

The status of protected butterfly species in Romania in the context of national and EU legislation

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Summary: Insects are undergoing global declines with major implications for ecosystem stability and biodiversity, driven by land-use intensification, pesticides, and climate change. In Europe, long-term data reveal severe losses in pollinators and butterflies, while in Eastern Europe, post-socialist land-use shifts have accelerated insect decline despite initially higher diversity. Romania, home to over 200 butterfly species, has experienced both extinctions and rediscoveries, reflecting deficient monitoring and rapid environmental change. The country's conservation legislation has evolved from adapting the national legislation to the EU's legal framework, yet early legal transpositions were inconsistent, and enforcement remains limited. Although 58 butterfly species have appeared in national protection lists since 1993, the implementation of effective conservation measures—especially for species protected under the EU Habitats Directive—remains inadequate. Most Natura 2000 sites in Romania lack reliable data on species status, underscoring the need for systematic monitoring, targeted management, and evidence-based policy to ensure long-term butterfly conservation.

Key words: insect decline, protected butterfly species, community interest species, conservation assessment status, Romania.

Introduction

Insect decline in the last half-century

Over the past five decades, numerous studies have documented substantial declines in insect populations worldwide, raising serious concerns about biodiversity loss and the stability of ecosystem services (DIRZO *et al.* 2014, HALLMANN *et al.* 2017, WAGNER 2020). Reports from intergovernmental bodies, most notably the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES 2019), have emphasized that pollinators, decomposers, and other functional insect groups are in steep decline due to drivers such as land-use intensification, pesticide application, habitat fragmentation, and climate change. In Europe, long-term monitoring data confirm these trends, with insect biomass and species richness showing alarming reductions across multiple taxa (Seibold *et al.* 2019, van Swaay *et al.* 2019).

In response to these challenges, the European Commission published *The European Green Deal* on 11 December 2019, outlining a comprehensive framework for transforming the EU into a climate-neutral and environmentally sustainable economy. Within this framework, the EU Biodiversity Strategy for 2030 sets ambitious targets for the conservation and restoration of ecosystems, including legally binding commitments to protect at least 30% of the EU's land and sea area, with one third under strict protection,

building on the existing Natura 2000 network (EUROPEAN COMMISSION 2020). These measures aim not only to halt biodiversity decline but also to reverse it, thereby safeguarding ecosystem services—such as pollination—on which both agriculture and human well-being depend.

The “Insect Armageddon” – evidence for a massive loss of insect biodiversity?

A landmark study conducted in Germany reported a 76% decline in flying insect biomass between 1989 and 2016, based on standardized Malaise trap collections from 63 locations situated within protected areas (HALLMANN *et al.* 2017). Importantly, the decline could not be explained by meteorological variables or by measured changes in local habitat characteristics, leading the authors to attribute the losses to external drivers such as agricultural intensification in surrounding landscapes and long-term climatic stressors, including increased frequency of droughts. The study, often referred to as the “Krefeld study,” sparked unprecedented public and scientific debate, becoming one of the most widely discussed ecological publications of 2017 (BROOK 2018). Media outlets, including *The New York Times*, popularized the phenomenon under the labels “Insect Apocalypse” and “Insect Armageddon,” narratives reinforced by citizen-science observations such as the so-called “windshield phenomenon” - the perceived

reduction in insects splattered on cars over time (BROOK 2018, SAUNDERS *et al.* 2020).

Parallel case studies further fueled the discourse. For instance, long-term research in Puerto Rico's Luquillo rainforest reported a collapse of arthropod biomass of up to 60-fold between 1970 and 2010, which the authors linked to habitat loss, pesticide use, and a mean temperature rise of approximately 2 °C over four decades (LISTER and GARCÍA 2018). Such findings contributed to sensationalist media narratives of “biological annihilation,” the “Eremocene” (the age of loneliness), and an impending “ecological dark age,” echoing earlier warnings by WILSON (1992).

Nevertheless, the scientific community has expressed caution against overgeneralization. CARDOSO and LEATHER (2019) criticized the apocalyptic framing, highlighting fundamental knowledge gaps in insect taxonomy, distribution, and abundance - the so-called “Linnaean” and “Prestonian shortfalls.” They emphasized that the majority of data derive from a limited set of taxonomic groups (e.g., pollinators, butterflies) and from geographically restricted regions such as Europe and North America, making global extrapolations premature. MONTGOMERY *et al.* (2019) similarly argued that current evidence is insufficient to infer planetary-scale trends, stressing the need for standardized and long-term monitoring programs.

SAUNDERS *et al.* (2020) further warned that alarmist narratives can undermine public trust in science, particularly when complex ecological observations are simplified into “doom and gloom” messages. Instead, they proposed a multi-faceted agenda for evidence-based insect conservation, including (i) methodological advances such as non-destructive monitoring and robust statistical analyses of citizen science data, (ii) enhanced communication and education through large-scale participatory projects and user-friendly identification tools, and (iii) policy interventions and habitat management strategies. Importantly, their work concluded on a cautiously optimistic note: despite worrying signals, global insect biodiversity is not yet irreversibly lost, and timely action can still safeguard both species and the ecosystem services they provide.

Insect decline in Europe and Eastern Europe

In Europe, insect declines have been extensively documented across multiple taxa, particularly pollinators and butterflies, with significant implications for both biodiversity conservation and agricultural sustainability (POTTS *et al.* 2010, NIETO *et al.* 2014, VAN SWAAY *et al.* 2019). Long-term monitoring indicates that populations of grassland butterflies have fallen by more than 30% since 1990, reflecting broader trends of habitat degradation, agricultural intensification, and pesticide use (VAN SWAAY *et al.* 2019, WARREN *et al.* 2021). Analyses indicate that since the mid-20th century, agricultural

intensification in south-western Germany has led to a marked reduction in the abundance of butterfly and burnet moth species, particularly among habitat specialists dependent on semi-natural grasslands and bogs (HABEL *et al.* 2019). In addition, studies in Germany reported dramatic reductions in flying insect biomass—up to 75% over less than three decades—even within protected areas, highlighting the scale of the crisis (HALLMANN *et al.* 2017).

Eastern Europe presents a particularly complex picture. After the collapse of state socialism in the early 1990s, land-use changes included both agricultural intensification in some areas and large-scale land abandonment in others, leading to significant alterations in habitat structure and floral resources (BÁLDI and FARAGÓ 2007). While short-term biodiversity benefits sometimes followed abandonment, long-term successional processes often reduced open habitats critical for many pollinator species (KOVÁCS-HOSTYÁNSZKI *et al.* 2017). Recent analyses suggest that Eastern European landscapes, despite still harboring higher insect diversity compared to Western Europe, are now experiencing accelerating declines due to increasing pesticide application, homogenization of agroecosystems, and climate change (TÓTH *et al.* 2021). These findings underscore the urgency of region-specific conservation strategies tailored to the socio-economic and ecological context of Eastern European countries.

Butterflies of Romania in the European context

Brief overview of butterfly research in the territory of present-day Romania

Butterfly research in the territory of present-day Romania has a history spanning approximately 230 years (RÁKOSY 1996, SZÉKELY 2014, 2020). The first scientifically documented butterfly collection in line with the scientific standards of the time was carried out in 1793 by the Dresden-based entomologist Johann Centurius Graf von Hoffmannsegg, in the area around Băile Herculane. During this expedition, Hoffmannsegg collected the first specimens based on which a butterfly species from the current territory of Romania was described: *Erebia melas* (HERBST, 1796).

In the first volume (1850) of the journal „*Verhandlungen und Mitteilungen des Siebenbürgischen Verein für Naturwissenschaften zu Hermannstadt*”, Karl Fuss published, for the first time, a list of butterfly species known in Transylvania up to that point (FUSS 1850). This work is considered the foundation of butterfly research in both Transylvania and Romania (RÁKOSY 2012). Naturally, several other significant faunistic catalogues and studies followed. The entomological journal “*Rovartani Lapok*”, first published in 1884 in Budapest, and its successor “*Folia Entomologica Hungarica*”, which has been published since 1923, provided opportunities

for publishing butterfly research results from the Transylvanian region in Hungarian (VIZAUER 2000, 2001).

The number of publications on Romanian butterflies increased significantly after the foundation of the Romanian Lepidopterological Society (*Societatea Lepidopterologică Română*) in March 1990. That same year, the Society launched its journal „*Buletin de informare a Societății Lepidopterologice Române*”, which published scientific articles in Romanian (from 2014 under the name „*Buletin de Informare Entomologică*”). Since 1996, scientific articles, mainly in English and German, have been published especially in the journal „*Entomologica romanica*”. According to a 2008 article by the Society’s chairman, the most productive decade in terms of Romanian publications on lepidopterological topics was the 1990–1999 period (RÁKOSY 2012).

Butterfly species numbers in Europe and Romania

The most recent European checklist of butterflies includes 496 species (WIEMERS *et al.* 2018). The last European Red List of Butterflies was published in 2010 and reported a total of 451 breeding butterfly species within the then 27 EU member states (VAN SWAAY *et al.* 2010). The countries with the richest butterfly faunas in Europe, in descending order, are: Italy (272 species), Russia (258 species), and France (255 species). An analysis of the butterfly checklists of 42 European countries revealed that Romania, with an estimated 193 butterfly species, does not rank among the top ten most species-rich countries in Europe.

However, source works by Romanian authors specify that the number of butterfly species present in the country exceeds 200. Catalogues and books published over the last two decades, which include species present in Romania, often contain species considered regionally extinct (5 to 10 species). In the latest checklists of Romanian lepidoptera, the number of butterfly species varies from 201 to 203 (RÁKOSY *et al.* 2003, RÁKOSY and GOIA 2021). The latest book on Romanian butterflies lists 206 species (RÁKOSY 2024).

Conservation status of rare and protected butterflies in Romania

Extinct and endangered butterfly species in Romania

There are two main reasons for the uncertainty surrounding the accurate number of butterfly species in Romania: the poor level of research on the country’s butterfly fauna and the extinction of certain species. The Romanian Red List of Butterflies considers the following butterfly species to be extinct (EX) from Romanian territory: *Parnassius apollo* (LINNAEUS, 1758), *Colias palaeno* (LINNAEUS, 1761), *Agriades*

optilete (KNOCH, 1781), *Polyommatus damon* ([DENIS & SCHIFFERMÜLLER], 1775), *Polygonia egea* (CRAMER, 1775), and *Kirinia climene* (ESPER, 1783). The authors of the Red List express doubts regarding the conservation status of some species listed as extinct. As such, these species are also considered data deficient (DD): *Aricia anteros* (FREYER, [1838]), *Erebia montanus* (PRUNNER, 1798), and *Pyronia cecilia* (VALLANTIN, 1894).

Each of the above-mentioned species had at least one confirmed population in Romania over the past two centuries, but none have been recorded in at least 25 years—and in some cases, for more than a century. Due to the limited coverage of faunistic surveys, it is possible that some species listed as data deficient may still have undiscovered populations in Romania. Therefore, conservation categories should be treated with caution—they are mostly indicative, and sometimes pleasant surprises may occur.

