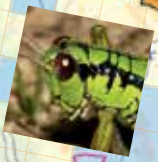
Monitoring
of animal species of Community interest in the Slovak Republic

Results and assessment in the period of 2013 – 2015









State Nature Conservancy
of the Slovak Republic
2015

Monitoring
of animal species of Community interest in the Slovak Republic

Results and assessment for the period of 2013 – 2015

Ministerstvo životného prostredia Slovenskej republiky

op | žp

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I. Introduction


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1. Baseline and objectives of monitoring

1.1 Definition of monitoring and general baseline

Monitoring of species and habitats of European importance provides an important data source for nature conservation in all member states of the European Union at national and international level and represents the basis for decision-making, reasoning and professional preparation of nature protection documentation for as well as for the evaluation of the conservation objectives achieved.

The basic principle of monitoring consists of repeated collection of data on the state of individual species and habitats in the field using standardized methods on precisely defined areas, so-called permanent monitoring localities (PMLs). With these principles the monitoring differs from the conventional field mapping.

The implementation of a comprehensive monitoring is supported and motivated by the commitment of Slovakia as a Member State of the European Union. The monitoring of species of Community interest and their habitats, as well as reporting on their conservation status every six years to the European Commission is the responsibility of the EU Member States. This results from the provisions of Articles 11 and 17 of the Council Directive no. 92/43/ EEC of 22 May 1992 on the conservation of natural habitats, and of wild fauna and flora (the Habitats Directive). The monitoring focuses on the species and habitats listed in the annexes to the Habitats Directive. Likewise, the directive implies a commitment to ensure appropriate management of the Natura 2000 sites (especially Article 6) as well as protection of selected species of plants and animals (articles 12-16).

1.2 Monitoring objectives

1.2.1 Setting-up proper management at the site level

The basic objective of monitoring in the long run is to establish a baseline for set-up of appropriate management of species at the site level. Without systematic data collection the implemented measures are often only estimates and their effect on the target species and their sites is to large extent questionable. Only long-term monitoring can prove the appropriateness of the management. Similarly, decisions on the importance of the effects, permitting or regulation of the economic activities affecting protected species may endanger their future if it is made without up-to-date and relevant information on their status. The monitoring plays a key role in this, which will definitely confirm or disprove the appropriateness of the implemented measures and enable their eventual regulation in the future. Based on the monitoring results it is therefore necessary to propose specific measures to prevent deterioration of the conservation status of animal species and to adopt these into strategies and plans of different levels and types (i.e. management plans for protected areas, forest management plans, river basin management plans, projects of land consolidation).


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1.2.2 Monitoring as a tool of precautionary protection of animal species

The information on the occurrence and the conservation status of monitored species in protected areas, as well as in the rest of the country, is an invaluable asset for practical nature conservation. It creates an important information baseline especially for the State Nature Conservancy of the


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Slovak Republic, which acts in accordance with the law no. 543/2002 Coll. on nature and landscape protection, as amended. It provides possibilities to share information with the administration, other organisations and stakeholders, and through publishing the information at www.biomonitoring.sk it provides a tool for precautionary protection of animal species of Community interest. Already during the first years of monitoring implementation, the information on the occurrence and conservation status of species gathered through the monitoring enabled the saving of populations of endangered species (e.g. *Unio crassus*) at localities outside of the protected areas. Several practical examples demonstrate that the collection of data through monitoring helps directly or indirectly to protect animal species at the site level. And since the data from monitoring are public, there can be no argument about the lack of knowledge on a presence of a certain species/habitats of Community interest and so cases of damage or destruction mean violation of the law if happening without appropriate permits.

1.2.3 Monitoring as a basis for strategic planning at national level

Without systematic monitoring at national level, local objectives are prioritized without a link to comprehensive strategy of animal conservation. Any priorities and measures appearing as appropriate from the viewpoint of a local management might not be appropriate and most needed from the regional or national perspective. From its very beginning, the monitoring has become an essential source of information for development of the National Biodiversity Action Plan. The evaluation of the species/habitats status and the effect thereon will be a tool for the assessment of the projects to be funded from the Operational Programme Quality of Environment 2014-2020. The priorities in the area of nature protection will continue to be based especially on the results of the monitoring.

1.2.4 Monitoring as a basis for meeting of EU requirements concerning the reports on the status of protected animal species in the Slovak Republic

Data collected through monitoring represent a basis for the development of reports on the status of species and habitats of Community interest according to Art. 17 of the Habitats Directive (i.e. reporting). This obligation is to be complied with every 6 years. The report is relatively detailed and requires a lot of baseline data. It has to be emphasized that the results of the reporting are later evaluated at European level and used as a basis for decision on the future direction and strategy of the nature protection in the EU. The monitoring results therefore determine funding of Natura 2000 sites management through Structural Funds, LIFE+ etc., too. Monitoring thus also influences the level of funding for nature protection in Slovakia.

1.2.5 Monitoring and ecosystem services

Ecosystem services represent an important part of the argumentation for nature conservation and the monitoring provides partial baseline for their assessment at the national as well as local level. Data from monitoring are used to establish the basic map of ecosystems and provide information for individual animal species on the quality of selected ecosystem services.

1.2.6 Further benefits of systematic monitoring

Monitoring data provide many further possibilities for the utilisation of partial or summary data. They are used as basis for preparation of official statements of the nature protection authorities, for assessment of the environmental impacts, and they can be used to monitor the impact of climate change. Many other possible applications are constantly emerging and such a complex statistical dataset provides a framework for creative use in many other analyses, planning and evaluation.

2. The process of establishment of the monitoring of protected animal species in Slovakia

2.1 Development of monitoring methodologies

The list of target species for monitoring was determined at the beginning of the process and it was based on the reference list of species of Annex II, IV and V of the Habitats Directive which occur in the Slovak Republic (altogether 146 animal species). For each individual species the detailed monitoring methodology has been created based on existing monitoring methodologies, standard methods and past experience. All methodologies have uniform structure and their development included preparation of field mapping forms specific for each taxonomical group or single species. Altogether 25 different types of forms were created, reflecting different needs for data collection for various taxonomic groups. These forms also determined the structure of the corresponding part of developed information system, particularly the monitoring module of Comprehensive Information and Monitoring System (CIMS).

2.2 Proposal of permanent monitoring localities (PMLs)

Criteria for identification (stratified selection) of the monitoring localities and plots within Slovakia have been determined for the proposal of PMLs, for the purpose of permanent monitoring, based on the following general criteria:

1. The occurrence of the species was assessed separately within each biogeographical region (Alpine and Pannonian), geographical coverage of the species' distribution of PMLs had to reflect its spatial and altitudinal variability. PMLs were selected in a way ensuring regular distribution within the entire species range and to avoid large gaps between PMLs or on the other hand clusters of PMLs.
2. The quality of species population or its habitat at PMLs was highly variable already at the time of selection; the requirement was to capture the most representative sample of the species population. Thus the monitoring did not include only localities of the highest quality, but also the ones which were degraded and threatened, to provide unbiased information on the species' status at the level of biogeographical region.
3. In case of species, which occur at less than 50 sites in Slovakia, there was an effort to include all known sites in the monitoring.

The selection of PMLs was based on the data from various existing databases (ISTB, SON, DAPHNE, etc.) and other sources (such as reporting for the EC) as well on unpublished data from experts. The primary choice of PMLs thus reflected the current level of knowledge on the distribution of species as of 2013. Naturally, some of selected sites have proven to be unsuitable for further monitoring upon the first visit to the PML and a substitute PML was proposed. The network of PMLs therefore expanded during the course of the project and the boundaries of PMLs were refined.

2.3 The establishment of Comprehensive Information and Monitoring System (CIMS)

For the purpose of collection, processing, evaluation and publication of data from field monitoring a Comprehensive Information and Monitoring System (CIMS) of SNC SR was developed, which includes electronic forms for filling in data in accordance with the methodology of monitoring. Development of CIMS started in parallel with the development of methodologies, PML proposal and the main monitoring itself executed in the field. Initial experiences of its use were continuously projected into the final form of the information system.

Each record inserted into the information system is validated on two levels, by group leader and expert coordinators of the SNC SR. Approved records are being published in an adapted form via portal www.biomonitoring.sk. CIMS summarizes and evaluates the data for the conservation status of species and its distribution on a daily basis.


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2.4 Realization of field monitoring and processing of the data

Implementation of monitoring in the field began in the winter period of 2013 and lasted until early autumn 2015. It involved 185 experts – mappers. The responsibility for individual animal species, monitoring was divided between the SNC SR and DAPHNE – Institute of Applied Ecology. For each taxonomic group the group leader was assigned, whose task was to coordinate mappers and, where appropriate provide methodical guidance and ensure communication with the coordinators at DAPHNE and SNC SR and in particular check and validate the monitoring records received from mappers. In three years of the project over 8,900 records of animal species monitoring have been carried out and processed into CIMS.


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2.5 Data evaluation – methodology of species' conservation status assessment

For the purpose of the assessment of the conservation status of individual animal species, a new approach has been developed and applied that uses data collected through monitoring in the field and presents those data in categories of conservation status: favourable (FV), unfavourable-inadequate (U1), unfavourable–bad (U2). These categories result from the report on the status of species and habitats (Habitats Directive Art. 17 report) presented periodically by the Slovak Republic to the European Commission under the provisions of the European Union directives.
The conservation status is evaluated at several levels:

1. Evaluation of the conservation status at locality level
2. Evaluation of the conservation status at the level of biogeographical region
3. Evaluation of the conservation status at national level
4. Evaluation of the conservation status within Sites of Community Interest (SCIs) and/or Special Areas of Conservation (SACs)
5. Evaluation of the conservation status for individual taxonomical groups of animal species

2.5.1 Evaluation of the conservation status at locality level (PML)

Evaluation of the species' conservation status at this level is based on the evaluation of partial parameters:
a) Quality of the population at the locality
b) Quality of the habitat at the locality
c) Future prospects of the species' habitat at the locality
These three parameters are evaluated during a field visit, according to a defined methodology for each species separately. The methodology usually sets threshold values for individual conservation status categories (favourable, unfavourable-inadequate and unfavourable-bad). For each parameter and category of status the percentage values are estimated, although each parameter must reach a total of 100 % (e.g. population quality is assessed as favourable: 30 %, unfavourable-inadequate: 40 %, unfavourable-bad: 30 %). Such record enters into the process of assessment, in which the total status of the individual parameters is assessed first, as follows:
Total status for a particular parameter is favourable, when the following values are achieved:
– favourable >= 85 %, or favourable >= 70 % when unfavourable-bad at the same time = 0
Total status for a particular parameter is unfavourable-bad, when the following values are achieved:
– unfavourable-bad >= 50 %
All other combinations of percentage values result in unfavourable-inadequate status of the given parameter.

The same method is used to assess the population quality, quality of the species' habitat and the future prospects of the species' habitat separately. This is followed by a summary evaluation of all assessed parameters, which combines the results of the evaluations of the single parameters. The parameter, which scored the worst, rules upon the total assessment at the locality level. So, where all three parameters are in favourable status (FV), the overall conservation status at the locality is also assessed as favourable (FV). If one or several parameters are assessed as unfavourable-bad (U2), the overall conservation status at the locality is assessed as unfavourable-bad (U2). All other combinations result in unfavourable-inadequate conservation status (U1).

The assessment method described above is applied on each monitoring record separately.

2.5.2 Assessment of the conservation status at the level of biogeographical region

This is based on results of the assessments at locality level (PML) made for each monitoring record. All locality assessments are summarized for the particular species, separately for the Alpine and for the Pannonian biogeographical region and the results are presented as a percentage of monitoring records with favourable (FV), unfavourable-inadequate (U1), unfavourable-bad (U2) total status assessment. The resulting status at the level of biogeographical region is determined again by using of same threshold values: 85 (70) Vs 50 (0) (see evaluation at locality level).

2.5.3 Evaluation of the conservation status at national level

The assessment method is the same as the one at the bioregion level, but the results of locality assessments data are summarized regardless of the association with a particular bioregion.

2.5.4 Evaluation of the conservation status at SCIs/SACs (Sites of Community Interest /Special Areas of Conservation)

Only records from permanent monitoring localities (PMLs) at least partially overlapping with the SCIs/SACs are taken into assessment.

