of recolonization, and the populations are therefore considered to be severely fragmented. The overall trend of populations is decreasing under constant pressure on its habitat, through agricultural or infrastructural practices resulting in a continuous decline in occurrence rate, area of use, habitat quality, number of subpopulations and number of mature individuals.</p>													
2.	TETTIGONIIDAE <i>Kadiytsa Bright Bush-cricket</i>	<i>Poecilimon pechevi</i> <b>Andreeva, 1978*</b>						VU	CR B1ab (iii,v) + 2ab(iii,v)	VU D2			I
<p><i>Poecilimon pechevi</i> is a very locally distributed species discovered in Bulgaria close to the Macedonian border. It is a local endemic, recorded on the top of Kadiica, Vlaina Planina, on the border between southwestern Bulgaria (Chobanov 2009) and on Macedonian side, we found it in 2012 on dominant Fabaceae (Lemonnier-Darcemont, unpublished data). According to Andreeva (1978), the species would be associated with grass groups consisting of <i>Trifolium</i> spp., <i>Urtica</i> spp., <i>Rubus idaeus</i>. At this site, the main potential threat could be overgrazing by sheep and cattle (combined), and also the risk of mining expansion, just downstream of the current habitat. This species is already assessed worldwide as vulnerable (IUCN, 2012). The extent of occurrence (EOO) is 11.6 km<sup>2</sup> in pan-Europe and about 5-6 km<sup>2</sup> in the EU 28, and the area of utilization (AOO) is 5-7 km<sup>2</sup> in pan-Europe and 3 km<sup>2</sup> in the EU 28. The steady decline the number of mature individuals depends on the degradation of its habitat. The habitat is affected by intensive blueberry picking. Due to the significant anthropogenic presence and physical disturbance of habitat (including motorized vehicles) during blueberry harvesting, a continuous decline in habitat quality is observed. Because of this threat, the species only occurs in one location. Habitat can also be affected by climate change.</p>													

3.	TETTIGONIIDAE <i>Jablanica Bright Bush-cricket</i>	<i>Poecilimon jablanicensis</i> <b>Chobanov &amp; Heller, 2010*</b>								NT	NT	NT A3c					I
The species is found in North Macedonia and its presence in Albania is uncertain. Since this species is known only from one mountain (Jablanica) Chobanov & Heller, 2010. Although widely distributed in the treeless zone of Mount Jablanica, the small territory of its endemic range and the sensitivity of its habitat to human impact can easily lead to a significant threat and in the future it may be affected by climate change or changes in land use.																	
4.	TETTIGONIDA <b>E</b> <i>Vodno Bright Bush-cricket</i>	<i>Poecilimon vodnensis*</i> <b>Karaman, 1958*</b>								NT	NT	DD NE					I
<i>Poecilimon vodnensis</i> is a Macedonian endemic, described from Mountain Vodno near Skopje, Republic of North Macedonia (Karaman 1958). Recently, the species was also discovered on Štavica and Dunje in the Mariovo region (Lemonnier-Darcemont et al. 2014). Its extent of occurrence (EOO) is about 330 km <sup>2</sup> , and the settlement area is 12 km <sup>2</sup> . Recently observed subpopulations of this species were relatively dense, but overall small and isolated, with little genetic exchange between them, which could lead to the extinction of the species with a reduced probability of recolonization. Populations of this species are considered to be severely fragmented.																	
5.	TETTIGONIIDAE <i>Ebner's Dark Bush-cricket</i>	<i>Pholidoptera ebneri</i> <b>Ramme, 1931</b> syn. <i>Pholidoptera stankoi</i>										NT A3c					I
This species is noted in the Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, as an endangered species (MK endemic), Current knowledge about the distribution of the species has been extended beyond its type locality (Ramme 1931), and to other records in eastern and southern Albania and the western part of North Macedonia (Lemonnier-Darcemont 2011, Lemonnier-Darcemont et al. 2014; Lemonnier-Darcemont pers. comm. 2015, D. Chobanov pers. comm. 2015). We have grouped these two taxa together because their synonymy is assumed by some taxonomists. Known from many isolated localities in Western Macedonia, this species seems to have a limited area of occupation that could be threatened in the future by modification of biotopes related to anthropic activities.																	
6.	TETTIGONIIDAE <i>Common Predatory Bush-cricket</i>	<i>Saga pedo</i> (Pallas, 1771)	IV		II					VU	LC	EN A2c, B2ab (iii)				II	I
This species was noted in the Official Gazette of the Republic of Nacedonia, number 139 of 07.10.2011, as an endangered species (MK endemic), but current knowledge indicates an expansion of its range of distribution in southern Europe, it has also been noted in Asia and introduced in the USA - Michigan). It belongs to the group of animal and plant species that are of interest to the community, which require																	