One such revelation was the rediscovery of *Iolana iolas* (OCHSENHEIMER, 1816). For decades it was considered extinct in Romania, with the last confirmed sightings occurring before the 1960s (RÁKOSY 2013). However, it was suspected that unknown populations might still survive in the southeastern or southwestern parts of the country. This assumption turned out to be true: in 2014, an undocumented population was discovered near the Iron Gates (GROZA *et al.* 2020). And the surprises did not stop there. From the same region, two butterfly species previously unknown to the Romanian fauna were also discovered: *Satyrus ferula* (FABRICIUS, 1793) in 2013 and *Melanargia larissa* (GEYER, [1828]) in 2015 (GROZA *et al.* 2020), highlighting that intensifying faunistic studies can yield valuable results.

These discoveries of new species near the southern border of Romania raise an important question: have these populations always been present in Romanian territory but remained undetected due to limited research, or are their recent sightings a result of a northward range shift, possibly due to climate change?

A particularly surprising find was the detection of a butterfly species in northern Romania. In June 2022, a relatively dense population of *Boloria eunomia* (ESPER, 1799) was discovered in a marshy area of the Călimani Mountains (CORDUNEANU *et al.* 2024). Even after more than 200 years of butterfly research in Romania, new butterfly species can still be expected to be discovered. The detection of currently unreported but potentially present species is especially likely in the southeastern and southwestern parts of the country. Examples include: *Pyrgus cinarae* (RAMBUR, 1840), *Leptidea duponcheli* (STAUDINGER, 1781), *Pieris krueperi* (STAUDINGER, 1860), and *Polyommatus eros* (OCHSENHEIMER, [1840]). It is also possible that new records could come from the northern Eastern Carpathians or northwestern Romania, with species such as: *Coenonympha hero* (LINNAEUS, 1760), *Coenonympha oedippus* (FABRICIUS, 1787),

Hipparchia alcyone ([DENIS & SCHIFFERMÜLLER], 1775), and *Lasiommata petropolitana* (FABRICIUS, 1787).

Of the newly recorded species in the past decade, only one or two populations have been discovered for each so far. Due to their scarcity, these species are classified as critically endangered (CR) or endangered (EN): *Iolana iolas* – CR (Critically Endangered), *Satyrus ferula* – EN (Endangered), *Melanargia larissa* – EN (and in some assessments, DD – Data Deficient).

Additionally, some butterfly species with only one or very few known populations in Romania for decades are also considered critically endangered. According to the Romanian Red List (RÁKOSY *et al.* 2021), the following species are closest to extinction in Romania: *Pieris ergane* (GEYER, 1828), *Lycaena helle* ([DENIS & SCHIFFERMÜLLER], 1775), *Tomares nogelii* (HERRICH-SCHÄFFER, [1851]), *Boloria titania* (ESPER, 1793). The following species are listed as endangered (EN): *Colibris myrmidone* (ESPER, 1780), *Pseudophilotes bavus* (EVERSMANN, 1832), *Phengaris nausithous* (BERGSTRÄSSER, 1779), *Polyommatus amandus* (SCHNEIDER, 1792), *Nymphalis vaualbum* ([DENIS & SCHIFFERMÜLLER], 1775), and *Erebia sudetica* STAUDINGER, 1861.

The evolution of legislation listing protected butterfly species in Romania

According to current legislation, a protected species is defined as “*any species of wild flora or fauna that enjoys legally protected status*” (Government Emergency Ordinance no.57/2007). A requirement for Romania’s accession to the European Union was adapting the national legislation to EU’s legal framework. As part of this process, in November 2000, the Romanian Government issued the Emergency Ordinance No. 236/2000 on the regime of protected natural areas, the conservation of natural habitats, and wild flora and fauna (hereinafter referred to as GEO 236/2000). Subsequently, this emergency ordinance was ratified by Law No. 462/2001 (hereinafter referred to as Law 462/2001) with only minor changes that did not substantially affect the list of protected species.

The annexes of these legislations were intended to list the butterfly species occurring in Romania that are included in the annexes of the EU Council Directive 92/43/EEC—commonly known as the Habitats Directive. This directive is one of the main European instruments for the protection of biodiversity. The protected species of European Community interest are outlined in two key annexes of this Directive:

- Annex II of the EU Habitats Directive includes species whose conservation requires the designation of special areas of conservation (SACs). These areas, in their entirety, form the Natura 2000 ecological network.
- Annex IV lists animal and plant species

of community interest that require strict protection.

In practice, GEO 236/2000 and Law 462/2001 incorrectly transposed the butterfly species listed in the Habitats Directive. This error was partially corrected by Order No. 1198/2005 of the Ministry of Environment and Water Management (hereinafter referred to as Order 1198/2005). This order introduced a new annex listing plant and animal species that require strict protection at the national level.

According to the new regulation, butterfly species in Romania were classified into three different protection categories. However, the numbering of the annexes in Order 1198/2005 did not follow the structure of either the Habitats Directive or previous Romanian conservation legislation.

A more logically structured list of protected species appeared in the year of Romania’s EU accession. The Romanian Government Emergency Ordinance No. 57/2007 on the regime of protected natural areas, conservation of natural habitats, and wild flora and fauna (hereinafter GEO 57/2007) includes in Annex 3 the so-called Natura 2000 indicator species, for which the ecological network is designated. Annex 4 lists strictly protected species, subdivided as follows: Annex 4A: species of community interest, and Annex 4B: species of national interest.

This structure was preserved by Law No. 49/2011, which modified and approved GEO 57/2007. More than a decade after the last major piece of Romanian conservation legislation came into effect, on February 9, 2023, Romania’s Ministry of Environment submitted a revised and expanded draft of the conservation law for public consultation. Stakeholders had ten days to submit proposals to improve or supplement the draft legislation. This revision expanded the list of nationally significant butterfly species under strict protection by nine taxa. However, the Romanian government did not adopt the amended version of the legislation that included the proposed list of protected species.

In 2020, the European Commission initiated an infringement procedure against Romania for failing to fulfill its obligations under the Habitats Directive. In October 2024, the European Commission followed up with a reasoned opinion [INFR (2020)2297] regarding the incomplete transposition of the Habitats Directive (Directive 92/43/EEC) into Romania’s national legislation.

On 2 October 2024, the European Commission followed up with a reasoned opinion [INFR (2020)2297] concerning the incomplete transposition of the Habitats into Romania’s national legislation. According to this reasoned opinion, “*the Romanian legislation does not explicitly mention that conservation measures contained in management plans need to take into account the ecological requirements of the natural habitat types and species present on the sites. This has a direct impact on the quality of*

the management plans as they may not contain the necessary measures to protect these habitat types and species.” As a result, the Romanian Government amended and supplemented Government Emergency Ordinance No. 57/2007, but without modifying the annex listing the strictly protected species of national interest. Therefore, this register remains unchanged in the new legislative act, Government Emergency Ordinance No. 7/2025.

Protected butterfly species in Romania

The protected butterfly species in Romania are listed in three annexes of conservation legislation approved since 2005, each corresponding to a different level of protection:

- a) Species of Community Interest, whose conservation requires the designation of Special Areas of Conservation (forming part of the interconnected European ecological network known as Natura 2000),
- b) Species of Community Interest requiring strict protection, and
- c) Species of National Interest requiring strict protection.

The Habitats Directive (hereafter referred to as 92/43/EEC HD) and the various versions of Romania’s conservation laws use different annex numbering systems (Table 1), which has often led to confusion among decision-makers and even professionals. For example, in the first comprehensive Romanian-language publication dedicated to butterflies, Székely (2008) refers to the Habitats Directive when discussing protected butterfly species, but uses annex numbers based on Order MMWM no. 1198/2005 and GEO no. 57/2007.

This source adds to the confusion by merging the conservation statuses from the European Red List of Butterflies (i.e., IUCN categories) with protection levels found in various international, community, and national laws under a single umbrella term („protection status/statut protector”).

RÁKOSY (2013) provided a separate list of strictly protected butterfly species in Romania, based on Annexes 4A and 4B of GEO no. 57/2007, which

include species requiring strict protection at the community and national level. However, he omits species of community interest that require the designation of special conservation areas. In the species description sections, he also refers to certain species as being protected by the Habitats Directive, although they are only listed in the Romanian national protection annex.

Between 1993 and 2025, a total of 58 butterfly species appeared in one or more annexes of Romanian conservation legislation (Annex 1). This represents 28.15% of the currently known 206 butterfly species in Romania (RÁKOSY 2024). Over the years, the number of protected species has gradually increased: in 2000, only 8 species were officially protected (Fig. 1), while under the current conservation law, the number has reached 46. The new draft legislation (draft Government Emergency Ordinance 2023) proposes to add 10 more species to the existing list, but the amendment to the legislation was not approved by the Romanian Government. Thus, Government Emergency Ordinance No. 7/2025 retains the list of protected Lepidoptera species in all three categories unchanged for the past 20 years, as established in Order of the Ministry of Environment and Water Management No. 1198/2005 and in Annexes 3, 4A, and 4B, as approved by Law No. 49/2011 (Fig. 1, 2).

The species proposed for protection by the Lepidopterists’ community in Romania in 2023 were as follows: *Pyrgus andromedae* (WALLENGREN, 1853); *Polyommatus amandus* (SCHNEIDER, 1792); *Iolana iolas* (OCHSENHEIMER, 1816); *Boloria eunomia* (ESPER, 1800); *Limenitis reducta* STAUDINGER, 1901; *Nymphalis xanthomelas* ([DENIS & SCHIFFERMÜLLER], 1775); *Melitaea arduinna* (ESPER, 1783); *Melanargia larissa* (GEYER, [1828]); *Hipparchia volgensis* (MAZOKHIN-PORSHNYAKOV, 1952); and *Erebia oeme* (HÜBNER, [1804]). At the same time, the removal of two species protected under GEO no 57/2007 was proposed: *Parnassius apollo* – considered extinct (RÁKOSY *et al.* 2021), and *Neptis sappho* – a species that has become widespread in Romania (RÁKOSY 2024).