2.5.5 Evaluation of the conservation status for taxonomic groups of species

A similar method as used for the assessment at the locality level is applied, but in the summary representation result assessments from all monitoring records for species of the same taxonomic group are combined. The result chart represents an overview of the proportion of favourable (FV), unfavourable-inadequate (U1) and unfavourable-bad (U2) assessment in summary for the entire taxonomic group.

All of the given assessment levels have been incorporated in the Comprehensive Information and Monitoring System (CIMS), performing automated assessments of conservation status based on actual data.

2.6 Specifics of monitoring of bats

Due to frequent common occurrence of various species of bats at a single PML, a specific method was chosen for the selection and monitoring of this group of animal species. At a single locality 3 to 14 bat species were jointly monitored, depending on the method used. There were six methods used (M1 Census during the breeding period in hiding, M2 Census in underground wintering habitats, M3 Trapping in nets during summer period, M4 Mapping of occurrence by trapping near underground shelters in autumn period, M5 Mapping of occurrence using ultrasound detector on transect, M6 Census of bats flying out from attic hiding places). With the exception of the greater noctule bat *Nyctalus lasiopterus*, every species was primarily monitored using two of the above methods; however, the occurrence was often recorded also by some of the other methods. Since in this situation, no specific species could be assigned to a particular PML – but a potential group of species (depending on the used method), it was also necessary to modify the methodology for evaluation of the collected data to avoid bias to the overall monitoring results. For this purpose we therefore evaluated the occurrence of each species within the expected area of occurrence (blue grid in the maps), and outside of this area only data from PML, where the species was positively registered, were considered, i.e. where the status of the population was evaluated as favourable or unfavourable-inadequate. For favourable status of population each positive occurrence of the species within PML was considered (reflecting the difficulties of the monitoring of bat populations' structure and size in the field, with the exception of census of mother colonies). In case the species did not occur on the PML during the monitoring but its occurrence there was expected (e.g. known, colony of the species long-term registered in the attic), the status of the population at the PML was evaluated as bad. For unfavourable-inadequate status mainly those cases were regarded where the species abundance dropped significantly compared to the previous period.

3. Summary information and statistics from monitoring results

3.1 Basic statistical data – animals:

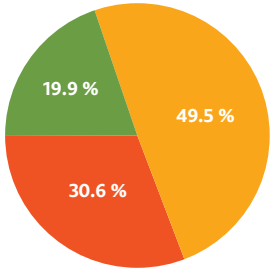
- Subject of the monitoring are 146 animal species.
- For each species a separate monitoring methodology has been developed for the purposes of field data collection.
- Monitoring of animal species is carried out at more than 3,000 localities.
- There have been more than 8,900 field visits carried out throughout Slovakia.
- Animal species monitoring was performed by 185 experts.

The results of monitoring are interpreted by the Comprehensive Information and Monitoring System (CIMS) of the State Nature Conservancy of the Slovak Republic (SNC SR) and made public via website www.biomonitoring.sk.

All reports and opinions presented in this publication are based on monitoring data collected in the period of 01/2013 – 08/2015.

3.2 General assessment of the species conservation status

According to summary results the status of most animal species of European importance in Slovakia is unfavourable. In 80.1 % of records the animal species were evaluated in unfavourable conservation status, i.e. as unfavourbale-inadequate (49.5 %) or unfavourable-bad (30.6 %). Less than 20 % of all field visits to PMLs demonstrated favourable conservation status. Compared to the expert estimates and partial data used in the last report on the status of animal species of European importance (reporting under Article 17 of the Habitats Directive), the assessment based on actual systematic complex monitoring shows significantly more negative results.



The absolute number of monitoring records is as follows:

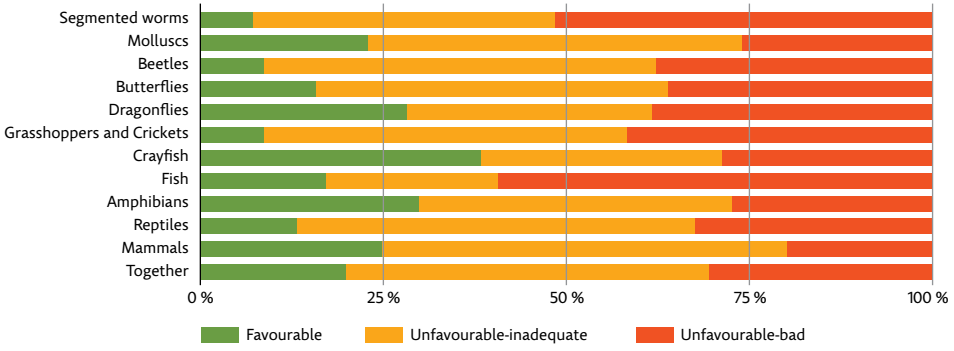
Conservation status	Favourable	Unfavourable-inadequate	Unfavourable-bad
Animal species	1,779	4,428	2,734

The table shows the absolute number of records from the field monitoring (field visits) entered into CIMS as of 30/08/2015. In total there are 8,941 monitoring records, which represent major data set, based on which all results in this publication are presented.

3.3 Summary assessment of the conservation status by taxonomic groups of animal species

From the viewpoint of the proportion of unfavourable to favourable status results, fish and segmented worms scored the worst, with more than 50 % of monitoring records having evaluated the species' conservation status as unfavourable-bad.

In the case of segmented worms – medicine leach (*Hirudo medicinalis*) the outcome can be influenced

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by the overall small number of monitoring records and insufficiently known distribution of this species. For fish, the conservation status assessment is influenced by large number of negative records from PML, where presence of the monitored species was not confirmed (due to poorly known real distribution). Orthopterans and beetles have unfavourable (inadequate or bad) conservation status in more than 90 % of the monitoring records, too. For these groups, the results are affected by methodological constraints – using reduced or non-destructive sampling methods. However, unfavourable weather conditions, such as extremely dry and hot weather in the spring and summer of 2013 and an early start of vegetation season in spring 2015 may have had a significant impact on the results, too. The results probably reflect the real inadequate or even bad conservation status of habitats for these species, which contributes to the overall negative assessment of their overall conservation status. Crayfish (*Astacus astacus, Austropotamobius torrentium*) have the largest portion of monitoring records with the favourable conservation status of the species (39 %) (*Astacus astacus, Austropotamobius torrentium*). Mammals (excluding large carnivores not dealt with in this project) achieved relatively the best assessment results.

The key information is however, that no taxonomic group of animals has been evaluated as being in favourable conservation status in majority of monitoring records, which confirms overall unfavourable status of animal species of European importance in Slovakia.

3.4 Assessment of pressures and threats

The assessment of pressures and threats is an integral part of the monitoring because it provides essential information for initial identification of potential sources of difficulty that prevent the attainment of a favourable status at the site now or in the future. When assessing all data it is evident, that natural biotic and abiotic processes are the paramount threat for animal species, mostly represented by secondary succession in non-forest habitats. The second major adverse effect is forestry and the pressures associated with current forest management methods, significantly impacting the status of species at individual localities. Agricultural practices also significantly affect the species' status. Interesting information is that the climate change was identified among the pressures for 3 % PMLs and as a future threat for 4 % PMLs. The monitoring results thus included this under-observed phenomenon among adverse impacts on the status of animal species of European interest in Slovakia.

The following table summarizes the negative pressures and threats with moderate or high intensity. The pressures represent the current problems at the monitored localities; threats represent the problems expected to have influence in the near future.

Category of pressure/threat	Species	
	Current pressures	Future threats
natural biotic and abiotic processes (except for disasters)	19.0 %	19.0 %
forestry	14.8 %	20.1 %
agriculture	13.0 %	11.6 %
human impact	9.5 %	8.8 %
utilization of biological resources other than agriculture and forestry	8.6 %	5.3 %
pollution	7.5 %	6.7 %
natural changes of ecosystems	7.1 %	8.9 %
transport and communication	6.3 %	3.6 %
urban development, settlements and development	5.1 %	5.5 %
climate change	2.9 %	3.9 %
invasive or otherwise problematic species	2.3 %	3.2 %
mining, raw material exploitation, energy production	1.1 %	1.3 %
natural disasters	0.3 %	0.2 %

Legend

Total number of **permanent monitoring localities (PMLs)** for the particular species.

Scientific name of the species, author and year of description, taxonomic classification into order and family.
(an asterisk * before the name means that the species is considered a priority species according to Habitats Directive)

Pressures and threats for the species most frequently reported from the PMLs and their assessment.

Most common accompanying species observed by the experts at the PML. Mostly species of the same group as the monitored species.

Very brief annotation of the method used for monitoring of PML. Monitoring methods are provided in a separate publication.

Map representing permanent monitoring localities for the species in favourable status (green), unfavourable-inadequate status (orange) and unfavourable-bad status (red) from the last field visit at the locality. Blue 10×10 km grids show the distribution of the species according to the reporting under the Article 17 of the Habitats Directive (2013). Violet shows the border between Alpine and Pannonian Biogeographical Region.

Population size and estimated trend of population development – a combination of expert estimates and data reporting under the Article 17 of the Habitat Directive. Categories of population trend mean: + (increasing), – (decreasing), 0 (stable), × (unknown)

Cucujus cinnaberinus (Scopoli, 1763)
(*Coleoptera, Cucujudae*)

Cucujus cinnaberinus is distributed in Slovakia from lowland floodplain forests to sub-montane and montane forests. It is a typical species of old forests with plenty of dead trees.

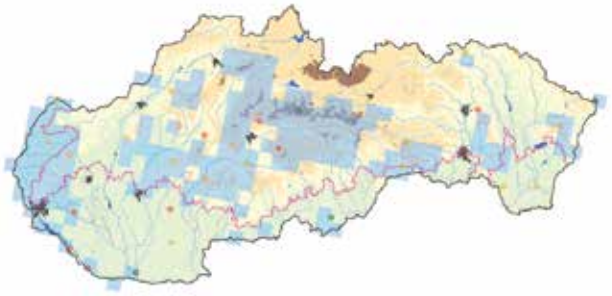
Number of PMLs: 32 **PML average area size:** 1,566 ha

Number of involved experts: 6 **Number of PML field visits:** 128

The most common accompanying species: *Pyrochroa coccinea, Rosalia alpina alpina, Schizotus pectinicornis, Ceruchus chrysomelinus, Lucanus cervus, Eurythyrea austriaca, Dicerca berolinensis, Sinodendron cylindricum, Carabus clatratus clatratus.*

Monitoring method: Visual registration of larvae and imagoes under the bark of dead wood on transects from 1st of April to 30th of November.

PMLs distribution and localization: Old preserved forests with plenty of dead wood, often protective forests or forests of special purpose (protected areas).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000,000 – 5,000,000 individuals
Estimate of the population size in the Pannonian Bioregion: 500,000 – 1,000,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include inappropriate management of forest habitats, especially forest renewal (86 % in the Alpine Bioregion and 67 % in the Pannonian Bioregion), spreading of invasive woody species (black locust), it is problematic in warmer regions of Slovakia (over 10 %) and planting of non-native tree species (*Pinus sylvestris, Pinus nigra, Larix decidua*) and negative changes in the water regime of lowland deciduous floodplain forests (16 %).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Assessment and notes on the monitoring results: The habitat quality in most of the monitored locations is unfavourable. The reason for this is the lack of older forest stands with the presence of coarse dead wood. Some of the localities are in bad conservation status because of the small area of older stands that are often very fragmented. In localities where the forest management maintains plenty of coarse dead wood in the stands and silvicultural management is close to natural, it has favourable future prospects. In the Alpine Bioregion such situations represent only 8 % of PMLs and in the Pannonian Bioregion 23 %, thanks to nature reserves and protective forests. The quality of the population in both bioregions is evaluated as inadequate and bad quality of the populations in the Pannonian Bioregion reach 39 %, in the Alpine Bioregion 22 %. The natural negative factors affecting the occurrence of the pre-imago developmental stages of *Cucujus cinnaberinus* include unsuitable weather conditions (2015), in particular drought which adversely affects the substrate of the larvae. In order to maintain a stable population of the species, the most important localities are floodplain forests with plenty of coarse dead wood in the southern part of Slovakia and small-scale protected areas in areas with non-intervention regime and plenty of coarse dead wood, such as Stužica, Komárnická jedlina, Mláčik and protective forests that are not attractive for the forestry from the economic point of view. To support the species also in commonly managed forests we can clearly recommend the retention of coarse dead wood in forests in the minimum amount of 5 pieces/ha. For forest renewal use of small-scale felling should be preferred, keeping the native tree species composition even after the forest renewal, and preventing spreading of invasive woody species is recommended. For the survival of the species the greatest importance is however maintaining a sufficiently large area of forests (over 50 ha) with the occurrence of coarse dead wood in non-intervention regime in the form of small-scale protected areas.