strict protection. The threats to this species are abandonment of the traditional way of grazing, urbanization, industrial development, construction of wind farms, intensification of pasture management, transformation of pastures into arable land and forest fires (Krištín and Kaňuch, 2007, Holuša et al. 2013, Lemonnier - Darcemont et al. 2014). A decline in the population of this taxon is also projected for the Republic of North Macedonia (Lemonnier-Darcemont et al. 2014).																
7.	TETTIGONIIDAE Lesser Predatory Bush-cricket	<i>Saga campbelli campbelli</i> <b>Uvarov, 1921*</b>								NT	NT	VU A2c; D2				<b>I</b>
Endemic to the Balkan Peninsula: Albania, Greece, Serbia, Bulgaria and North Macedonia. This is a rare species of bush cricket (Kaltenbach A. 1965). Subpopulations are usually small and isolated and may become extinct with reduced probability of recolonization. Therefore, the population is considered to be severely fragmented (D. Chobanov, I. Iorgu and M. Lemonnier-Darcemont pers. comm. 2015). There is a risk of anthropogenic impact on its biotope. This species is threatened by overgrazing, (Lemonnier-Darcemont et al. 2014); transformation of its habitat into farmland, forest fires and insecticide use (M. Lemonnier-Darcemont, I. Iorgu and D. Chobanov pers. comm. 2015). A small isolated subpopulation in northwestern Bulgaria is declining as a consequence of large-scale logging (D. Chobanov pers comm.).																
8.	TETTIGONIIDAE Greek Predatory Bush-cricket	<i>Saga hellenica</i> <b>Kaltenbach, 1967*</b>								LC	LC	VU A2c; D2				<b>I</b>
Endemic to the Balkan Peninsula: Albania, Greece, Serbia, Bulgaria and North Macedonia. This species is rated as Least Concern because it is widespread, has a high occurrence (EOO) (about 120.000 km <sup>2</sup> in the EU 28 region and about 190.000 km <sup>2</sup> in Europe) and occurs in a variety of habitats. However, this species is likely to be threatened by forest fires, agriculture and road construction.																
9.	TETTIGONIIDAE Ramme's Predatory Bush-cricket	<i>Saga rammei</i> <b>Kaltenbach, 1965 *</b>									LC	NT A3c				<b>I</b>
Endemic to the Balkan Peninsula: North Macedonia and Greece. There is a high risk of its endangerment due to the anthropogenic impact on its biotope.																
10.	TETTIGONIIDAE <i>Big-Bellied Glandular Bush- Cricket</i>	<i>Bradyporus skopjensis</i> <b>Karaman, 1961</b> <b>syn. <i>Bradyporus</i></b> <b><i>macrogaster macrogaster</i>*</b>								EN	EN B2ab(i,ii, iii,iv,v)	CR A2c; B2ab(ii)				<b>I</b>
Stenoendemic: Known only from the type locality Macedonia: Distribution. (Fig. 194), Skopje, Ržaničino (Ržaničave), Trubarevo (Karaman 1961); S. Serbia [now North Macedonia]: Skopje (Ebner & Beier 1964). The species is threatened with extinction if not already extinct. The systematic track of this subspecies is unclear! It is labeled as <i>Bradyporus (Callimenus) macrogaster skopjensis</i> n. ssp.: Karaman 1961: 115: as <i>Callimenus macrogaster skopjensis</i> Karaman, 1961: Ebner & Beier 1964: 65; Harz 1969: 619 as syn. of <i>C. macrogaster longicollis</i> ; as <i>Bradyporus (Callimenus) skopjensis</i> Karaman, 1961: in Ünal 2011: 6, as a syn. of <i>B. (C.) macrogaster longicollis</i> ; Type locality. N. Macedonia,																