Table 1. Annex numbers in the Habitats Directive and various Romanian conservation legislations listing protected butterfly species in Romania.

| Legislation/Protection level | 92/43/EEC HD | GEO no. 236/2000 | Law no. 462/2001 | Order 1198/2005 | GEO no. 57/2007 | Law no.49/2011 | GEO no. 7/2025 |
|---|--------------|------------------|------------------|-----------------|-----------------|----------------|----------------|
| Species of Community Interest, whose conservation requires the designation of Special Areas of Conservation | II | 3 | 3 | 2 | 3 | 3 | 3 |
| Species of Community Interest requiring strict protection | IV | 4 | 4 | 3A | 4A | 4A | 4A |
| Species of National Interest requiring strict protection | - | - | - | 3B | 4B | 4B | 4B |

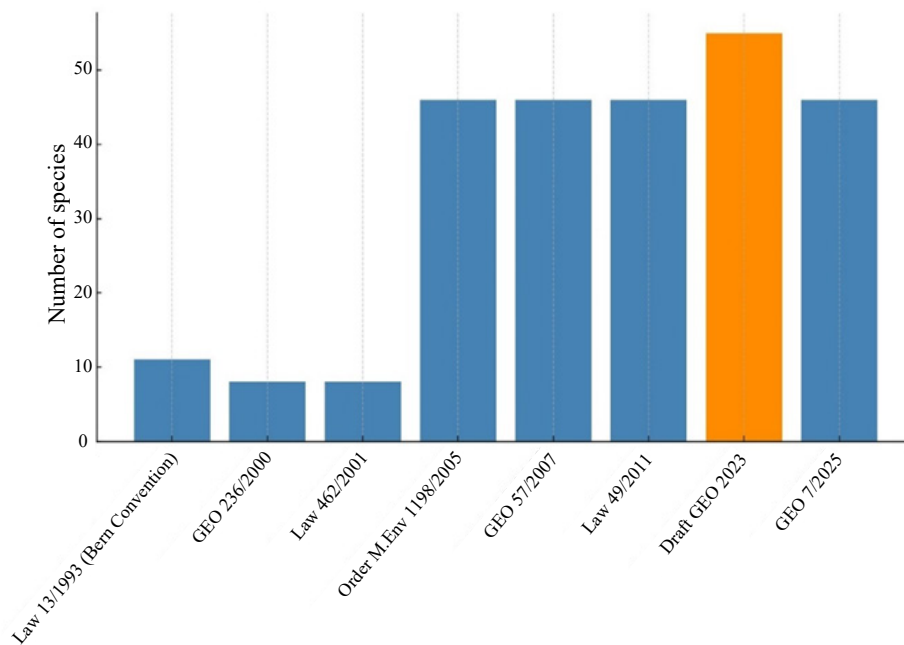


Figure 1. The number of protected butterfly species under various legislations in post-communist Romania.

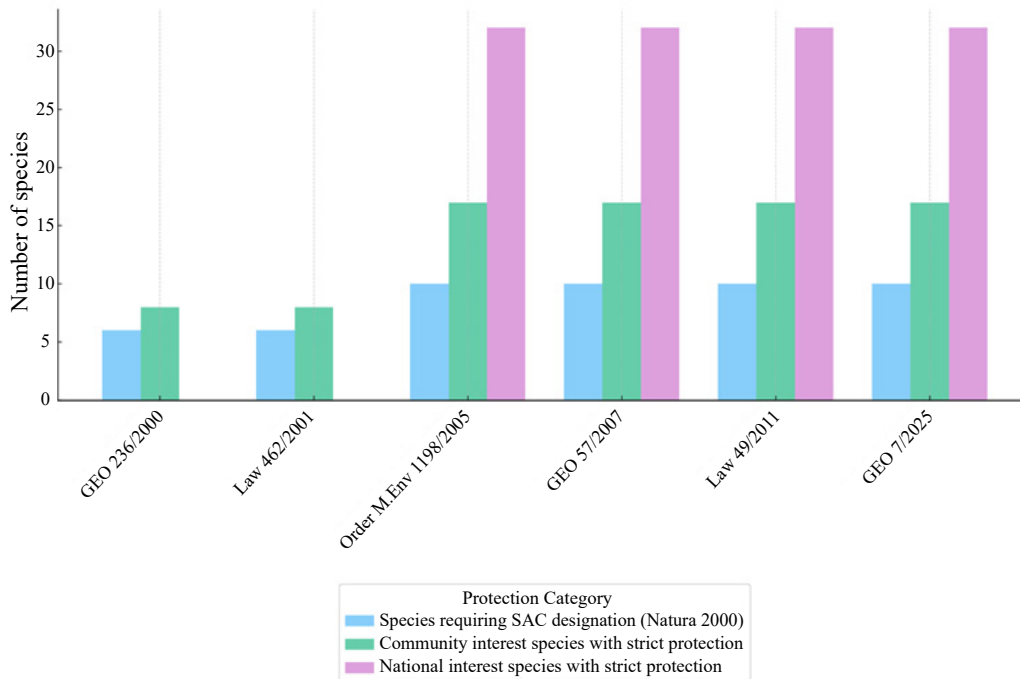


Figure 2. Changes in the total number of protected butterfly species in Romania, by protection regime.

The status of butterflies protected by the Habitat Directive in Romania

In 2007, with the accession of Romania, the European Union was joined by a new member state possessing the highest number of biogeographical regions among all EU member countries. These regions include: Continental, Alpine, and—due to the EU’s eastern enlargement—Pannonian, Stepic, and Black Sea regions (DEMETER 2002).

In the year of Romania’s accession to the European Union, the Natura 2000 ecological network was

established in the country. The Order of the Ministry of Environment and Sustainable Development No. 1964/2007 designated 273 Natura 2000 sites based on the Habitats Directive. In 2011, the Natura 2000 network in Romania was expanded to 408 sites (Order of the Ministry of Environment and Forests No. 2387/2011). The most recent wave of expansion took place in 2016 (Order of the Ministry of Environment, Waters and Forests No. 46/2016). Currently (as of April 2025), Romania has a Natura 2000 network consisting of 442 Sites of Community Importance (SCI).

At present, the Natura 2000 network in Romania

includes 222 special areas of conservation (ROSAC), 213 sites of community importance (ROSCI). According to data sheets updated in 2016, 85 of these Natura 2000 (ROSCI and ROSAC) sites were designated for the protection of at least one butterfly species. Among the ten Natura 2000 butterfly species, *Lycaena dispar* has been the target of the most designations, with 53 Natura 2000 sites established to support its conservation. Due to their rarity, only a small number of sites have been designated for at least five other butterfly species: *Nymphalis vaualbum* 9 sites, *Colias myrmidone* and *Pseudophilotes bavius* 7 sites, *Phengaris nausithous* and *Lycaena helle* 4 sites (Fig. 3, Annex 2).

Following the ascending order of the number of SCI sites established in Romania, the number of sites designated for the conservation of each protected butterfly species generally increased gradually, with the exception of two species: *Nymphalis vaualbum* and *Colias myrmidone*. For these two species, a critical reassessment of their current distribution in Romania has been carried out. *Nymphalis vaualbum* has seen a reduction in its distribution range since the 1930s–1940s, with most records known from the late 19th and early 20th centuries (RÁKOSY 2013). *Colias myrmidone* has experienced a decline starting in the 1960s–1970s in the western part of its distribution range (MARHOUL and DOLEK 2012). In Romania, *C. myrmidone* populations have followed the same trend (VIZAUER 2011, RÁKOSY 2013, 2024). Thus, in 2016, the name of *C. myrmidone* was removed from most of the Natura 2000 standard data forms where it had been listed in 2007 and 2011. However, in 2016, three new Natura 2000 sites were designated for the conservation of this species (LOOS *et al.* 2020). In the past five years, at least 5–10 previously unknown populations, subpopulations, and colonies have been identified in Cluj and Harghita counties (DEMBOWSKI *et al.* 2025, *in prep.*).

The conservation status of butterfly species protected under the Habitats Directive in Natura 2000 sites in Romania

An analysis of management plans or, in their absence, of the standard data forms prepared for Natura 2000 sites in Romania designated for the conservation of the 10 species listed in Annex II of the Habitats Directive reveals that for 68.11% of site/species combinations, the conservation status is unknown (Fig. 4). Where the conservation status is known, a total of 3.38% are considered unfavourable–bad, 16.42% unfavourable–inadequate, and only 12.07% have a favourable conservation status.

At the species level, the conservation status of *Lycaena helle* is unfavorable, even worrying: in the 4 sites designated for its conservation, the status is unknown in 3 sites, and unfavourable–bad in the only site where it is assessed (Fig. 4).

During its accession process to the European Union, Romania adopted into its own legal system the provisions of the two EU directives that implement biodiversity conservation. This harmonization process began with Government Emergency Ordinance no. 236/2000, which listed the plant and animal species protected by the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC). The list of protected species in Romanian conservation legislation has undergone four additional revisions and amendments.

Romanian nature conservation laws do not include specific provisions for the conservation of strictly protected butterfly species of community and national interest; instead, they only prohibit the destruction of populations and their habitats. According to Article 17 of the Habitats Directive, Romania is required to report every six years on the conservation status of species of community interest, which means that these species are periodically monitored.

However, for the nationally important, strictly protected butterfly species, research and assessments aimed at identifying their distribution, populations, habitat threats, conservation status, and ongoing monitoring, as well as conservation interventions where necessary, are still lacking. Without undertaking and committing to such efforts, these species currently benefit from protection only in principle, based on declarative legal status.

Legislations issued by the Romanian Government and the Minister of Environment, in chronological order

Romanian Parliament. (1993). Law No. 13 of 11 March 1993 on Romania's accession to the Convention on the Conservation of European Wildlife and Natural Habitats, adopted in Bern on 19 September 1979. Official Gazette No. 62 of 25 March 1993. Retrieved from <https://legislatie.just.ro/Public/DetaliiDocument/3036> (accessed on April 2, 2025).

Romanian Government. (2000). Government Emergency Ordinance No. 236 of 24 November 2000 on the regime of protected natural areas, the conservation of natural habitats, and of wild flora and fauna. Published in the Official Gazette No. 625 of 4 December 2000. Retrieved from <https://legislatie.just.ro/Public/DetaliiDocumentAfis/25339> (accessed on April 2, 2025).

Romanian Parliament. (2001). Law No. 462 of 18 July 2001 approving Government Emergency Ordinance No. 236/2000 on the regime of protected natural areas, the conservation of natural habitats, and wild flora and fauna. Published in the Official Gazette No. 433 of 2 August 2001. Retrieved from <https://legislatie.just.ro/Public/DetaliiDocument/29936> (accessed on April 2, 2025).

Ministry of Environment and Water Management. (2005). Order No. 1.198 of 25 November 2005 on the

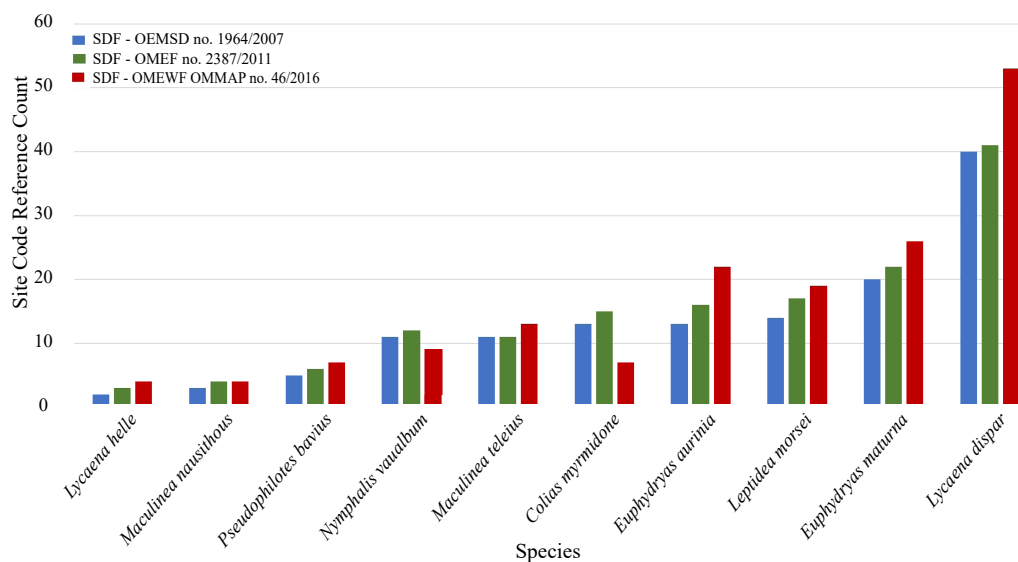


Figure 3. The dynamics of the number of Natura 2000 sites designated in Romania for the conservation of butterfly species protected under the Habitats Directive (see Annex 2).