Other significant species of beetles were recorded in the monitored localities, such as *Ceruchus chrysomelinus, Eurythyrea austriaca, Carabus clathratus, Brachygonus megerlei, Stenagostus rhombeus, Peltis grossum, Megopis scabricornis.*


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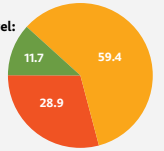
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Images of the species and/or its typical habitat.

Evaluation of the monitoring results, experience or proposals for species conservation and management to improve its status.

Overall assessment of the status of the species by individual biogeographical regions and at the national level.

Resulting status within the SCIs/SACs:

- FV – Favourable
- U1 – Inadequate
- U2 – Bad
- XX – Unknown

Three assessed parameters (quality of population, quality of species habitat and future prospects) are the general data determined at each PML, required for the reporting under the Article 17 of the Habitats Directive. The report is submitted to the European Commission for each species separately, for both Alpine (ALP) and Pannonian (PAN) Biogeographical Region, every 6 years. They are assessed in 3 categories: FV – favourable (green), U1 – inadequate (orange) and U2 – bad (red), resp. XX – unknown (grey). The numbers in the graphs represent the percentage of the corresponding status category.

Note: All data in the publication, assessments and statistics are related to the period of 01/2013 – 08/2015.

Hirudo medicinalis (Linnaeus, 1758)
(*Hirudinea*, *Hirudinidae*)

This annelid has unmistakable colouring. It lives in standing and slowly flowing waters, permanent, but also periodic waters, usually with at least a partially muddy bottom. In the winter or during the periods without water, it survives buried in the mud.

Number of PMLs: 11 **PML average area size:** 77.3 ha

Number of involved experts: 3 **Number of PML field visits:** 21

The most common accompanying species: *Haliplus fluviatilis*, *Hygrotus versicolor*, *Acrocephalus schoenobaenus*, *Acrocephalus palustris*, *Hydroglyphus pusillus*, *Hyphydrus ovatus*, *Laccophilus variegatus*, *Peltodytes caesus*, *Emberiza schoeniclus*.

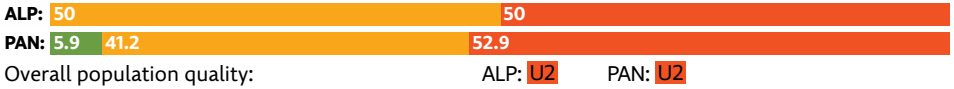
Monitoring method: Visual registration and catching of individuals using aquatic net in the localities from 1st of April to 30th of November.

PMLs distribution and localization: Standing, natural or artificial, permanent as well as periodic waters (marshes, old silted material pits, oxbow lakes etc.). It occurs in the lowlands and basins – in Záhorská nížina Lowland and Podunajská nížina Lowland, Poiplie Region and in Turčianska kotlina Basin.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 5,000 individuals
Estimate of the population development trend: ALP: × PAN: –

Population quality in PMLs:



Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV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Pressures and threats: The most frequently recorded pressures and threats of high to moderate intensity in both bioregions include human-induced changes in the hydrological conditions. These include mainly drainage of wetlands, or even their destruction. In the past it inhabited various types of wetlands and water bodies in the floodplains of large rivers – the Danube, Nitra, Žitava, Ipeľ etc. The small isolated populations live in wetlands on agricultural land where they are threatened by the application of pesticides, other chemicals and fertilisers that can cause pollution of water, eutrophication, growth of algae etc.

Assessment and notes on the monitoring results: In the initial phase of monitoring seven localities in the Pannonian Bioregion were chosen for PMLs, two of them are in Podunajsko (Danube floodplain) and three of them located in Záhorie Region. Some localities were designated according to older literature records or unpublished data only and the precise locations were not known. This fact, together with very dry and warm spring and summer probably caused that all the visits in 2013 ended with a negative result. In 2014, the list of PMLs was completed (based on unpublished data) with one new locality in the Alpine Bioregion where the species had not been reported before. Its presence was successfully confirmed there. The year 2014 was rich in rainfall and the species was confirmed in five of the eight PMLs. During monitoring of other species and habitats, three new localities of this species were found, which were later added to the PMLs. In 2015, the situation with a dry summer was repeated, however, the species was confirmed in most of the localities, although not on the locality in the Alpine Bioregion. At the same time, two new localities were found – in Záhorie Region and in Rimavská kotlina Basin.

The monitoring results indicate that the distribution of *Hirudo medicinalis* in Slovakia is scattered over most of the Panonnian Bioregion. However, data from eastern Slovakia are missing. The most numerous populations, or more accurately, the most well-known localities are in Záhorie Region. The localities in Podunajsko and Poiplie Region are probably isolated, even though it is possible that some others will be found in the future. The populations there are of low abundance and thus more vulnerable to negative impacts. The status of the species is evaluated as unfavourable-bad in both bioregions, though it nearly reaches the threshold for inadequate status. Other vertebrate and invertebrate species, which are linked to aquatic habitats, were recorded in the localities of *Hirudo medicinalis*, e. g. *Haemopis sanguisuga*, *Cybister laterimarginalis*, *Hydrophilus piceus*, *Triturus dobrogicus* or *Alcedo atthis*.


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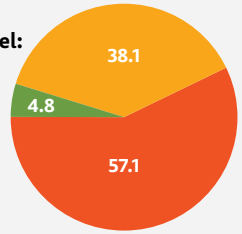
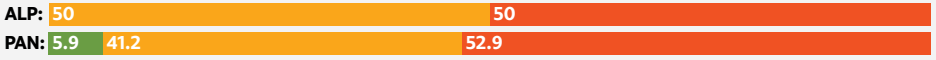
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: U2



By bioregion:



Anisus vorticulus (Troschel, 1834)
(*Mollusca, Planorbidae*)

Anisus vorticulus has a relict occurrence in the territory of Slovakia. It is distributed in isolated localities in floodplains of large rivers in southern Slovakia (Podunajská nížina Lowland and Záhorská nížina Lowland).

Number of PMLs: 10 **PML average area size:** 30.2 ha

Number of involved experts: 2 **Number of PML field visits:** 17

The most common accompanying species: *Planorbarius corneus, Bithynia tentaculata, Planorbis planorbis, Lymnaea stagnalis, Viviparus contectus, Anisus vortex, Segmentina nitida, Physa fontinalis, Valvata cristata, Aplexa hypnorum.*

Monitoring method: Visual observation and collection of individuals using a plankton net and sieve. Alternatively, sampling and analysis of approximately 12 litres sample of fluvial deposits.

PMLs distribution and localization: Shallow standing waters in the floodplains of rivers and ponds (the Danube, Morava, Hrhovské rybníky Ponds etc.).

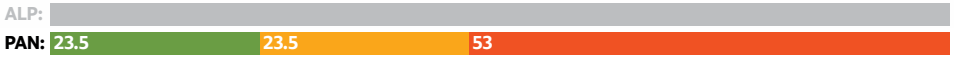
Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals

Estimate of the population development trend: ALP: PAN: –

<u>Population quality in PMLs:</u>



Overall population quality: ALP: PAN: U2

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include changes in the hydrological conditions and in the quality of the habitats (58 %), caused mainly by agricultural activity.

Assessment and notes on the monitoring results: In almost half of the localities the quality of the habitat for species is inadequate or bad. The reason is the destruction of the localities by overgrowing vegetation that decreases the number of habitats suitable for the occurrence of *Anisus vorticulus* (lack of sunlit water surface is a limiting factor for this species). Suitable habitats are declining also due to the change in the hydrological conditions in the streams and the pollution mainly from agriculture. The population quality is in a bad status. *Anisus vorticulus* is a species sensitive to the changes in the habitat quality which is reflected in the low number of individuals found during the monitoring in the particular PMLs. Regarding the ongoing natural degradation of habitats of the species, its future prospects are evaluated as inadequate. This corresponds to the most frequent negative pressures and threats.

To improve the conditions for the species it is necessary to minimize the pollution of water courses and in case of localities that are subject to natural changes (overgrowing and silting) it is necessary to ensure measures leading to the restoration of these habitats. One of the possible ways of enhancing the quality and abundance of the population of *Anisus vorticulus* is the creation of artificial shallow waters on meadows in places where this species occurs.

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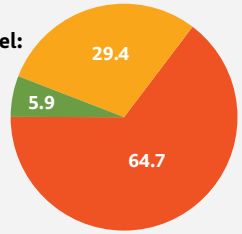
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Helix pomatia Linnaeus. 1758
(*Mollusca. Helicidae*)

Helix pomatia is a relatively common species in Slovakia. It can be often found near human settlements and parks. It lives mainly in bushy stands, near water courses, but also in gardens, forests and on the edges of roads.

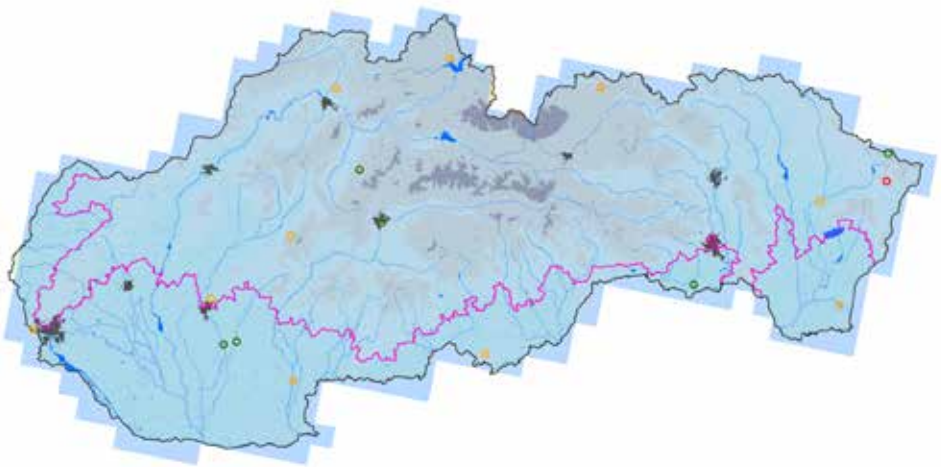
Number of PMLs: 13 **PML average area size:** 413.4 ha

Number of involved experts: 12 **Number of PML field visits:** 20

The most common accompanying species: Other species of molluscs sharing habitats with *Helix pomatia* were not being recorded during the monitoring.

Monitoring method: Visual observation and the collection of individuals directly in the locality.

PMLs distribution and localization: Forest stands, banks of ponds and water reservoirs, banks of water courses, abandoned orchards.



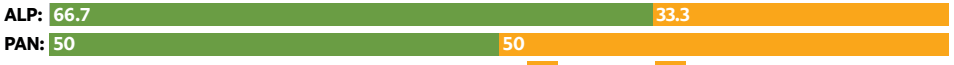
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

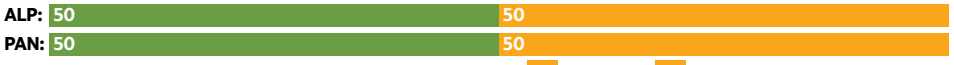
Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent negative factor is natural succession and overgrowing of habitats.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Assessment and notes on the monitoring results: In most areas the habitat quality is in favourable status, especially in the Alpine Bioregion. This corresponds to the population quality of the species that reaches 75 % in a good status in the Alpine Bioregion. We assume that the significantly low population quality in the Panonnian Bioregion may be caused by the higher intensity of succession, more intensive agricultural activity and the higher rate of use of chemical agents. *Helix pomatia* was a common and abundant species in the past in Slovakia, but the abundance of its population significantly decreased due to its unregulated collection in the wild for culinary purposes. At the present times, its collection is regulated in selected regions and it is limited to the collection of individuals of specific size during only a designated period of the year. This step contributed to the fact that in the recent years the abundance of the population of *Helix pomatia* has been relatively stable in Slovakia.