<p>Skopje. Syntypes male (ZZDBE sensu Cigliano et al. 2017). <i>Bradyporus skopjensis</i> Karaman, 1961, has recently been re-exploited as a valid name for its syn. <i>Bradyporus macrogaster macrogaster</i>, as stated in the Red List of Orthoptera of the Republic of Macedonia. Previous data for South Macedonia (eg Ramme 1951) are very doubtful. There is a possibility that the species never existed there. The species was recorded in the 60s-70s by Karaman (1961, 1975) in Skopje, but we couldn't find it there at the moment. This may be due to significant habitat changes that have occurred since the 1970s until today. Thus, the species is highly threatened with extinction if it is not already extinct.</p>														
11.	TETTIGONIIDAE Wood- louse Glandular Bush- Cricket	<i>Bradyporus oniscus</i> (Burmeister, 1838)*									LC	EN A2c; B2ab(ii)		I
<p>Endemic to the Balkan Peninsula: North Macedonia and Greece. Except for one recent record in 2003 (leg. Stojkoska, det. Lemonnier-Darcemont), all records of this species are old (Berland &amp; Chopard, 1922; Karaman, 1961; Us &amp; Matvejev, 1967). In 2012, a large part of the old sites were visited by one of us (Lemonnier-Darcemont), without success. Some of them are too damaged and are no longer suitable. The species is very sensitive to any disturbance of its habitat, has poor colonization abilities and high sensitivity to contamination of its food plants with pesticides. Known subpopulations are usually small (up to about 5-10 males per hectare) and severely fragmented.</p>														
12.	RAPHIDOPHORID AE Lazaropole Cave- cricket	<i>Troglophylus lazaropolensis</i> Karman, 1958*									DD	VU A3c	II	I
<p>This species is listed in the Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, as an endangered species (MK endemic), but the current knowledge about this Balkan endemic indicates an expansion of its distribution area on the Balkan Peninsula in Greece, Albania, North Macedonia and Serbia. It is designated as a vulnerable species due to its limited distribution.</p>														
13.	RAPHIDOPHORID AE Zora's Cave- cricket	<i>Troglophilus zorae</i> Karaman & Pavićević, 2011*									LC	VU A3c		I
<p>Balkan endemic species known in Albania, Greece and North Macedonia. The species is usually found in caves in karst areas, but we suspect a wider occurrence in underground habitats (soil cracks, mesophilic forests) (Karaman et al. 2011). The species is active at night. Nymphs and adults emerge throughout the year, but hibernate in winter. The species is designated as a vulnerable species due to its limited distribution.</p>														
14.	ACRIDIDAE Nordic mountain grasshopper or narrow-winged locust	<i>Melanoplus frigidus</i> (Boheman, 1846)									LC	VU A3c; D2		I

The species is a glacial relic registered on the plateau of Jakupica mountain. In North Macedonia it is marked as a vulnerable species. The global population trend is decreasing. Potential threats are climate change (especially the altitudinal shift of its habitat) and excessive livestock grazing. In the Republic of North Macedonia, the species is marked as vulnerable due to the limitation in its distribution.														
15.	ACRIDIDAE Albanian Mountain Grasshopper	<i>Odontopodisma albanica</i> <b>Ramme, 1951</b>									L C	LC	Vu A3c	I
Endemic to the Balkan Peninsula: Albania, Bosnia and Herzegovina, Montenegro, Serbia and North Macedonia. The species has limited expansion capabilities. The population is severely fragmented, but there are no indications of its decline. It is therefore rated Least Concern (LC). The habitat of this species is very sensitive and prone to degradation, as a result of overgrazing or direct habitat changes, such as conversion to farmland (Lemonnier-Darcemont et al. 2014). In the Republic of North Macedonia, the species is marked as vulnerable due to the limitation in its distribution.														
16.	ACRIDIDAE Tricolored Grasshopper	<i>Paracinema tricolor</i> <b>(Thunberg, 1815)</b>										NT	EN A2c; B2ab(iii)	I
This species is widespread, but due to its association with wetland habitats, subpopulations are quite small and isolated. The distances between subpopulations are very large and the probability of re-colonization in places from which it disappeared is low. Populations are therefore considered severely fragmented. A strong decline in the populations of this species is assumed for Italy (Massa et al. 2012). The species is also in decline in Catalonia (Olmo-Vidal, J. M., 2002) and in the Balkans (S. Ivkovic and D. Chobanov pers. comm. 2016). The species is extinct in Switzerland (Baur et al. 2006), also probably extinct in Albania (G. Puskas pers. comm. 2016) and Sicily. In the Republic of North Macedonia, the species is marked as endangered due to the overall size of the population, which is decreasing. The main threats to this species are drainage of its habitat, transformation of habitat into farmland, overgrazing, water pollution (Lemonnier-Darcemont et al. 2014) and urbanization (S. Gomboc pers. comm. 2016). Increasing droughts as a result of climate change may also threaten this species (J.J. Presa pers. comm. 2016).														
17.	ACRIDIDAE Large marsh grasshopper	<i>Stethophyma grossum</i> <b>(Linnaeus, 1758)</b>										LC	EN A2c; B2ab(iii)	I