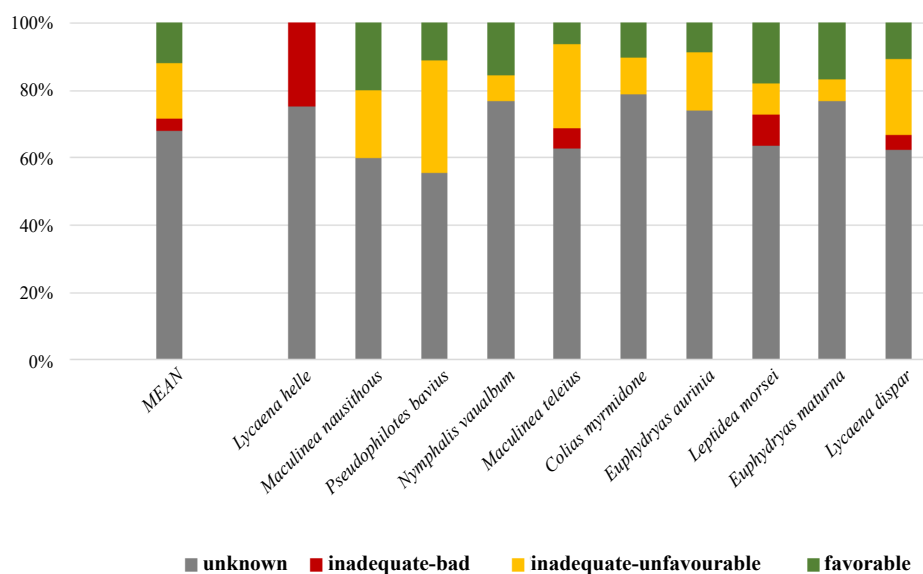


Figure 4. Distribution of conservation statuses of community interest butterfly species in the sites designated for their protection in Romania.

update of Annexes No. 2, 3, 4, and 5 to Government Emergency Ordinance No. 236/2000 on the regime of protected natural areas, the conservation of natural habitats, and of wild flora and fauna, approved with amendments and additions by Law No. 462/2001. Published in the Official Gazette No. 1.097 of 6 December 2005. Retrieved from <https://legislatie.just.ro/Public/DetaliuDocument/66760> (accessed on April 2, 2025).

Ministry of Environment and Sustainable Development. (2007). Order No. 1964 of 13 December 2007 on the establishment of the protected natural area regime for sites of Community importance, as part of the European ecological network Natura 2000 in Romania. Published in the Official Gazette No. 98 of 7 February 2008. Retrieved from <https://legislatie.just.ro/Public/DetaliuDocument/89382> (accessed on April 2, 2025).

Romanian Government. (2007). Government

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Annex 1.

Systematic list of protected butterfly species (taxonomy according to RÁKOSY and GOIA 2021) included in various legislative acts in post-communist Romania. The numbers and letters in the columns represent the annex numbers for each legislation. The numbers and letters in brackets represent subspecies listed in the legislation. Abbreviations: GEO – Government Emergency Ordinance, MEWM – Ministry of Environment and Water Management.

| No. | Family | Species name in legislations | Scientific name of the species/ subspecies | Law No. 13/1993 | GEO No. 236/2000 | Law no. 462/2001 | Order of MEWM no. 1198/2005 | GEO no. 57/2007 | Law no. 49/2011 | GEO project 2023 |
|-----|--------------|------------------------------|--|-----------------|------------------|------------------|-----------------------------|-----------------|-----------------|------------------|
| 1 | Papilionidae | Parnassius mnemosyne | <i>Parnassius mnemosyne</i> (LINNAEUS, 1758) | 2 | | | 3A | 4A | 4A | 4A |
| 2 | Papilionidae | Parnassius apollo | <i>Parnassius apollo</i> (LINNAEUS, 1758) | 2 | 4 | 4 | 3A | 4A | 4A | |
| 3 | Papilionidae | Zerynthia cerisy ferdinandi | <i>Zerynthia cerisy</i> (GODART, [1824]) | | | | 3B | 4B | 4B | 4B |
| 4 | Papilionidae | Zerynthia polyxena | <i>Zerynthia polyxena</i> ([DENIS & SCHIFFERMÜLLER], 1775) | 2 | | | 3A | 4A | 4A | 4A |
| 5 | Hesperiidae | Heteropterus morpheus | <i>Heteropterus morpheus</i> (PALLAS, 1771) | | | | 3B | 4B | 4B | 4B |
| 6 | Hesperiidae | Muschampia cribrillum | <i>Muschampia cribrillum</i> (EVERSMANN, 1841) | | | | 3B | 4B | 3B | 4B |
| 7 | Hesperiidae | Muschampia tessellum | <i>Muschampia tessellum</i> (HÜBNER, [1803]) | | | | 3B | 4B | 3B | 4B |
| 8 | Hesperiidae | Pyrgus sidae | <i>Pyrgus sidae</i> (ESPER, 1784) | | | | 3B | 4B | 4B | 4B |
| 9 | Hesperiidae | Pyrgus andromedae | <i>Pyrgus andromedae</i> (WALLENGREN, 1853) | | | | | | | 4B |
| 10 | Pieridae | Leptidea morsei | <i>Leptidea morsei</i> (FENTON, 1882) | | 3, 4 | 3, 4 | 2, 3A | 3, 4A | 3, 4A | 3, 4A |
| 11 | Pieridae | Colias chrysotheme | <i>Colias chrysotheme</i> (ESPER, [1781]) | | | | 3B | 4B | 4B | 4B |
| 12 | Pieridae | Colias myrmidone | <i>Colias myrmidone</i> (ESPER, [1781]) | | 4 | 4 | 2, 3A | 3, 4A | 3, 4A | 3, 4A |
| 13 | Pieridae | Pieris ergane | <i>Pieris ergane</i> (GEYER, [1828]) | | | | 3B | 4B | 4B | 4B |
| 14 | Pieridae | Euchloe ausonia (taurica) | <i>Euchloe ausonia</i> (HÜBNER, [1804]) | | | | 3B | 4B | 4B | 4B |
| 15 | Lycaenidae | Lycaena helle | <i>Lycaena helle</i> ([DENIS & SCHIFFERMÜLLER], 1775) | | 3, 4 | 3, 4 | 2, 3A | 3, 4A | 3, 4A | 3, 4A |
| 16 | Lycaenidae | Lycaena dispar | <i>Lycaena dispar</i> ([HAWORTH], 1802) | 2 | | | 2, 3A | 3, 4A | 3, 4A | 3, 4A |
| 17 | Lycaenidae | Lycaena hippothoe | <i>Lycaena hippothoe</i> (LINNAEUS, [1760]) | | | | 3B | 4B | 4B | 4B |
| 18 | Lycaenidae | Tomares nogelii dobrogensis | <i>Tomares nogelii</i> (HERRICH-SCHÄFFER, 1851) | | | | 3B | 4B | 4B | 4B |