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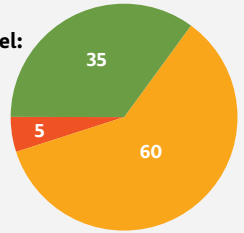
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Sadleriana pannonica Frauenfeld, 1865
(*Mollusca, Hydrobiidae*)

Sadleriana pannonica is a Western Carpathian endemic species of Slovenský kras (Slovak Karst) and Aggtelek Karst of Hungary. It is a species of karst exsurgences and springs.

Number of PMLs: 39 **PML average area size:** 4,016 m^2

Number of involved experts: 1 **Number of PML field visits:** 74

The most common accompanying species: *Hauffenia* sp., *Bythinella austriaca, Helix pomatia, Carychium tridentatum, Pisidium* sp., *Carychium minimum, Vallonia pulchella, Acanthinula aculeata, Truncatellina cylindrica, Punctum pygmaeum.*

Monitoring method: Visual observation and the collection of individuals directly in the locality. Sampling and analysis of sediments.

PMLs distribution and localization: Karst exsurgences and springs in Slovenský kras. It can be exceptionally found in springs in the southern part of Volovské vrchy Mountains.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: FV

Pressures and threats: They are mainly activities that lead to the alteration of the hydrological regime and the drainage of the localities. The negative impacts on the population of the species include also the pollution of springs from the nearby dumping sites or as a consequence of using biocides in the catchment area of exsurgences and springs.

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Assessment and notes on the monitoring results: The status of the habitat for species is evaluated as favourable, especially in the Panonnian Bioregion (95%) where the species has the core of its distribution in Slovakia. This corresponds to the population quality that is also favourable in the Panonnian Bioregion (95%). In the Alpine Bioregion the species occurs only sporadically and the habitat quality as well as the population quality is evaluated as inadequate. Despite the negative influences the future prospects of the habitat are evaluated as favourable in the Panonnian Bioregion or unfavourable-inadequate in the Alpine Bioregion. Securing of the protection of this species in the long term requires minimizing the interventions at the springs, especially the capture of water from the springs, and the removal of dumping sites from the vicinity of the springs and exsurgences.

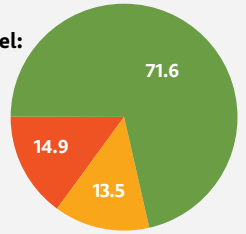
It is interesting that the frequent corrosion of the first threads (on the top of the shell) of the individuals found in Slovakia significantly distorts the overall shape of the shell.

© *Jozef Grego*

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: FV
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Unio crassus Philipsson, 1788
(*Mollusca, Unionidaea*)

Unio crassus occurs in Slovakia in larger and smaller water courses with a rocky bottoms that alternate with muddy sections and fine sediment deposits.

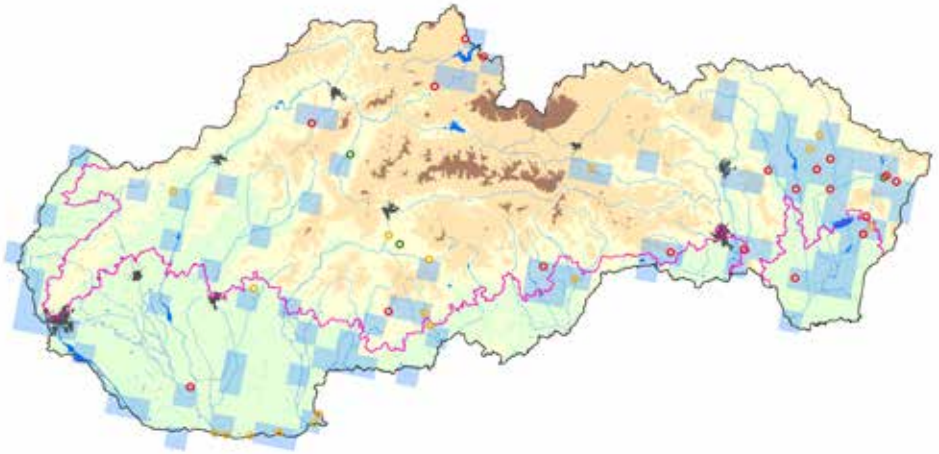
Number of PMLs: 39 **PML average area size:** 15 ha

Number of involved experts: 7 **Number of PML field visits:** 103

The most common accompanying species: *Pisidium casertanum*, *Lithoglyphus naticoides*, *Unio tumidus*, *Corbicula fluminea*, *Ancylus fluviatilis*, *Dreissena polymorpha*, *Theodoxus fluviatilis*, *Unio pictorum*, *Ancylus fluviatilis*, *Anodonta anatina.*

Monitoring method: Visual observation of the individuals and collection of recent and subrecent shells directly in the locality; additionally analysis of fluvial deposits.

PMLs distribution and localization: Larger as well as smaller water courses.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: Regulations of water courses and modifications of the hydrological regime are the most frequent (35 %) negative factor that influences *Unio crassus*. Another significant negative factor is the pollution of surface water by sewage from human settlements (almost 29 %). This affects especially the water courses that flow through villages without a sewage system.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Assessment and notes on the monitoring results: Also due to the ongoing threat of water courses pollution and their regulation, the quality as well as the future prospects of the habitat is evaluated as inadequate. During the monitoring only the presence of empty shells was found in many localities, or the species was not found at all. In comparison with the status 10 years ago, the species was not confirmed in several localities. On the other hand, during the monitoring, relatively abundant populations were found (thousands of living individuals) in new places, mainly in central Slovakia. Despite this, the quality of the species' population is evaluated as unfavourable-inadequate on national level. To ensure the protection of the species in the future it is necessary to consider the interventions into water courses with the occurrence of *Unio crassus*, mainly interventions related to the regulation and dredging of the water courses. It is necessary to eliminate the pollution of surface water by sewage, mainly by the removal of the sewage system with drain outlets into these streams.


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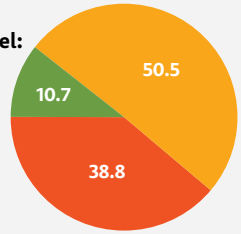
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Vertigo angustior Jeffreys, 1830
(*Mollusca, Vertiginidae*)

Vertigo angustior is a calciphile species that occurs mainly in open alkaline wetlands, such as wet meadows, fens, peatlands, springs, river floodplains etc.

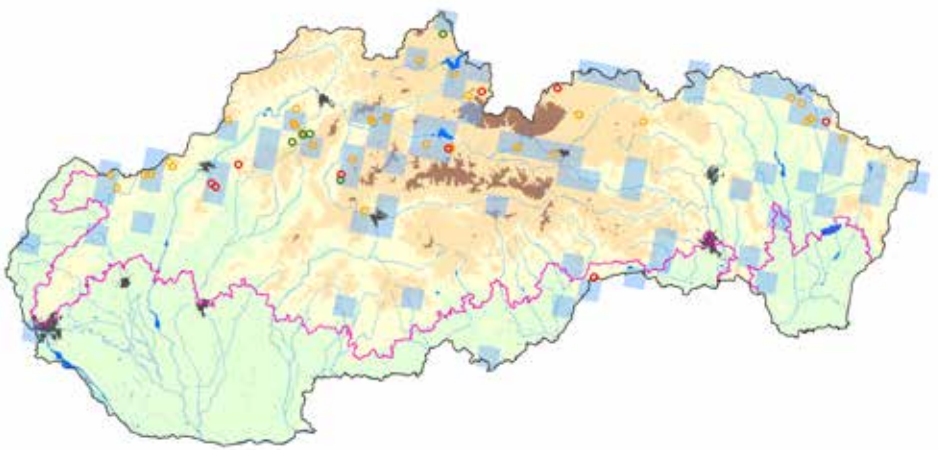
Number of PMLs: 49 **PML average area size:** 3.2 ha

Number of involved experts: 4 **Number of PML field visits:** 129

The most common accompanying species: *Punctum pygmaeum*, *Carychium minimum*, *Euconulus praticola*, *Cochlicopa lubrica*, *Succinea putris*, *Vallonia pulchella*, *Carychium tridentatum*, *Nesovitrea hammonis*, *Vertigo antivertigo*, *Zonitoides nitidus*.

Monitoring method: Sampling and analysis of approximately 12 litres of sample taken from the litter, including mosses.

PMLs distribution and localization: Wet meadows, peatlands, fens and springs. In the territory of Slovakia, in comparison with other Habitats Directive Annex species of the *Vertigo* genus, it is relatively abundant.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most significant negative pressures are modifications of the water regime and the draining of wetlands. The gradual drying-up of localities and their overgrowing by herbaceous vegetation lead to the overall degradation of the habitat. Intensive grazing and eutrophication have a negative impact too.

Assessment and notes on the monitoring results: The habitat quality in the Alpine Bioregion was evaluated mainly as favourable (almost 68 %). Only one PML was included in the monitoring in the Panonnian Bioregion (a spring near the village of Silická Brezová), where the species was not found, therefore the population quality as well as the overall status of the species were evaluated as unfavourable – bad. Although the quality of the species' population in the Alpine Region is evaluated as inadequate, it can be concluded that in the particular PMLs there are relatively numerous and stable populations of *Vertigo angustior*. The future prospects of the species' habitats and the overall status in the Alpine Bioregion are evaluated as inadequate due to the deterioration of suitable habitats.

Appropriate management measures for the protection of the species and its habitats include ensuring of regular mowing and removal of wood encroachment and the preservation of a suitable water regime in the particular localities.

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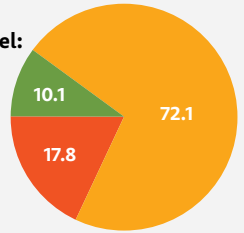
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Vertigo geyeri Lindholm, 1925
(*Mollusca, Vertiginidae*)

Vertigo geyeri is a calciphile species that occurs especially in non-forest wetlands with sedge vegetation as well as in peatlands, springs and fens rich in calcium and with high and stable groundwater table.

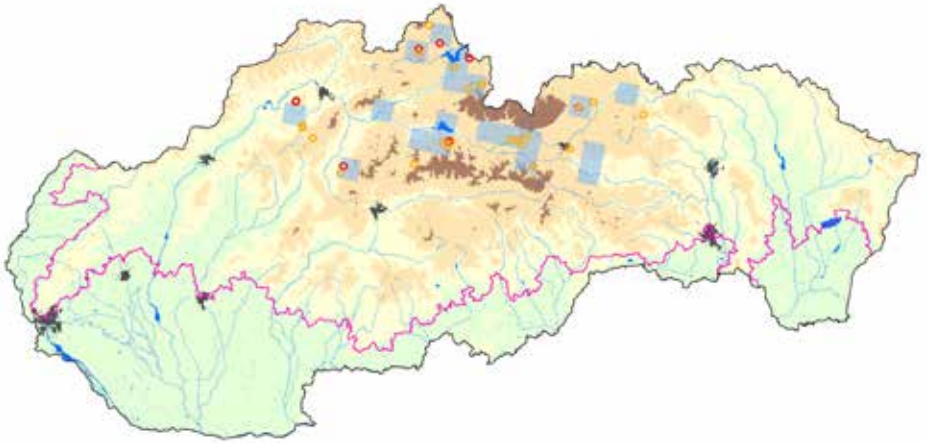
Number of PMLs: 32 **PML average area size:** 6 ha

Number of involved experts: 2 **Number of PML field visits:** 90

The most common accompanying species: *Vertigo angustior*, *Punctum pygmaeum*, *Carychium minimum*, *Euconulus praticola*, *Cochlicopa lubrica*, *Succinea putris*, *Vallonia pulchella*, *Vertigo substriata*, *Nesovitrea hammonis*, *Pisidium casertanum.*

Monitoring method: Sampling and analysis of approximately 12 litres of sample taken from the litter, including mosses.

PMLs distribution and localization: Wet meadows, peatlands, fens and springs. In the territory of Slovakia it has a relict occurrence.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: × PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most serious negative pressures represent the alterations of the water regime and the drying-up of wetlands as well as excessive fertilisation and subsequent eutrophication of water. Intensive grazing and mowing have a negative impact too, they lead to the decrease of abundance/coverage of the low vegetation preferred by this species.