5.	SYRPHIDAE <i>Hoverflies</i>	<i>Psarus abdominalis</i> <b>(Fabricius, 1794)</b>							EN	VU B2ab (i,ii,iii,iv)				II	I
<p>This species is listed in the Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, as an endangered species. Vujic et al. (2001) list the species as generally threatened in Europe, but not threatened in the Balkans. The small number of recent records from the Balkans indicates declining populations. In parts of Western Europe, the species is extinct (Sweden, Belgium, Holland, Switzerland) or nearly extinct (France, Germany). His status in Western Europe would be critically endangered. In the eastern and southeastern countries of the EU, the species is extinct (Slovenia and Slovakia, and possibly in Romania). A few localities were still found in Greece, Bulgaria, and probably also in Latvia and Lithuania. The large decline in the population of this species clearly shows that it is seriously endangered. Its preferred thermophilic oak forests are threatened by nitrogen deposition and acid rain. However, it has become extinct or nearly extinct in large areas of its former distribution, so the overall population trend is decreasing.</p>															
6.	SYRPHIDAE <i>Hoverflies</i>	<i>Riponnensia morini</i> <b>Vujić, 1999</b>							EN	EN B2ab(iii)					I
<p>Probably an extinct species from the type locality in Montenegro, but it is present in Serbia, North Macedonia and in several localities along the Balkan Peninsula. The species is thought to be severely fragmented because the several subpopulations are so far apart that any interaction between them seems unlikely.</p>															
7.	SYRPHIDAE <i>Hoverflies</i>	<i>Sphegina sublatifrons</i> <b>Vujić, 1990*</b>							EN	EN; B2ab; (ii,iii)					I
<p>This species is listed in the Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, as an endangered species. Balkan endemic is found in Greece, North Macedonia, Romania and Serbia. Pollution caused by anthropogenic activities and climate change, represent a threat to this species. On Mount Kopaonik this species occurs in large numbers together with <i>Sphegina latifrons</i> and can be found in many successive years. Some of the former sites have now been destroyed by the construction of ski slopes, which probably caused the subpopulation to decline. The remaining records are mostly few, with individual samples from each locality and are not repeated in subsequent years (Krpáč et al. 2011). Mount Kopaonik appears to be its main source area (Vujić 1990, van Steenis et al. 2015).</p>															

**An asterisk (\*) symbol after the species name indicates that it is a priority or endemic species**

**The bold letters of the Latin name indicate the valid name of the taxon.**

## Conclusion

After the reviewed literature and its revision, the proposal for the list of strictly protected species was evaluated, whereby 24 species from the order of Butterflies - Lepidoptera are proposed for list I - strictly protected species of the Macedonian fauna. Of them, 4 species belong to the family of Scippers - Hesperidae; 4 species from the Swallowtail family - Papilionidae; 3 from the family Whites & Sulphurs - Pieridae; 7 taxa (5 species and 2 subspecies); from the family of Blue, Hairstreaks and Copper butterflies - Lycaenidae and 6 taxa (4 species and 2 subspecies) from the family of Nymphalids & Browns - Nymphalidae.

The analysis of the Butterfly fauna of Macedonia indicated the need to expand the list I of strictly protected species. So, the already existing 17 butterflies' species in List I, noted in the Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, are added 7 species more that were on List II protected species. The species added in the List I, in last decade are highly endangered in the country, due to the strong anthropogenic influence that conditions the change of habitats, as well as the drastic change in climatic conditions, which have a negative effect on the butterfly fauna in our country. This causes a decline in the size and number of populations both in Europe and in our country.

Among the Moths for List I - strictly protected species, we suggest 1 species.