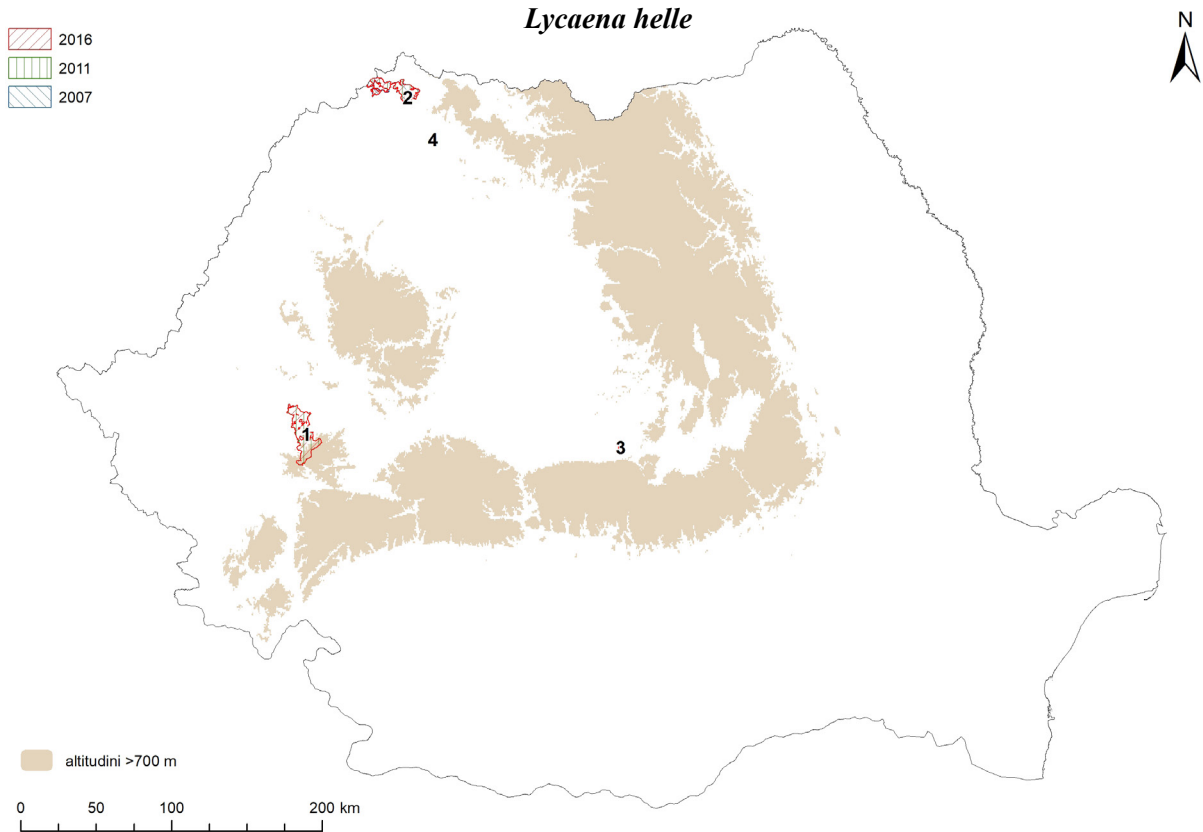
| No. | Family | Species name in legislations | Scientific name of the species/ subspecies | Law No. 13/1993 | GEO No. 236/2000 | Law no. 462/2001 | Order of MEWM no. 1198/2005 | GEO no. 57/2007 | Law no. 49/2011 | GEO project 2023 |
|-----|-------------|--|--|-----------------|------------------|------------------|-----------------------------|-----------------|-----------------|------------------|
| 19 | Lycaenidae | Maculineaalcon | <i>Phengarisalcon</i> ([DENIS & SCHIFFERMÜLLER], 1775) | | 3, 4 | 3, 4 | 3B | 4B | 4B | 4B |
| 20 | Lycaenidae | Maculinea arion | <i>Phengaris arion</i> (LINNAEUS, 1758) | 2 | | | 3A | 4A | 4A | 4A |
| 21 | Lycaenidae | Maculinea teleius | <i>Phengaris nausithous</i> (BERGSTRÄSSER, 1779) | 2 | | | 2, 3A | 3, 4A | 3, 4A | 3, 4A |
| 22 | Lycaenidae | Maculinea nausithous | <i>Phengaris teleius</i> (BERGSTRÄSSER, 1779) | 2 | | | 2, 3A | 3, 4A | 3, 4A | 3, 4A |
| 23 | Lycaenidae | Pseudophilotes bavius (egea) | <i>Pseudophilotes bavius</i> (EVERSMANN, 1832) | | 3, 4 | 3, 4 | 2, 3A, (3B) | 3, 4A, (4B) | 3, 4A, (4B) | 3, 4A |
| 24 | Lycaenidae | Iolana iolas | <i>Iolana iolas</i> (OCHSENHEIMER, 1816) | | | | | | | 4B |
| 25 | Lycaenidae | Cupido (Everes) alcetas | <i>Cupido alcetas</i> (HOFFMANSEGG, 1804) | | | | 3B | 4B | 4B | 4B |
| 26 | Lycaenidae | Cupido osiris | <i>Cupido osiris</i> (MEIGEN, 1829) | | | | 3B | 4B | 4B | 4B |
| 27 | Lycaenidae | Aricia (Eumedonia) eumedon | <i>Eumedonia eumedon</i> (ESPER, 1780) | | | | 3B | 4B | 4B | 4B |
| 28 | Lycaenidae | Plebeius sephirus | <i>Kretania sephirus</i> (FRIVALDSZKY, 1835) | | | | 3B | 4B | 4B | 4B |
| 29 | Lycaenidae | Polyommatus amandus | <i>Polyommatus amandus</i> (SCHNEIDER, 1792) | | | | 3B | 4B | 4B | 4B |
| 30 | Lycaenidae | Polyommatus admetus | <i>Polyommatus admetus</i> (ESPER, 1783) | | | | | | | 4B |
| 31 | Nymphalidae | Neptis hylas (sappho) | <i>Neptis sappho</i> (PALLAS, 1771) | | | | 3B | 4B | 3B | |
| 32 | Nymphalidae | Limenitis reducta | <i>Limenitis reducta</i> STAUDINGER, 1901 | | | | | | | 4B |
| 33 | Nymphalidae | Argynnis laodice | <i>Argynnis laodice</i> (PALLAS, 1771) | | | | 3B | 4B | 4B | 4B |
| 34 | Nymphalidae | Boloria aquilonaris | <i>Boloria aquilonaris</i> (STICHEL, 1908) | | | | 3B | 4B | 4B | 4B |
| 35 | Nymphalidae | Boloria eunomia | <i>Boloria eunomia</i> (ESPER, 1800) | | | | | | | 4B |
| 36 | Nymphalidae | Boloria (Clossiana) titania transsylvanica | <i>Boloria titania</i> (ESPER, [1793]) | | | | 3B | 4B | 4B | 4B |
| 37 | Nymphalidae | Apatura metis | <i>Apatura metis</i> FREYER, 1829 | 2 | | | 3A, 3B | 4A, 4B | 4A, 4B | 4A |
| 38 | Nymphalidae | *Nymphalis vaualbum | <i>Nymphalis vaualbum</i> ([DENIS & SCHIFFERMÜLLER], 1775) | | 3, 4 | 3, 4 | 2, 3A | 3, 4A | 3, 4A | 3, 4A |

| No. | Family | Species name in legislations | Scientific name of the species/ subspecies | Law No. 13/1993 | GEO No. 236/2000 | Law no. 462/2001 | Order of MEWM no. 1198/2005 | GEO no. 57/2007 | Law no. 49/2011 | GEO project 2023 |
|-----|-------------|---|---|-----------------|------------------|------------------|-----------------------------|-----------------|-----------------|------------------|
| 39 | Nymphalidae | Nymphalis xanthomelas | <i>Nymphalis xanthomelas</i> ([DENIS & SCHIFFERMÜLLER], 1775) | | | | | | | 4B |
| 40 | Nymphalidae | Euphydryas aurinia | <i>Euphydryas aurinia</i> (ROTTEMBERG, 1775) | 2 | | | 2, 3A | 3, 4A | 3, 4A | 3 |
| 41 | Nymphalidae | Euphydryas maturna | <i>Euphydryas maturna</i> (LINNAEUS, 1758) | 2 | | | 2, 3A | 3, 4A | 3, 4A | 3, 4A |
| 42 | Nymphalidae | Melitaea arduinna | <i>Melitaea arduinna</i> (ESPER, 1783) | | | | | | | 4B |
| 43 | Nymphalidae | Coenonympha tullia | <i>Coenonympha tullia</i> (MÜLLER, 1764) | | | | 3B | 4B | 4B | 4B |
| 44 | Nymphalidae | Coenonympha leander | <i>Coenonympha leander</i> (ESPER, 1784) | | | | 3B | 4B | 4B | 4B |
| 45 | Nymphalidae | Kirinia roxelana | <i>Kirinia roxelana</i> (CRAMER, 1777) | | 3, 4 | 3, 4 | 3B | 4B | 4B | 4B |
| 46 | Nymphalidae | Lopinga achine | <i>Lopinga achine</i> (SCOPOLI, 1763) | 2 | | | 3A | 4A | 4A | 4A |
| 47 | Nymphalidae | Melanargia larissa | <i>Melanargia larissa</i> (GEYER, [1828]) | | | | | | | 4B |
| 48 | Nymphalidae | Hipparchia volgensis delattini | <i>Hipparchia volgensis</i> (MAZOKHIN-PORSHNYAKOV, 1952) | | | | | | | 4B |
| 49 | Nymphalidae | Arethusana arethusana arethusana | <i>Arethusana arethusana</i> ([DENIS & SCHIFFERMÜLLER], 1775) | | | | 3B | 4B | 4B | 4B |
| 50 | Nymphalidae | Satyrus ferula | <i>Satyrus ferula</i> (FABRICIUS, 1793) | | | | | | | 4B |
| 51 | Nymphalidae | Chazara briseis | <i>Chazara briseis</i> (LINNAEUS, 1764) | | | | | | | 4B |
| 52 | Nymphalidae | Hyponephele lycaon | <i>Hyponephele lycaon</i> (KÜHN, 1774) | | | | 3B | 4B | 4B | 4B |
| 53 | Nymphalidae | Hyponephele lupinus | <i>Hyponephele lupinus</i> (COSTA, 1836) | | | | 3B | 4B | 4B | 4B |
| 54 | Nymphalidae | Erebia oeme | <i>Erebia oeme</i> (HÜBNER, [1804]) | | | | | | | 4B |
| 55 | Nymphalidae | Erebia gorge | <i>Erebia gorge</i> (HÜBNER, [1804]) | | | | 3B | 4B | 4B | 4B |
| 56 | Nymphalidae | Erebia sudetica (radnaensis) | <i>Erebia sudetica</i> STAUDINGER, 1861 | | | | 3A, 3B | 4A, 4B | 4A, 4B | 4A |
| 57 | Nymphalidae | Erebia pharte | <i>Erebia pharte</i> (HÜBNER, [1804]) | | | | 3B | 4B | 4B | 4B |
| 58 | Nymphalidae | Erebia melas (ruencensis, carpathicola) | <i>Erebia melas</i> (HERBST, 1796) | | | | (3B) | (4B) | (4B) | 4B |

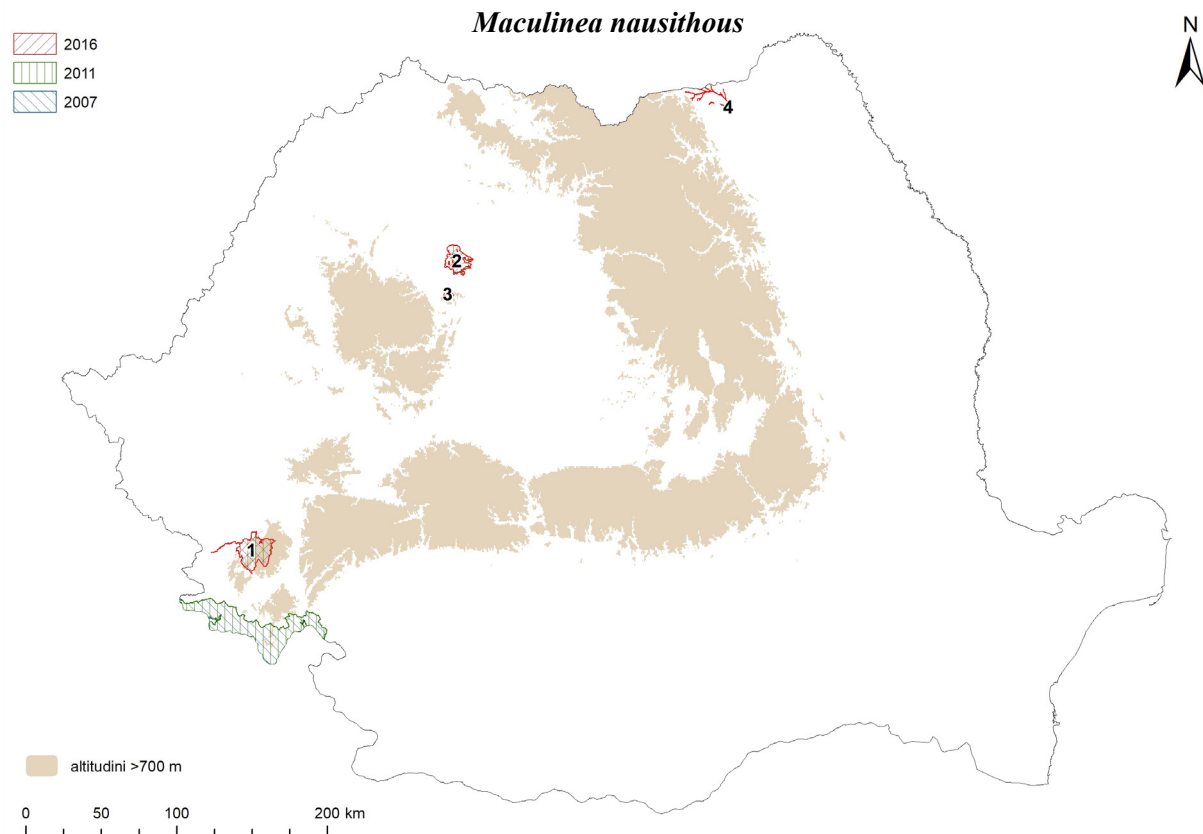
Annex 2.