Assessment and notes on the monitoring results: *Vertigo geyeri* is a relict species that occurs in Slovakia in the Alpine Bioregion only. Due to the current threat to the localities with the presence of this species, the habitat quality and the future prospects of the habitat were evaluated as unfavourable-inadequate.

The appropriate management measures for the protection of the species and its habitats include the elimination of the interventions that negatively influence the water regime and the limitation of the use of pesticides and other chemical agents near the localities of occurrence. The intensive use (mainly grazing and mowing) in some localities should be changed to extensive use, which will ensure preservation of low vegetation in which the *Vertigo geyeri* occurs.

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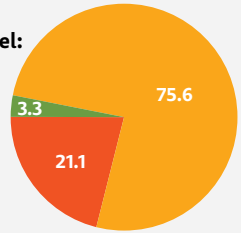
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Vertigo moulinsiana (Dupuy, 1849)
(*Mollusca, Vertiginidae*)

Vertigo moulinsiana is a calciphile species, its occurrence is bound to tuffa springs, wetlands rich in calcium and the banks of water reservoirs. The individuals can be often observed on the stalks of vegetation especially sedges and reed. In the territory of Slovakia it has a relict occurrence.

Number of PMLs: 15 **PML average area size:** 4,025 m²

Number of involved experts: 3 **Number of PML field visits:** 35

The most common accompanying species: *Vertigo angustior*, *Punctum pygmaeum*, *Carychium minimum*, *Euconulus praticola*, *Cochlicopa lubrica*, *Succinea putris*, *Zonitoides nitidus*, *Vertigo antivertigo*, *Galba truncatula*, *Succinela oblonga.*

Monitoring method: Sampling and analysis of approximately 12 litres of sample taken from the litter including mosses.

PMLs distribution and localization: Springs with tuffa formation, calcareous fens, and banks of water reservoirs.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: × PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most serious threats and pressures include the alterations of the water regime and the drying-up of wetlands as well as over-fertilization and subsequent eutrophication of water.

Assessment and notes on the monitoring results: *Vertigo moulinsiana* is a relict species that occurs mainly in the northern half of Slovakia. This is the reason why all the known localities situated in the Alpine Bioregion were included in the monitoring. The habitat quality as well as its future prospects were evaluated as favourable in 66 % of cases. Despite this, due to the current threat to the species' localities, these two factors were evaluated as inadequate, overall.

The appropriate management measures for the preservation of the species and its habitats include the elimination of the interventions that negatively influence the water regime and the limitation of the use of pesticides and other chemical agents in the vicinity of the localities of species' occurrence.

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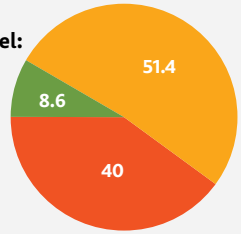
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Bolbelasmus unicornis (Schrank, 1789)
(*Coleoptera*, *Geotrupidae*)

This species occurs on original grassy steppe areas only, where it is bound to the underground fungi.

Number of PMLs: 8 **PML average area size:** 45.4 ha

Number of involved experts: 1 **Number of PML field visits:** 56

The most common accompanying species: *Tettigonia viridissima*, *Mantis religiosa*, *Gnaptor spinimanus*, *Copris lunaris*, *Sisyphus schaefferi*, *Dorcadion* (*Autodorcadion*) *fulvum fulvum*, *Iphiclides podalirius*, *Pholidoptera griseoaptera*, *Selatosomus* (*Selatosomus*) *latus latus*, *Argiope bruennichi*.

Monitoring method: Visual and acoustic registration of imagoes in the selected localities in May – August, capture using backlight traps and non-lethal bait traps.

PMLs distribution and localization: The original steppes, forest steppes and oak forests on loess soils and limestone substrate, that were never or only extensively used for agricultural purposes.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include species invasions, especially the habitat overgrowing by pioneer trees and black locust (*Robinia pseudoaccacia*), transformation of steppic grasslands into vineyards and biological processes – succession as a result of lack of grazing.

Assessment and notes on the monitoring results: In most localities, the quality of the habitat for species is unfavourable as a result of secondary succession of vegetation and invasive wood species. Extensive grazing in the localities appears to be a positive ecological factor affecting the population (in the Pannonian Bioregion 8 % of PMLs). From all PMLs, the only locality with a population in favourable status was the PML Cerová vrchovina Highland where the occurrence of the species was repeatedly confirmed.

Other significant species of beetles were also recorded in the monitored localities, such as *Gnaptor spinimanus* (in the Red List as an endangered species), *Sisyphus schaefferi*, *Copris lunaris* (in the Red List as least concern species) and *Odonteus armiger*. Unlike the two latter species, using backlight traps for the monitoring of *Bolbelasmus unicornis* revealed, that it is not directly attracted by the light.

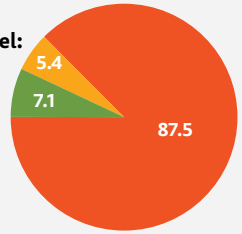
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Boros schneideri (Panzer, 1795)
(*Coleoptera*, *Boridae*)

In the territory of Slovakia *Boros schneideri* occurs in a few localities only, in Kremnické vrchy Mountains, Starohorské vrchy Mountains and in the massif of Busov Mountain (Stebnická Magura). It is a very rare species of the best-preserved natural forests with dead, often still standing firs, under the bark of which the species lives.

Number of PMLs: 8 **PML average area size:** 2,291 ha

Number of involved experts: 3 **Number of PML field visits:** 18

The most common accompanying species: *Ceruchus chrysomelinus*, *Ipidia binotata*, *Peltis grossum*, *Danosoma fasciata*, *Cucujus cinnaberinus*, *Lacon lepidopterus*, *Ampedus elegantulus*, *Eurythyrea austriaca*, *Diacanthous undulatus*, *Acanthocinus reticulatus*.

Monitoring method: Visual registration of larvae and imagoes under the bark of dead and dying trees (mainly firs) on transects from 1st of April to 30th of October.

Rozírenie a lokalizácia TML: Old, preserved mixed forests of central and north-eastern Slovakia with the presence of fir and plenty of standing dead wood, often protected forests or forests of special purpose (protected areas).

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: – PAN:

Population quality in PMLs:

Overall population quality: ALP: U2 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U2 PAN: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Pressures and threats: The most frequent pressures and threats of high or moderate intensity include forest management (92 %), collection of the imagoes (5 %) and other forestry activities (3 %).

Assessment and notes on the monitoring results: The quality of the species' habitat is inadequate in most localities, which is related to the fact that the species is significantly bound to well-preserved natural forests with a significant proportion of dead fir trunks, whose area is constantly decreasing. The species has good future prospects practically only in protective forests and protected areas with a non-intervention regime, but this is about 17 % of PMLs only. The quality of the population is bad (up to 94 %), which can be attributed to several factors, in particular, the extreme rarity of the species and the hidden way of life causing a low probability of positive recording of the species. During the monitoring only one imago of the species was recorded, but this was outside of any PML. The fact that monitoring should be sensitive is important, and therefore it is not possible to make detailed survey using a destructive method (peeling off bark) on each suitable tree. It is also not possible to search higher parts of standing trees, which significantly reduces the probability of findings. The reported total abundance of the species is therefore much higher than can be statistically derived from the results of monitoring.


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In terms of maintaining the population of the species in Slovakia, it is necessary to preserve and improve protection of the best preserved forest complexes (non-intervention regime) in the known localities of occurrence in Kremnické vrchy Mountains. It will also be necessary to increase the efforts to discover and map new habitats in other orographic units, since this is one of the most endangered and rarest species of beetle in Slovakia. *Boros schneideri* is one of the few species, for which collectors of insects pose a particular threat, especially by destroying the micro habitats, where the larvae develop, during the search for imagoes.

Other significant species of beetles were also recorded in the monitored localities, such as the protected species: *Cucujus cinnaberinus, Rhysodes sulcatus, Lacon leidopterus* and *Eurythyrea austriaca* or threatened species: *Ceruchus chrysomelinus, Peltis grossum* and *Acanthocinus reticulatus*, many of them are considered to be relics of the primeval forests.

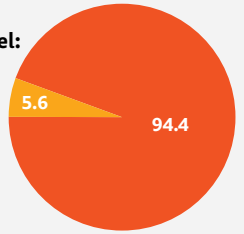
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN:

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Carabus hungaricus Fabricius, 1792
(*Coleoptera*, *Carabidae*)

In the territory of Slovakia *Carabus hungaricus* occurs in the southernmost part. It is an inhabitant of forest steppes on sandy soils. It requires low vegetation without trees and bushes.

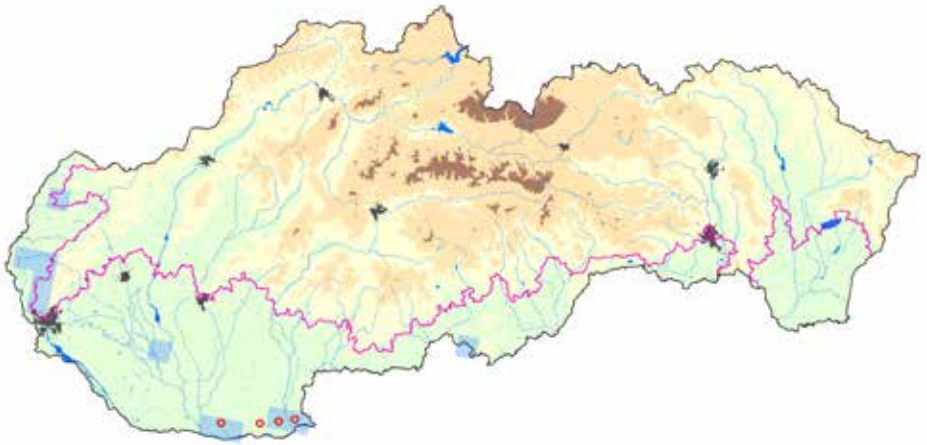
Number of PMLs: 4 **PML average area size:** 174 ha

Number of involved experts: 1 **Number of PML field visits:** 24

The most common accompanying species: *Carabus coriaceus*, *Carabus ulrichii*, *Acrida ungarica.*

Monitoring method: The species was monitored by non-lethal pitfall traps and by visual observation of imagoes in the autumn (end of September).

PMLs distribution and localization: Forest steppe with sufficient open space and a minimum of trees and bushes, often protected areas.



Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals

Estimate of the population development trend: ALP: PAN: 0

<u>Population quality in PMLs:</u>

Overall population quality: ALP: PAN: U2

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include secondary succession (20 %) and the impact of agricultural activities (18 %).

Assessment and notes on the monitoring results: The habitat quality in most of the monitored locations is unfavourable-inadequate. The reason for this is mostly vegetation succession, to a lesser extent the economic activity of the humans. Some of the localities are in bad conservation status due to the inappropriately set management measures (Jurský Chlm). Only in one PML was the population of the monitored species in favourable status. In order to maintain a stable population of the species this locality appears to be the most important. It will be necessary to determine the distribution of the species around the already known localities and determine the appropriate method for its protection. The occurrence of the species is possible also in other localities of forest steppes on sandy soils. In the near future it will be necessary to carry out a verification of some other potential localities.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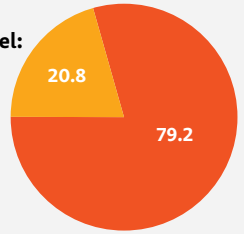
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Carabus (*Hygrocarabus*) *variolosus* Fabricius, 1787
(*Coleoptera*, *Carabidae*)

Carabus variolosus is a predatory hygrophilous species that is distributed discontinuously throughout Slovakia – in deciduous and mixed forests, especially on the banks of preserved water courses and in the immediate vicinity of other wetlands (springs, standing waters, peatlands).