From the order of Beetles in List I - strictly protected species, we propose 4 species: 3 species of the family Cerambycidae and 1 species of the family Scarabidae. They are listed in Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011 in the List II. We have transferred all 4 species of Beetles to List I with the rationale: the species *Cerambyx cerdo* Linnaeus, 1758 belongs to animal that are of interest to the community and whose preservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. This species is restricted to living in old trees. All activities that destroy these trees (eg cutting avenues) are highly harmful to the species. A decline in numbers in the area of its residence or reduced habitat quality has been observed with a suspected decrease in population size by 30% over the last 10 years. Reduction of causes may not cause a reversible process, based on specified A1 under (a) to (d). *Rosalia alpine* (Linnaeus, 1758) also belongs to animal species that are of interest to the community and whose preservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. A typical species that depends on grasslands, open beech forests, almost up to the mountains. Log removal is a major threat because the larvae have a long development phase of two or three years. *Morimus asper funereus* Mulsant, 1863 belongs to animal species that are also of interest to the community and whose preservation requires the determination of special areas for protection. It is found in Belgium, Czech Republic, Slovakia, Germany, Hungary, Moldova, Romania, Bulgaria, Bosnia and Herzegovina, Montenegro, Serbia, North Macedonia, Greece, Turkey and Ukraine. A continuous decline in the populations of adult individuals has been observed. Adults of this species can be observed in March-September, mainly active at dusk and at night, but can also be seen during the day, depending on the climatic conditions. Females lay eggs in the trunks of trees, with the larvae developing under the bark of decaying wood in the first stage, while in the final stage they develop in the heart of the trunk. Larvae have a long developmental stage that lasts three to five years. *Osmoderma eremita* (Scopoli, 1763) belongs to animal species that are of interest to the community and whose preservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. In the extensive study of Europe, this species is noted for Macedonia (fig. 5)! Based on the literature data Mikšić (1955) we found one

record of *O. eremita* from Tetovo, 1941. The specimen is preserved in the Natural History Museum of Belgrade (L. Protić, pers. comm.). This species is restricted to living in old trees. Any activity that destroys these trees (eg cutting avenues) is very harmful to the species. Larvae typically develop for two years or longer when conditions are not optimal.

Species *Goldstreifiger* - *Buprestis splendens*\* belongs to animal that are of interest to the community and whose preservation requires the determination of special areas for protection and that are of interest to the community, which require strict protection. This species is listed in the Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, as threatened (EN) B2ab(iii,iv) as its home range is less than 500 km<sup>2</sup>, its habitat is threatened by unfavorable forest management and it is in decline. This European endemic is very rare with isolated populations and is suspected to be extinct in some countries, B2ab(ii): Area of residence estimated at less than 500 km<sup>2</sup> (EN) with estimates indicating severely fragmented populations and the it is in no more than 5 (EN) locations and has a continuous decline, observed and projected in its area of residence. Although the species has been observed in all surrounding countries, it has not yet been registered for North Macedonia. This indicates that it should be excluded from the list of strictly protected species. The probability that he will be registered in Macedonia is high and some future detailed research will confirm that.

From the order of Grsshoppers, Locusts and Cricets - Orthoptera for List I - strictly protected species we propose 18 taxa (16 species and 2 subspecies). From the Tetigonidae family we propose 11 taxa (9 species and 2 subspecies); from the family Raphidophoridae 2 species; from the family Acrididae 5 species.

Species Saga pedo is noted in Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, as an endangered species (MK endemic), but current knowledge indicates an expansion of its range of distribution in southern Europe, it has also been noted in Asia and introduced in the USA - Michigan). It belongs to the group of animal and plant species that are of interest to the community, which require strict protection. The threats to this species are abandonment of the traditional way of grazing, urbanization, industrial development, construction of wind farms, intensification of pasture management, transformation of pastures into arable land and forest fires (Krištín and Kaňuch, 2007, Holuša et al. 2013, Lemonnier - Darcemont et al. 2014). A decline in the population of this taxon is also projected for the Republic of North Macedonia (Lemonnier-Darcemont et al. 2014). Due to the serious disturbance of the number of the population of this taxon in North Macedonia, the species needs a higher degree of protection and therefore it is placed from the list of protected species II, to the list of strictly protected species I.

The species *Troglophylus lazarepolensis* is noted in Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011, as an endangered species (MK endemic), but the current knowledge about this sub-endemic indicates an expansion of its distribution area on the Balkan Peninsula in Greece, Albania, North Macedonia and Serbia. The taxon is marked as vulnerable, due to the limitation in its distribution and way of life and requires a higher level of protection, therefore it is placed from the list of protected species II, to the list of strictly protected species I.

From the Flies order, for List I - strictly protected species, we propose 7 species from the family of Hoverflies - Syrphidae. 5 Of them were already listed in Strictly protected species in List I. Two species: *Chrysogaster mediterraneus* and *Psarus abdominalis* was noted in List II in the Official Gazette of the Republic of Macedonia, number 139 of 07.10.2011. With the revision of List I and II, *C. mediterraneus* and *P. abdominalis* were added from the List I to the List I, because of the strong threats against them.

For list I - strictly protected species from the Macedonian fauna, we propose a total of 54 taxa (48 species and 6 subspecies).

For the reason stated above, the species *Buprestis splendens* is excluded from the list of protected species.

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