The maps of Natura 2000 sites established in Romania during the period 2007–2016 for the protection of butterfly species listed in Annex II of the Habitats Directive, according to the data presented in the Standard Data Forms of the sites.

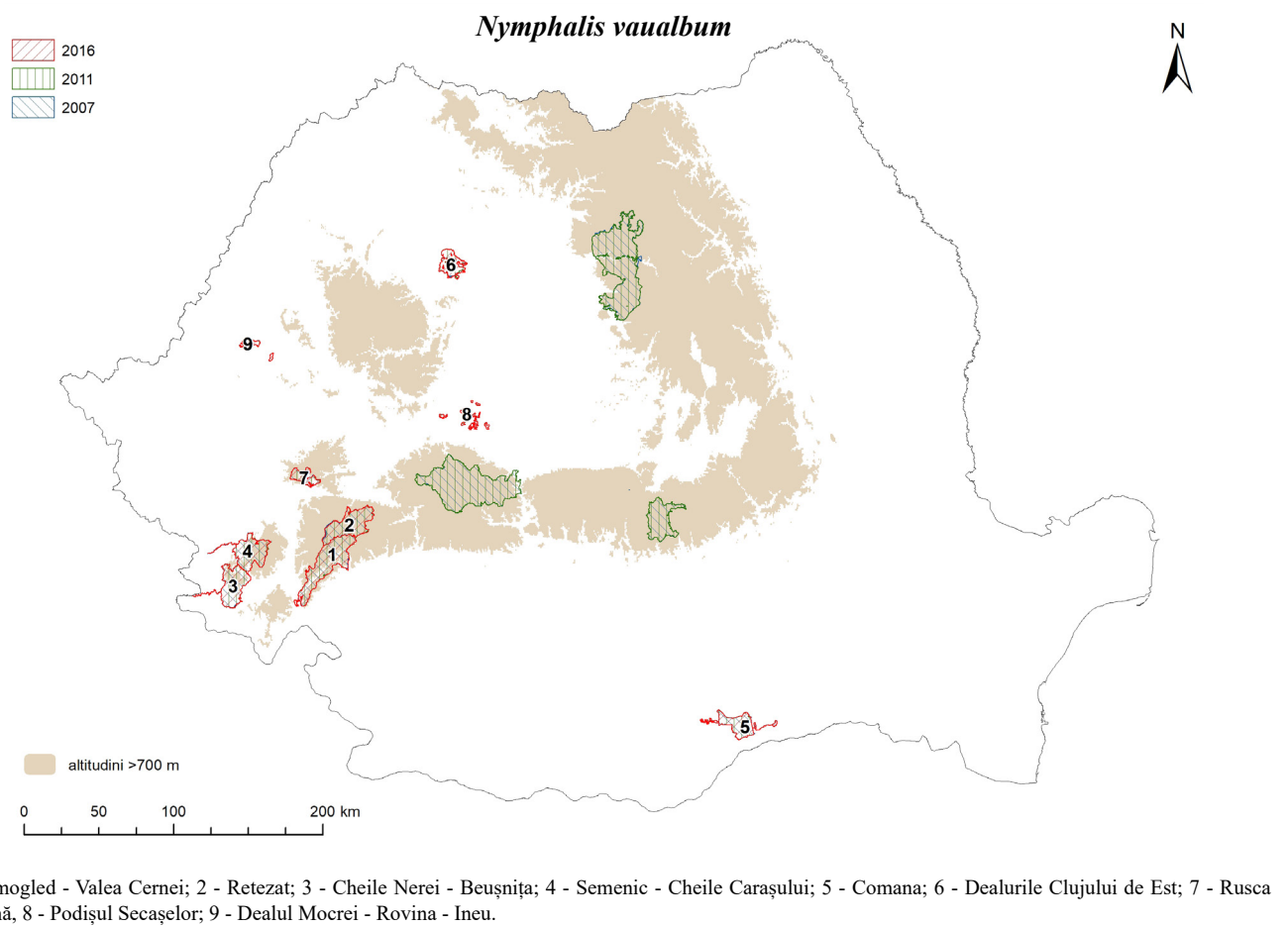
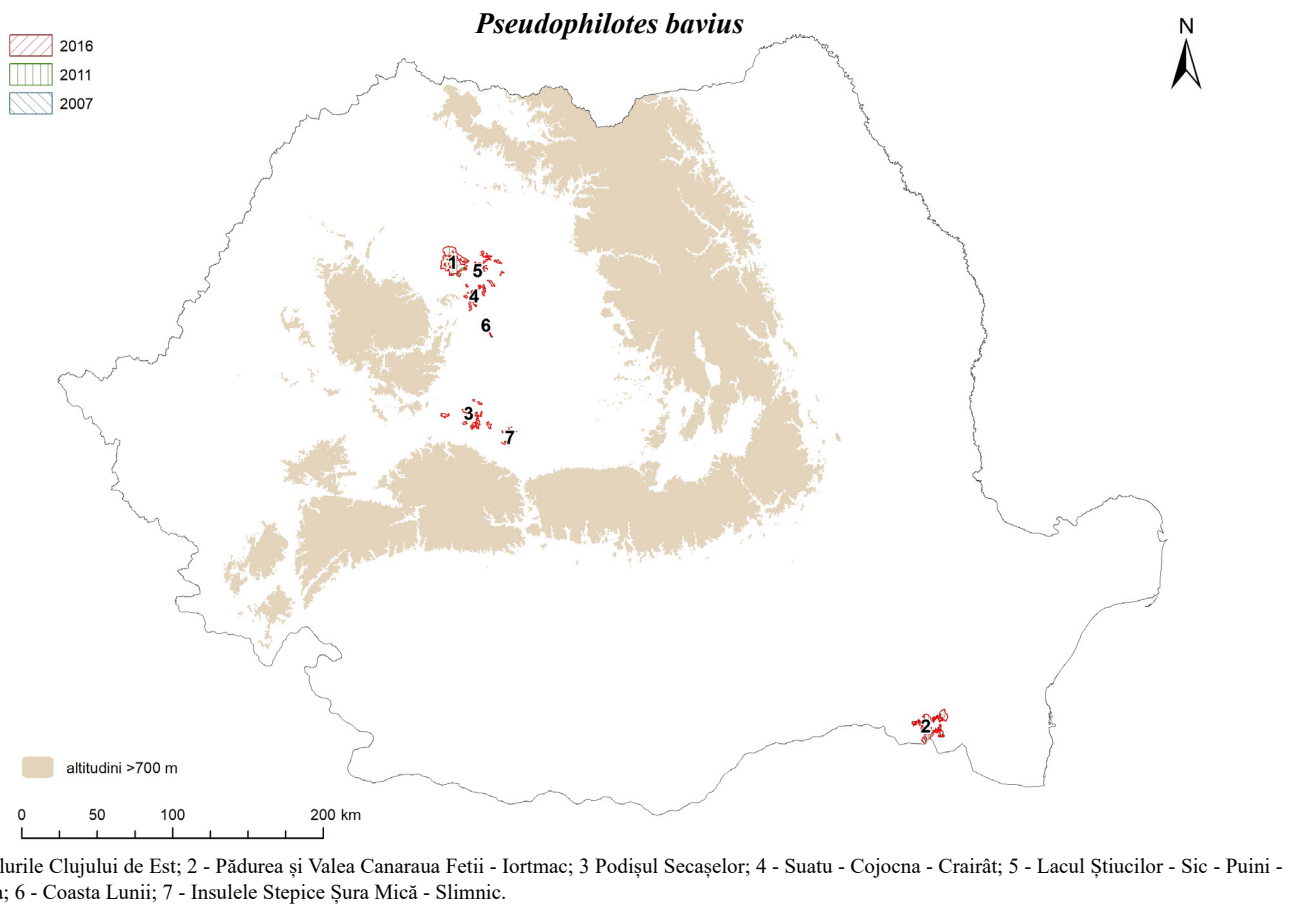
Only those Natura 2000 sites hosting populations of protected butterfly species are labeled and numbered in descending order of their area, based on data updated until April 2025 in the European Nature Information System (<https://eunis.eea.europa.eu/>).

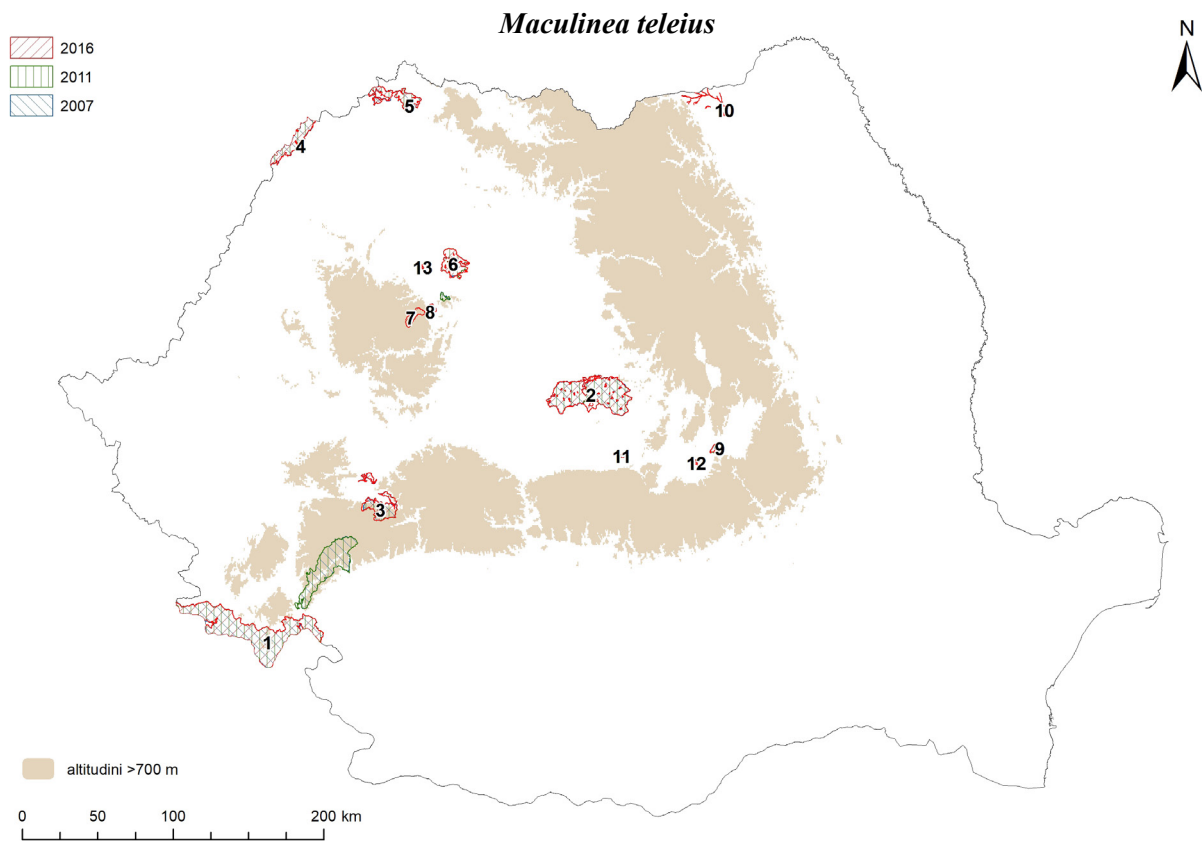


1 - Podișul Lipovei - Poiana Ruscă; 2 - Râul Tur; 3 - Poienile cu narcise de la Dumbrava Vadului; 4 - Pădurea celor Două Veverițe.