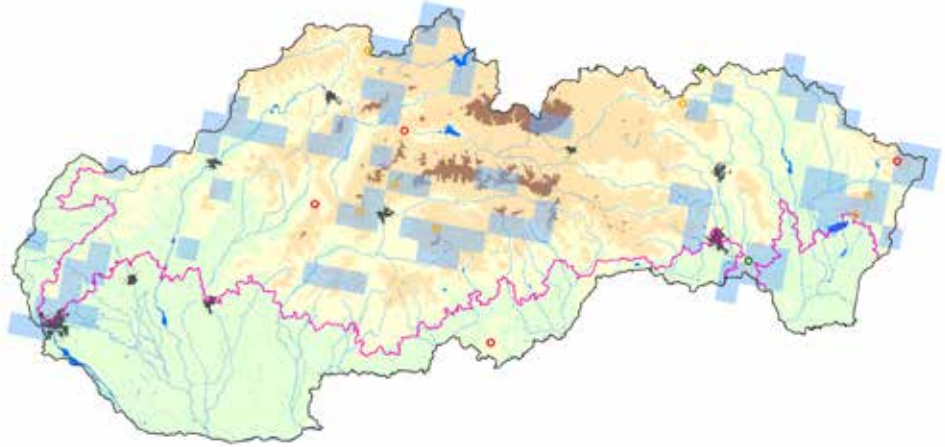
Number of PMLs: 13 **PML average area size:** 5,789 ha

Number of involved experts: 3 **Number of PML field visits:** 74

The most common accompanying species: *Anoplotrupes stercorosus*, *Carabus* (*Megodontus*) *violaceus*, *Pterostichus* (*Bothriopterus*) *oblongopunctatus*, *Abax* (*Abacopercus*) *schueppeli rendschmidtii*, *Abax* (*Abax*) *ovalis*, *Carabus* (*Oreocarabus*) *glabratus*.

Monitoring method: Visual registration of imagoes and larvae using non-lethal pitfall traps with bait (preservative-free liquid) on properly selected mapping lines in PMLs (upper, middle and lower sections of a water course) from 1st of May to 30th of June.

PMLs distribution and localization: Forest units in the sub-montane and lower montane zone with preserved smaller water courses, especially in large-scale protected areas.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: 0 PAN: ×

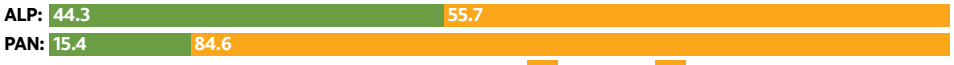
Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include forest management (52 %), human-induced changes in the hydrological conditions (17 %), other forestry activities (12 %) and surface water pollution (9 %). In general, the greatest threat for this species is the change of the hydrological regime of water courses and wetlands, use of heavy machinery in logging and pollution of streams, especially the spillage of oil.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Assessment and notes on the monitoring results: The quality of the species' habitats is evaluated as favourable to inadequate in general, while in the Pannonian Region the proportion of inadequate habitats is higher, which is related to the ecological requirements of the species (submontane and montane species). It is similar with the future prospects of the habitat; in lower altitudes the status of smaller water courses flowing through the forest, as well as other suitable wetlands is much worse due to intensive land use. The species has much better future prospects in higher altitudes of the Alpine Bioregion, where the species finds optimal conditions in sub-montane and montane habitats, such as in Poľana, Kremnické vrchy, Malá Fatra and Veľká Fatra, Nízke Tatry, Vihorlat and other mountains. In these areas it is expected that the species has stable and strong populations (thousands of individuals).

The best conditions for the survival of the species are of course in the best preserved areas with undisturbed water regime in unmanaged areas (protected forests and reserves). But it successfully survives even in areas with extensive management with minimal interventions into the watercourses and wetlands and with the presence of dead wood in their vicinity.

Due to the low number of recorded individuals, the population quality of the species is evaluated as bad, which is probably an inappropriate evaluation that the following ongoing monitoring may slightly correct on the basis of further data, much like the conservation status of the species, especially in the Alpine Bioregion, where it was evaluated as favourable only in 7 % of all monitoring visits. To maintain stable populations of the species it will be important to eliminate threats resulting from the forest management, such as skidding on water courses, destruction of spring areas during felling, draining of localities, pollution of water courses with oil products and any significant changes of the water regime. The retention of a minimum amount of dead wood in water courses or their immediate vicinity would be also appropriate.


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Other significant species of beetles were also recorded in the monitored localities, such as the other protected species of the *Carabus* genus.

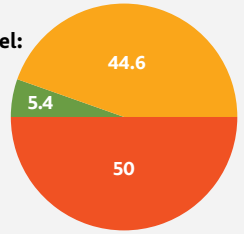
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U2



By bioregion:

Carabus zawadszkii Kraatz, 1854
(*Coleoptera, Carabidae*)

The species inhabits foothill and lower mountain meadows, well-lit forests with glades and edges of forests near meadows with extensive management and with plenty of natural hiding places.

Number of PMLs: 4 **PML average area size:** 5,595 ha

Number of involved experts: 1 **Number of PML field visits:** 18

The most common accompanying species: *Carabus violaceus violaceus*, *Carabus glabratus glabratus*, *Carabus obsoletus*, *Carabus nemoralis nemoralis*, *Pterostichus oblongopunctatus*, *Abax schueppeli rendschmidtii*, *Abax ovalis ovalis*, *Molops piceus piceus*.

Monitoring method: Individual visual observation of the species under stones, as well as monitoring on every PML using non-lethal pitfall traps with bait installed in transects in the period from 1st of May to 15th of October.

PMLs distribution and localization: It occurs in Slovakia very rarely, only in north-eastern Slovakia (especially Vihorlat Mountains, Ondavská vrchovina and Laborecká vrchovina Highlands, Bukovské vrchy and Čergov Mountains).

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: × PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most frequently recorded pressures and threats include inappropriate forest management (48 %) and changes in water courses and surrounding wetlands (26 %). The effect of the abandonment of the traditional way of management in grassland habitats is questionable, but on the other hand, there is relatively intensive large-scale use of meadows.

Assessment and notes on the monitoring results: In most of the localities, the quality of the species' habitat is inadequate due to the gradual disappearance of natural non-forest areas in the complexes of forests and changes in the forest structure and bankside vegetation. In many places there is relatively intensive use of existing grassland habitats. Future prospects of the habitats are inadequate, as in the management of grasslands heavy mechanisms are preferred and the meadows are overgrowing with successional wood species that are commonly used for energetic purposes (wood chips), this changes species-rich forest ecotones. The quality of the population is mostly inadequate or even bad, but the reason may be adverse weather conditions, particularly in 2015 due to extremely dry weather. The negative aspect of the monitoring of *Carabus zawadskii* is the lack of suitable experts, which meant that in 2013 the species was not monitored, in 2014 only 2 PMLs were monitored and only in 2015 were all four PMLs monitored. For the future we can recommend that the species is monitored especially in May and June during climatically suitable conditions. To support the species, particularly in protected areas, we can clearly recommend not to interfere into forest ecotones during felling of the forests and to manage grassland habitats more extensively (mowing, grazing). When restoring grasslands overgrown by wood species, it is necessary to thin the overgrown parts gradually by removing small groups of trees and retaining solitary trees or the groups of trees so that a varied mosaic of habitats is formed.

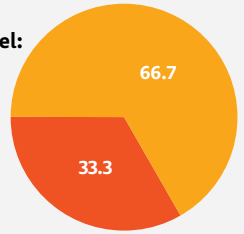
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Cerambyx cerdo (Linnaeus, 1758)
(*Coleoptera*, *Cerambycidae*)

The species inhabits the original old, sparse, well-lit oak forests in warmer parts of Slovakia, especially in the lowlands and highlands on the hillsides with southerly aspect.

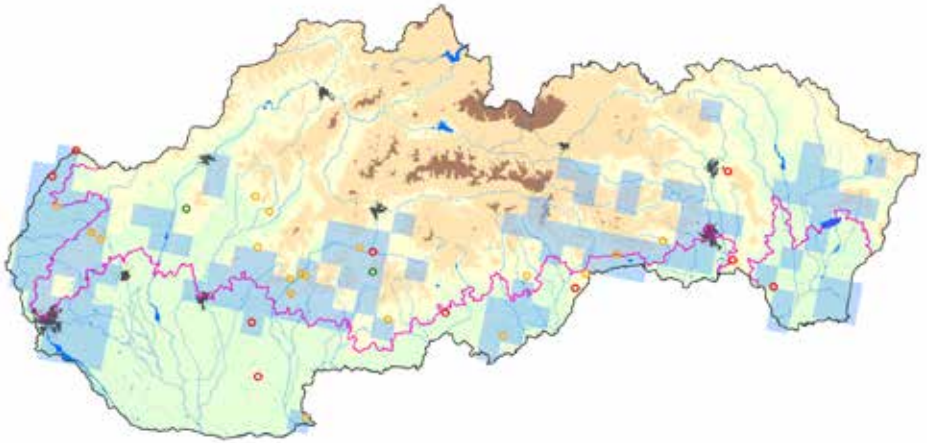
Number of PMLs: 30 **PML average area size:** 1,455 ha

Number of involved experts: 6 **Number of PML field visits:** 135

The most common accompanying species: *Lucanus cervus*, *Eurythyrea quercus*, *Cucujus cinnaberinus*, *Cetonischema aeruginosa*, *Plagionotus detritus*, *Lacon querceus*, *Acmaeoderella flavofasciata*, *Gnorimus variabilis.*

Monitoring method: Visual registration of imagoes in the late afternoon and survey of fresh fly-out holes on selected monitoring trees (oaks) from 15th of May to 30th of September.

PMLs distribution and localization: Old preserved deciduous forests with plenty of old oak, often protective forests or forest of special purpose (protected areas) and pasture forests.



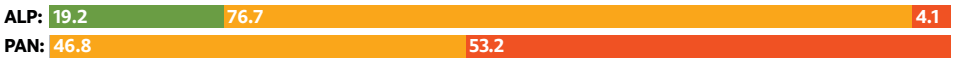
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 400,000 individuals
Estimate of the population size in the Pannonian Bioregion: 50,000 – 200,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

<u>Population quality in PMLs:</u>

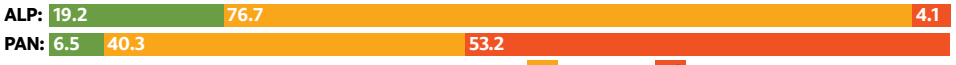
Overall population quality: ALP: U1 PAN: U2

<u>Habitat quality for the species in PMLs:</u>



Overall habitat quality for the species: ALP: U1 PAN: U2

<u>Future prospects of habitat for the species in PMLs:</u>



Overall future prospects of habitat for the species: ALP: U1 PAN: U2

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include improper management of forest habitats, especially of oak forest (81 %), spread of invasive wood species (black locust), planting non-native tree species (*Pinus sylvestris*, *Pinus nigra*, *Larix decidua*) and negative changes in the water regime in lowland deciduous forests with the occurrence of oaks.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Assessment and notes on the monitoring results: The quality of the habitat, of the population and the future prospects of the habitat in the Alpine Bioregion are in much better condition than in the Pannonian Bioregion. In the Alpine Bioregion the habitat quality in the monitored PMLs is in 19 % favourable and only in 4 % bad. In the Pannonian bioregion the habitat quality in the monitored PMLs is in 53 % bad and the rest is inadequate. The population quality of *Cerambyx cerdo* in the monitored PMLs depends on the habitat quality. In the Pannonian Bioregion, due to inappropriate management of native oak forests (felling, removal of old oak trees, conversion of oak stands to monoculture stands of pine and black locust, growing dense stands with high crop density), the habitats of *Cerambyx cerdo* are gradually disappearing. Another problem is the high abundance of game species that prevents the natural regeneration of oak forests. In order to maintain a stable population of the species, the most important localities are small protected areas in areas of the native oak forests with appropriate management, and protective forests that are economically unattractive for forestry activities. To support the species also in commonly managed forests we can clearly recommended the retention of old oak trees in forests in the minimum amount of 5 pieces/ha. When renewing oak forests it is recommended to use small-scale felling, to maintain the native wood species composition even after the renewal of the forest, prevent spreading of invasive wood species and to regulate the abundance of the game that threatens the natural renewal of the forest.