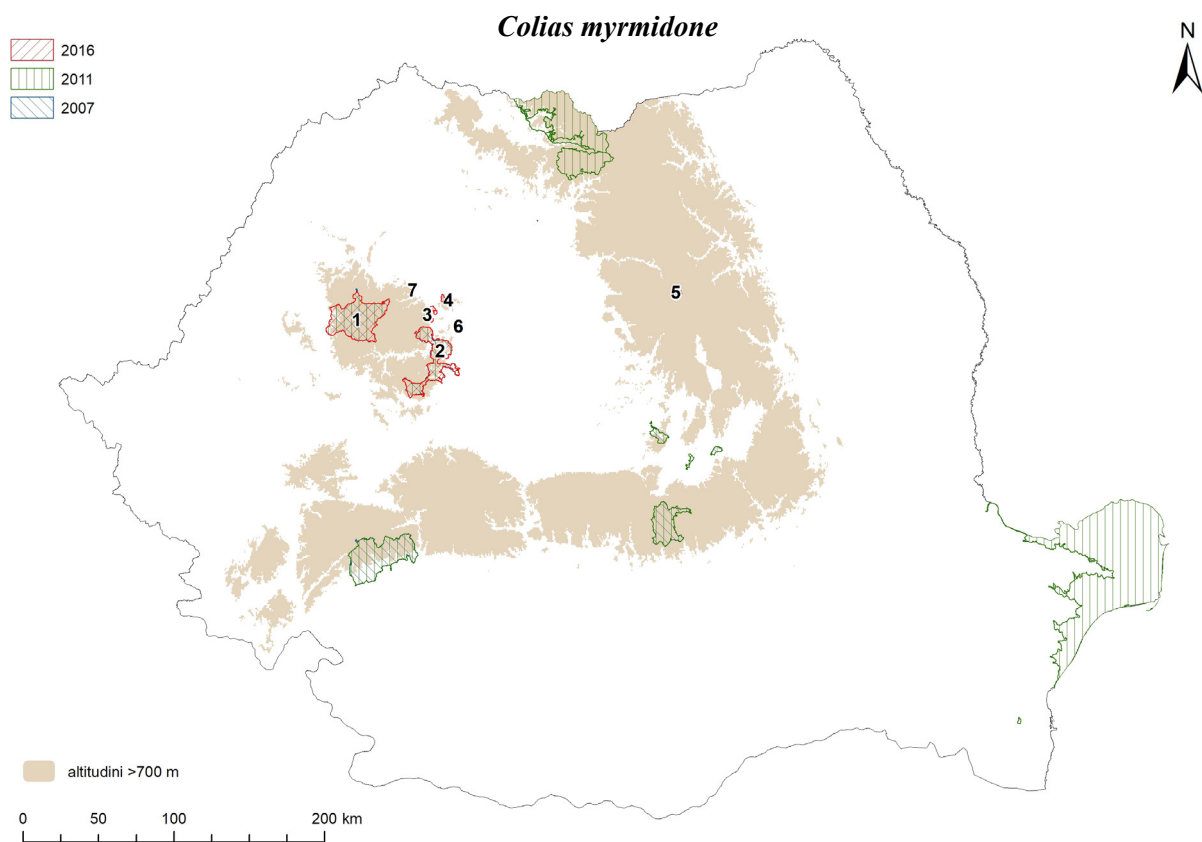


1 - Semic - Cheile Carașului; 2 - Dealurile Clujului de Est; 3 - Făgetul Clujului - Valea Morii; 4 - Râul Suceava.



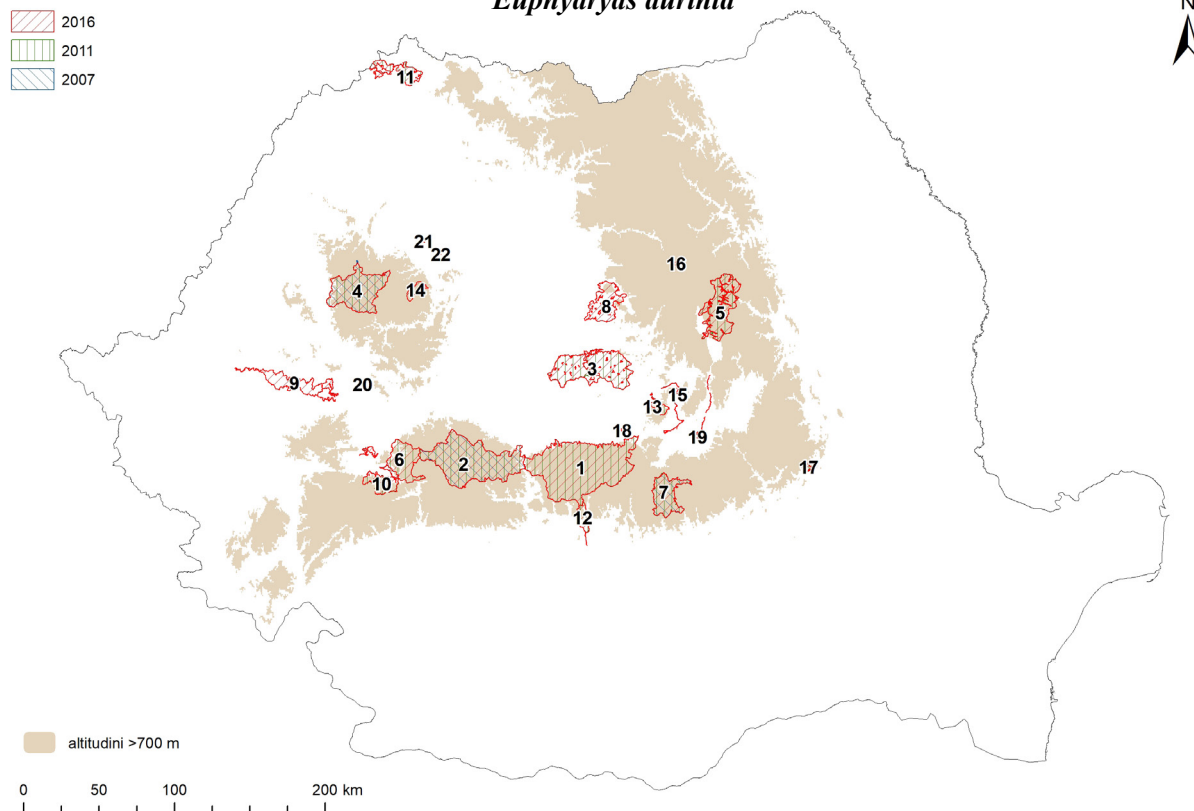


1 - Porțile de Fier; 2 - Sighișoara - Târnava Mare; 3 - Strei - Hațeg; 4 - Câmpia Careiului; 5 - Râul Tur; 6 - Dealurile Clujului de Est; 7 - Valea Ierii; 8 - Pajiștile de la Liteni - Săvădisla; 9 - Mestecănișul de la Reci; 10 - Râul Suceava; 11 - Poienile cu narcise de la Dumbrava Vadului; 12 - Pădurea și mlaștinile eutrofe de la Prejmer; 13 - Valea Șardului.



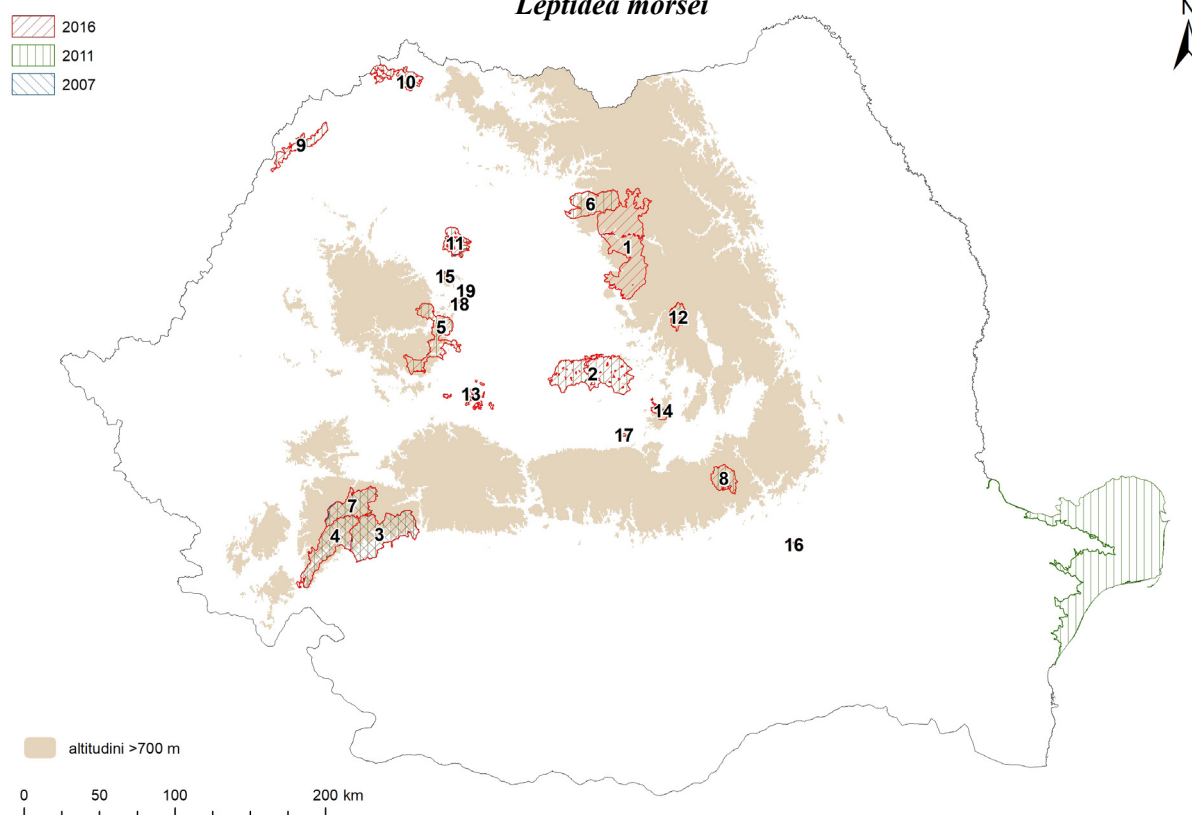
1 - Apuseni; 2 - Trascău; 3 - Pajiștile de la Liteni - Săvădisla; 4 - Făgetul Clujului - Valea Morii; 5 - Valea Chiuruților; 6 - Cheile Turzii; 7 - Agârbiciu.