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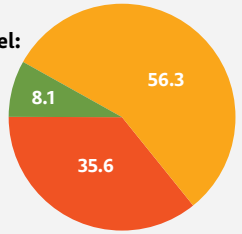
Also other significant species of beetles were recorded in the monitored localities, such as *Eurythyrea quercus*, *Cetonischema aeruginosa, Akimerus schaefferi, Rhopalopus varini, Cerambyx miles, Purpuricenus kaehleri.*

<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Cucujus cinnaberinus (Scopoli, 1763)
(*Coleoptera, Cucujudae*)

Cucujus cinnaberinus is distributed in Slovakia from lowland floodplain forests to sub-montane and montane forests. It is a typical species of old forests with plenty of dead trees.

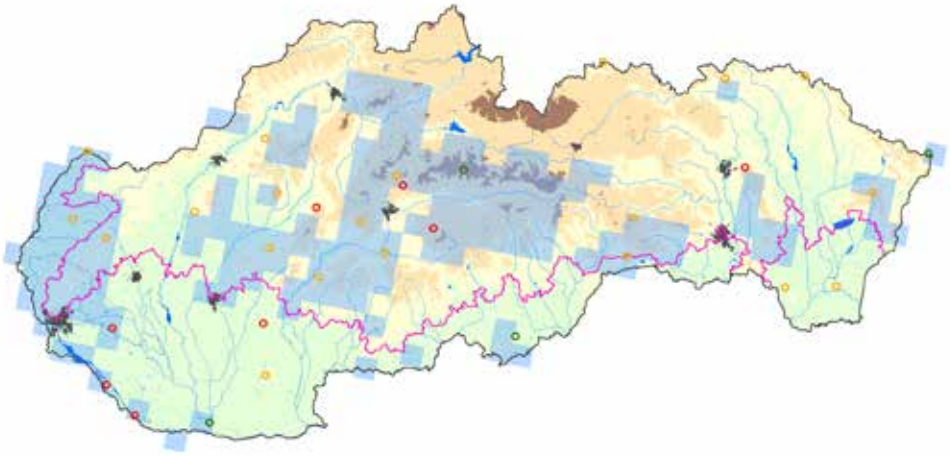
Number of PMLs: 32 **PML average area size:** 1,566 ha

Number of involved experts: 6 **Number of PML field visits:** 128

The most common accompanying species: *Pyrochroa coccinea, Rosalia alpina alpina, Schizotus pectinicornis, Ceruchus chrysomelinus, Lucanus cervus, Eurythyrea austriaca, Dicerca berolinensis, Sinodendron cylindricum, Carabus clatratus clatratus.*

Monitoring method: Visual registration of larvae and imagoes under the bark of dead wood on transects from 1st of April to 30th of November.

PMLs distribution and localization: Old preserved forests with plenty of dead wood, often protective forests or forests of special purpose (protected areas).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000,000 – 5,000,000 individuals
Estimate of the population size in the Pannonian Bioregion: 500,000 – 1,000,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most frequent pressures and threats of high or moderate intensity include inappropriate management of forest habitats, especially forest renewal (86 % in the Alpine Bioregion and 67 % in the Pannonian Bioregion), spreading of invasive woody species (black locust), it is problematic in warmer regions of Slovakia (over 10 %) and planting of non-native tree species (*Pinus sylvestris*, *Pinus nigra*, *Larix decidua*) and negative changes in the water regime of lowland deciduous floodplain forests (16 %).

Assessment and notes on the monitoring results: The habitat quality in most of the monitored locations is unfavourable. The reason for this is the lack of older forest stands with the presence of coarse dead wood. Some of the localities are in bad conservation status because of the small area of older stands that are often very fragmented. In localities where the forest management maintains plenty of coarse dead wood in the stands and silvicultural management is close to natural, it has favourable future prospects. In the Alpine Bioregion such situations represent only 8 % of PMLs and in the Pannonian Bioregion 23 %, thanks to nature reserves and protective forests. The quality of the population in both bioregions is evaluated as inadequate and bad quality of the populations in the Pannonian Bioregion reach 39 %, in the Alpine Bioregion 22 %. The natural negative factors affecting the occurrence of the pre-imago developmental stages of *Cucujus cinnaberinus* include unsuitable weather conditions (2015), in particular drought which adversely affects the substrate of the larvae. In order to maintain a stable population of the species, the most important localities are floodplain forests with plenty of coarse dead wood in the southern part of Slovakia and small-scale protected areas in areas with non-intervention regime and plenty of coarse dead wood, such as Stužica, Komárnická jedlina, Mláčik and protective forests that are not attractive for the forestry from the economic point of view. To support the species also in commonly managed forests we can clearly recommend the retention of coarse dead wood in forests in the minimum amount of 5 pieces/ha. For forest renewal use of small-scale felling should be preferred, keeping the native tree species composition even after the forest renewal, and preventing spreading of invasive woody species is recommended. For the survival of the species the greatest importance is however maintaining a sufficiently large area of forests (over 50 ha) with the occurrence of coarse dead wood in non-intervention regime in the form of small-scale protected areas.


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Other significant species of beetles were recorded in the monitored localities, such as *Ceruchus chrysomelinus, Eurythyrea austriaca, Carabus clathratus, Brachygonus megerlei, Stenagostus rhombeus, Peltis grossum, Megopis scabricornis.*

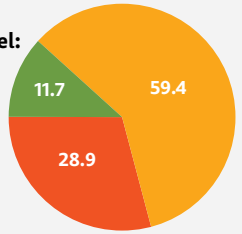
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Duvalius hungaricus (Csiki, 1903)
(*Coleoptera, Carabidae*)

Duvalius hungaricus is a subterranean species that lives in soil cavities and under stones in sink holes and near the entrances to caves. It is an endemic species of Slovenský kras (Slovak Karst).

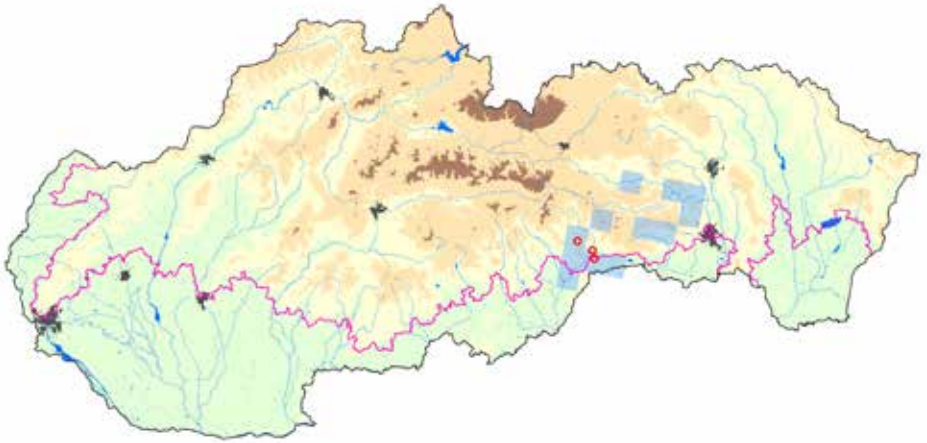
Number of PMLs:3 **PML average area size:** 3,113.1 ha

Number of involved experts: 1 **Number of PML field visits:** 9

The most common accompanying species: *Carabus* (*Archicarabus*) *nemoralis.*

Monitoring method: Visual registration of imagoes under rocks, installation of non-lethal pitfall traps near the entrances to caves.

PMLs distribution and localization: Entrances (halls) of the caves of Silická planina and Plešivecká planina Plains.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

ALP: 100
PAN: 100

Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

ALP: 100
PAN: 100

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

ALP: 100
PAN: 100

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: Among the factors that can negatively affect the population of *Duvalius hungaricus* illegal trapping by collectors, including the installation of bait traps has been recorded. The entomofauna of caves is generally poor, but interesting in terms of the occurrence of stenotop, endemic species as in this case. The traps and turned-up stones (e.g. In Silická ľadnica cave) are probably the activities focused on getting this species by the collectors. The halls of caves where the individuals are active, are a relatively small area, so such activities can pose threats for the population, which is of a very low number and very isolated.

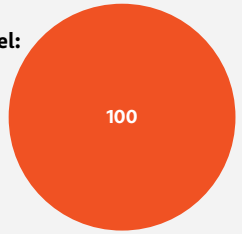
Assessment and notes on the monitoring results: The habitat quality in all PMLs was evaluated as favourable. The species could not be recorded in any of the PMLs, probably due to the extremely dry and hot weather in August of 2015. The individuals are sensitive to weather changes and during dry and warm periods they move into deeper parts of the caves and into soil cavities. To determine the occurrence of the species it is, in any case, necessary to implement intensive monitoring by the use of non-lethal pitfall traps with bait and more frequent checks. The populations of each subspecies are of relict and isolated nature, and therefore it is very important to maintain a strict non-intervention regime in caves with their occurrence, including the interventions in the nearby area, which could lead to the disruption of the water regime. If these conditions are maintained, the particular populations have favourable future prospects.

In the monitored localities other significant species were recorded on the nearby vegetation and under the bark of fallen trees – *Tibicina haematodes* and *Bolitophagus reticulatus*, as well species that got into the cave hall from the nearby habitats by an accident: *Prionus coriarius*, *Cerambyx cerdo* and *Carabus* (*Archicarabus*) *nemoralis*.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: **U2**



By bioregion:

ALP: 100
PAN: 100

Graphoderus bilineatus (De Geer, 1774)
(*Coleoptera, Dytiscidae*)

In the territory of Slovakia *Graphoderus bilineatus* occurs locally in the river basins of Morava, the Danube and Latorica rivers, where it prefers standing or slowly flowing waters of permanent character with dense vegetation and with a preserved gradual littoral zone.

Number of PMLs: 10 **PML average area size:** 106,2 ha

Number of involved experts: 1 **Number of PML field visits:** 55

The most common accompanying species: *Hydrochara caraboides*, *Hydaticus transversalis*, *Ilybius fenestratus*, *Cybister laterimarginalis*, *Helochares obscurus*, *Colymbetes fuscus*, *Graphoderus cinereus*, *Hydrophilus piceus*, *Hydaticus seminiger*, *Dytiscus marginalis*.

Monitoring method: Catching by sweeping under the water surface with aquatic net and/or using non-lethal traps during the period April-May and September-October.

PMLs distribution and localization: Natural, preserved standing and slowly flowing waters with plenty of macrophyte vegetation, often in the river inundations.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U2 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include species invasions (25 %), human-induced changes in hydrological conditions (25 %) and biological processes (natural silting – 25 %).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Assessment and notes on the monitoring results: Capture of individuals in non-lethal traps proved to be an effective method for determining the presence of the species in the locality. Monitoring results showed that the stable populations of the species live in the floodplains of rivers Morava, the Danube and Latorica and in their immediate vicinity, while the natural hydrological regime of the rivers in the form of flooding is a favourable ecological factor. Suitable habitats for the species in the European part of its range, including Slovakia, include also drainage/irrigation channels (e.g. Hámsky kanál, Obid); but in these habitats the monitoring results show a probable negative factor – predation from invasive alien fish species. The published occurrence of species in the peatland Jurské jazero Nature Reserve in the Alpine Bioregion was not confirmed.

Other significant species of beetles were also recorded in the monitored localities, such as the protected species *Hydrophilus piceus* and *Hydrophilus atterimus*, the species of Community Interest *Rhysodes sulcatus* (Jurské jazero) and species enlisted in the Red List as vulnerable – *Graphoderus cinereus* and *Spercheus emarginatus*.


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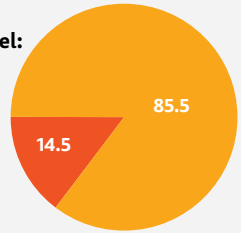
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Limoniscus violaceus (P. W. J. Müller, 1821) (*Coleoptera, Elateridae*)

Slovakia has probably the largest number of localities with this species in central Europe. It occurs mainly in the southern half of the central Slovakia in native forest ecosystems with plenty of old deciduous trees.