Euphydryas aurinia



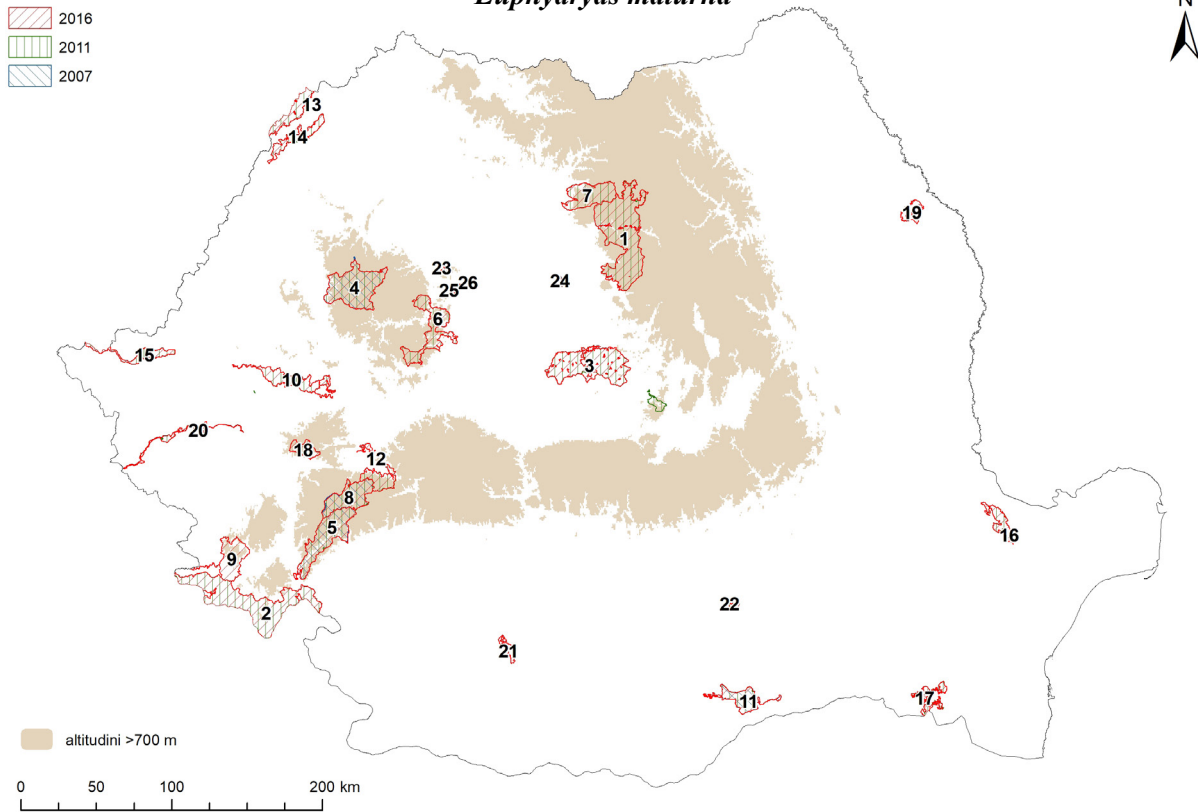
1 - Munții Făgăraș; 2 - Frumoasa; 3 - Sighișoara - Târnava Mare; 4 - Apuseni; 5 - Munții Ciucului; 6 - Grădiștea Muncelului - Cioclovina; 7 - Bucegi; 8 - Dealurile Târnavei Mici - Bicheș; 9 - Defileul Mureșului; 10 - Strei - Hațeg; 11 - Râul Tur; 12 - Valea Vâlsanului; 13 - Pădurea Bogății; 14 - Valea Ierii; 15 - Oltul Superior; 16 - Valea Chiuruților; 17 - Bisoca; 18 - Poienile cu narcise de la Dumbrava Vadului; 19 - Pădurea și mlaștinile eutrofe de la Prejmer; 20 - Măgurile Băitei; 21 - Valea Șardului; 22 - Poienile de la Șard.

Leptidea morsei



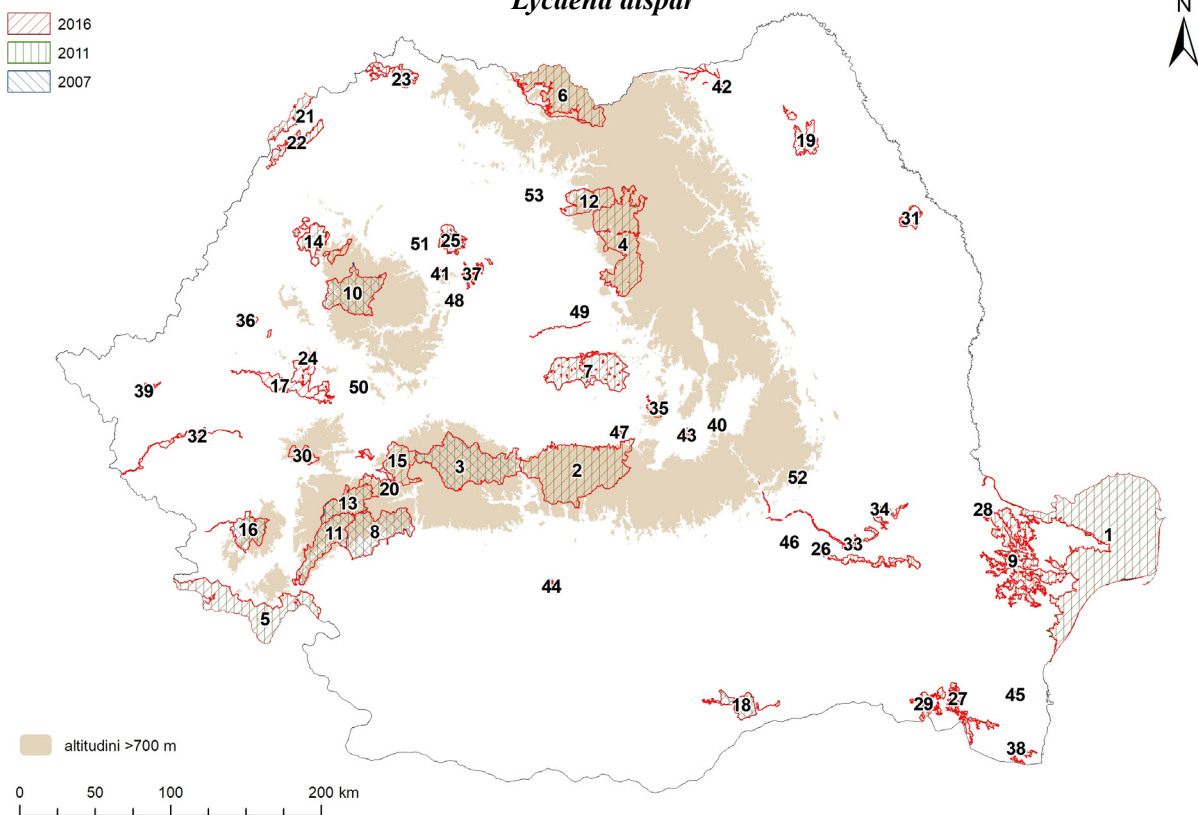
1 - Călimani - Gurghiu; 2 - Sighișoara - Târnava Mare; 3 - Nordul Gorjului de Vest; 4 - Domogled - Valea Cernei; 5 - Trascău; 6 - Cușma; 7 - Retezat; 8 - Ciucaș; 9 - Câmpia Ierului; 10 - Râul Tur; 11 - Dealurile Clujului de Est; 12 - Harghita Mădăraș; 13 - Podișul Secașelor; 14 - Pădurea Bogății; 15 - Făgetul Clujului - Valea Morii; 16 - Dealul Istrița; 17 - Poienile cu narcise de la Dumbrava Vadului; 18 - Cheile Turzii; 19 - Cheile Turenilor.

Euphydryas maturna



1 - Călimani - Gurghiu; 2 - Porțile de Fier; 3 - Sighișoara - Târnava Mare; 4 - Apuseni; 5 - Domogled - Valea Cernei; 6 - Trascău; 7 - Cușma; 8 - Retezat; 9 - Cheile Nerei - Beușnița; 10 - Defileul Mureșului; 11 - Comana; 12 - Strei - Hațeg; 13 - Câmpia Careiului; 14 - Câmpia Ierului; 15 - Lunca Mureșului Inferior; 16 - Munții Măcinului; 17 - Pădurea și Valea Canaraua Fetii - Iortmac; 18 - Rusca Montană; 19 - Pădurea Bărnova - Repedea; 20 - Lunca Timișului; 21 - Pădurea Sarului; 22 - Scroviștea; 23 - Făgetul Clujului - Valea Morii; 24 - Pădurea Glodeni; 25 - Cheile Turzii; 26 - Cheile Turenilor.

Lycaena dispar



1 - Delta Dunării; 2 - Munții Făgăraș; 3 - Frumoasa; 4 - Călimani - Gurghiu; 5 - Porțile de Fier; 6 - Munții Maramureșului; 7 - Sighișoara - Târnava Mare; 8 - Nordul Gorjului de Vest; 9 - Podișul Nord Dobrogean; 10 - Apuseni; 11 - Domogled - Valea Cernei; 12 - Cușma; 13 - Retezat; 14 - Defileul Crișului Repede - Pădurea Craiului; 15 - Grădiștea Muncelului - Cioclovina; 16 - Semenic - Cheile Carașului; 17 - Defileul Mureșului; 18 - Comana; 19 - Dealul Mare - Hârlău; 20 - Strei - Hațeg; 21 - Câmpia Careiului; 22 - Câmpia Ierului; 23 - Râul Tur; 24 - Zarándul de Est; 25 - Dealurile Clujului de Est; 26 - Valea Călmățuiului; 27 - Dumbrăveni - Valea Urluia - Lacul Vederoasa; 28 - Munții Măcinului; 29 - Pădurea și Valea Canaraua Fetii - Iortmac; 30 - Rusca Montană; 31 - Pădurea Bărnova - Repedea; 32 - Lunca Timișului; 33 - Lunca Buzăului; 34 - Balta Albă - Amara - Jirlău - Lacul Sărat Căneni; 35 - Pădurea Bogății; 36 - Dealul Mocrei - Rovina - Ineu; 37 - Suatu - Cojoanca - Crairât; 38 - Pădurea Hagieni - Cotul Văii; 39 - Mlaștina Satchinez; 40 - Mestecănișul de la Reci; 41 - Făgetul Clujului - Valea Morii; 42 - Râul Suceava; 43 - Dealul Ciocaș - Dealul Vițelului; 44 - Pădurea Topana; 45 - Fântânița Murfatlar; 46 - Dealul Istrița; 47 - Poienile cu narcise de la Dumbrava Vadului; 48 - Cheile Turzii; 49 - Râul Târnava Mică; 50 - Măgurile Băitei; 51 - Valea Șardului; 52 - Platoul Meleci; 53 - La Sărătura.