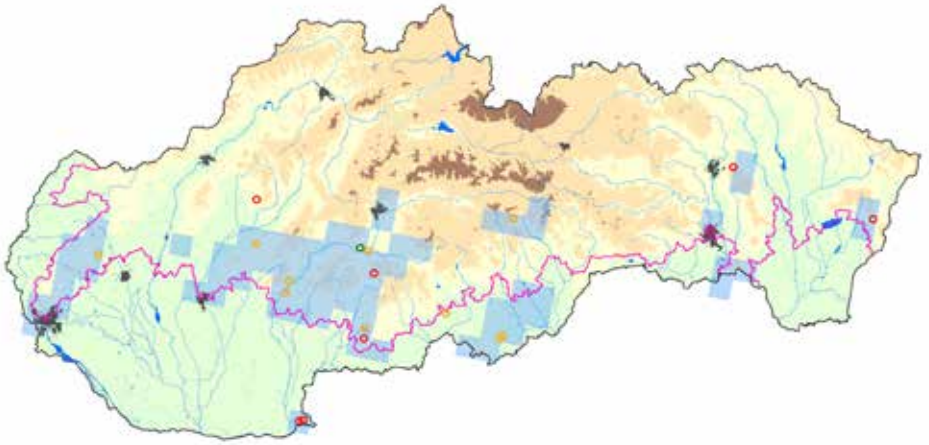
Number of PMLs: 17 **PML average area size:** 1,517 ha

Number of involved experts: 5 **Number of PML field visits:** 82

The most common accompanying species: *Ischnodes sanguinicollis*, *Ampedus cardinalis*, *Ampedus praeustus*, *Ampedus forticornis*, *Cardiophorus nigerrimus*, *Cerambyx cerdo cerdo*, *Cucujus cinnaberinus*, *Lucanus cervus.*

Monitoring method: Visual registration of larvae and imagoes in the tree hollows. Additional methods are the use of pitfall traps installed into the hollows and sweeping with net on the vegetation near hollow trees in the period from 1st of April to 30th of November.

PMLs distribution and localization: Old preserved deciduous forests with plenty of old trees with hollows near the soil surface, often in protective forests or forests of special purpose (protected areas).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most frequent pressures and threats of high or moderate intensity include inappropriate management of forest habitats, especially of oak forests (in the Pannonian Bioregion it is more than 56 %, in the Alpine it is more than 85 %), spreading of invasive tree species (black locust) and planting non-native tree species (*Pinus sylvestris*, *Pinus nigra*, *Larix decidua*).

Assessment and notes on the monitoring results: The quality of the habitat, of the population and the future prospects of the habitat in the Alpine Bioregion for *Limoniscus violaceus* are much more favourable than in the Pannonian Bioregion. In the Alpine Bioregion the habitat quality in the monitored PMLs is 16 % favourable, 69 % unfavourable and 16 % bad. In the Pannonian Bioregion the habitat quality in the monitored PMLs is 42 % bad and 58 % inadequate. In original deciduous forests *Limoniscus violaceus* inhabits old trees with hollows near soil surface that can be found only in forests older than 120 years! In the commercially managed forests such old trees have practically disappeared. The population quality of *Limoniscus violaceus* in the monitored PMLs depends of the habitat quality. In the Pannonian Bioregion, due to inappropriate management of native deciduous forests (felling, removal of old hollow deciduous trees, especially oaks and beeches, conversion of originally deciduous stands to monoculture stands of pine and black locust and conversion of old coppice forests to high-growth ones) the habitats of *Limoniscus violaceus* are gradually disappearing. In order to maintain a stable population of the species, the most important localities are small-scale protected areas in areas of the native deciduous forests with appropriate management, and protective forests that are economically unattractive for forestry. *Limoniscus violaceus* is a typical species of native primeval deciduous forests. To support the species in commercially managed forests we can clearly recommend the retention of old, multi-generation deciduous trees with cavities in the forest stands, with a minimum amount of 5 individuals/ha. For forest renewal use of small-scale felling, keeping the native tree species composition even after the renewal of forest and preventing spreading of invasive wood species is recommended.


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Other significant species of beetles were recorded in the monitored localities, such as *Ischnodes sanguinicollis, Ampedus cardinalis, Ampedus forticornis, Ampedus hjorti, Stenagostus rhombeus, Brachygonus megerlei.*

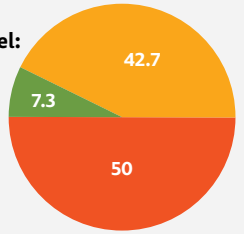
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Lucanus cervus (Linnaeus, 1758)
(*Coleoptera*, *Lucanidae*)

In the territory of Slovakia *Lucanus cervus* is locally, in warmer localities still a numerous species. It is typical for old deciduous forests, bankside vegetation, tree alleys, grazed forests, urban and municipal parks with plenty of dead trees.

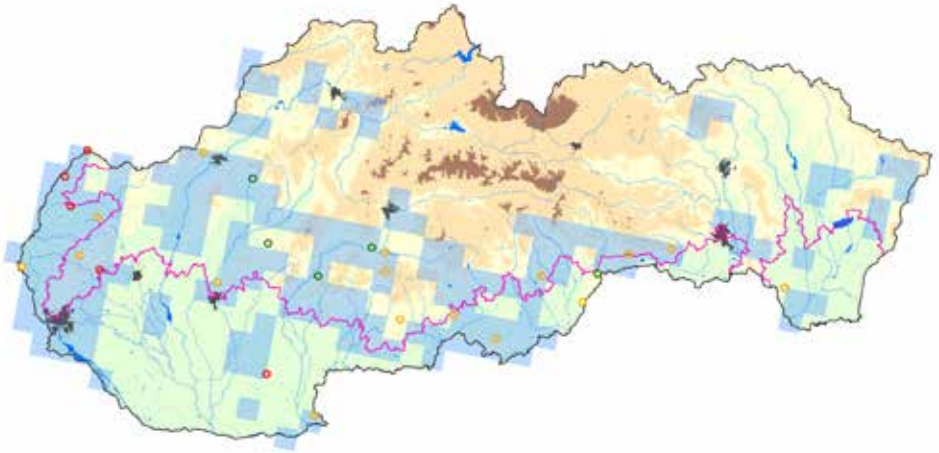
Number of PMLs: 25 **PML average area size:** 1,439 ha

Number of involved experts: 15 **Number of PML field visits:** 86

The most common accompanying species: *Oryctes nasicornis holdhausi*, *Dorcus parallelipipedus*, *Cerambyx cerdo cerdo*, *Liocola lugubris*, *Brachygonus megerlei*, *Osmoderma eremita*, *Eupotosia affinis*, *Liometopum microcephalum*, *Cucujus cinnaberinus*, *Velleius dilatattus*, *Cetonischema aeruginosa*, *Lacon querceus*, *Acmaeoderella flavofasciata*, *Gnorimus variabilis*.

Monitoring method: Visual registration of imagoes and recording of freshly dead individuals of *Lucanus cervus* on selected monitoring trees (oaks) from 1st of May to 31st of August.

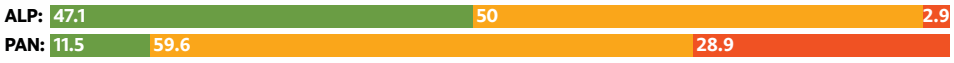
PMLs distribution and localization: Old preserved deciduous forests with plenty of dying trees, mainly oak, often protective forests or forests of special purpose (protected areas).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 300,000 individuals
Estimate of the population development trend: ALP: – PAN: 0

<u>Population quality in PMLs:</u>



Overall population quality: ALP: U1 PAN: U1

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: U1 PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include inappropriate management of forest habitats, especially of oak forests (80 %), spread of invasive tree species (black locust), planting non-native tree species (*Pinus sylvestris*, *Pinus nigra*, *Larix* etc.) and negative changes in the water regime in lowland deciduous forests with the occurrence of oaks.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Assessment and notes on the monitoring results: The quality of the habitat, of the population and the future prospects of the habitat in the Alpine Bioregion are much more favourable than in the Pannonian Bioregion. In the Alpine Bioregion the habitat quality in the monitored PMLs is 32 % favourable and 68 % unfavourable. In the Pannonian Bioregion the habitat quality in the monitored PMLs is 23 % unfavourable-bad, 65 % unfavourable-inadequate and only in 12 % favourable. The population quality of *Lucanus cervus* in the monitored PMLs depends on the habitat quality. In the Pannonian Bioregion, due to inappropriate management of native oak forests (renewal felling, removal of old oak trees, conversion of oak stands to monoculture stands of pine, black locust, growing dense stands with high crop density) the habitats of *Lucanus cervus* are gradually disappearing. Another problem is the high abundance of game that prevents the natural regeneration of oak forests. Also the vegetation on the banks of streams, old alleys and municipal parks, where the dying deciduous trees are removed, are threatened too. In order to maintain a stable population of the species, the most important localities are small-scale protected areas in areas of the native oak forests with appropriate management, and protective forests that are economically unattractive for the forestry sector. To support the species also in commonly managed forests we can clearly recommend the retention of old oak trees in forests with minimum of 5 individuals/ha. During renewal of oak forests small-scale forms of felling should be used, to keep the native tree species composition even after the renewal of forest, spreading of invasive woody species must be prevented, the stumps of cut trees should be maintained and the abundance of the game that threaten the natural forest regeneration should be regulated.


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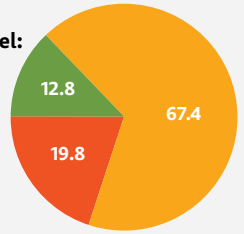
Other significant species of beetles were recorded in the monitored locations, such as *Oryctes nasicornis holdhausi*, *Brachygonus megerlei*, *Velleius dilatattus*, *Cetonischema aeruginosa*, *Lacon querceus*, *Gnorimus variabilis*.

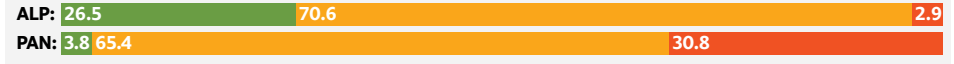
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:



*Osmoderma eremita (Scopoli, 1763) (Coleoptera, Scarabaeidae)

Distribution of *Osmoderma eremita* in the territory of Slovakia is heavily fragmented and the particular populations are often isolated from each other. It is bound to the cavities of old deciduous trees, particularly *Quercus, Salix, Tilia, Aesculus, Populus.* The larvae develop in the wood detritus found in the hollows of deciduous trees.

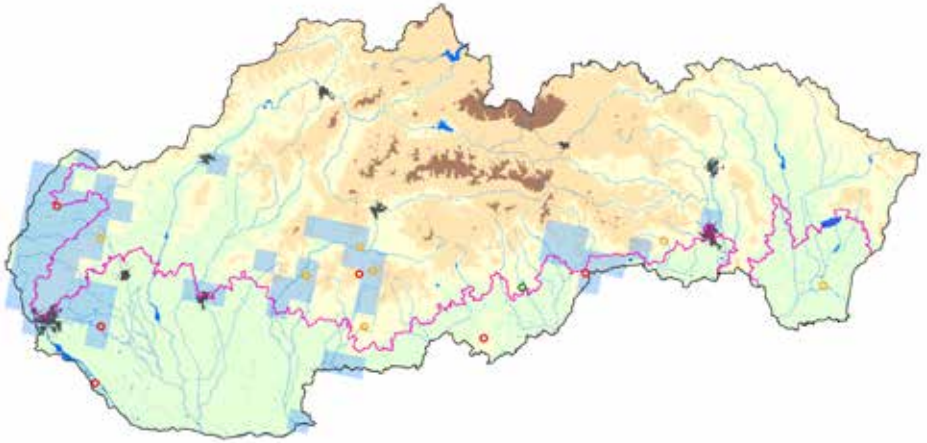
Number of PMLs: 14 **PML average area size:** 2,033 ha

Number of involved experts: 3 **Number of PML field visits:** 59

The most common accompanying species: *Elater ferrugineus ferrugineus, Lucanus cervus, Cerambyx cerdo cerdo, Liocola lugubris, Brachygonus megerlei, Cucujus cinnaberinus, Megopis scabricornis, Velleius dilatattus, Cetonischema aeruginosa, Lacon querceus, Acmaeoderella flavofasciata, Gnorimus variabilis.*

Monitoring method: Individual registration of imagoes and larvae in the selected PMLs as well as the indirect presence of species based on the characteristic excrement of larvae in the detritus. Visual registration of imagoes at early evening and nights on old trees with hollows was carried out from 1st of June to 30th of September.

PMLs distribution and localization: Preserved deciduous forests, bankside vegetation, urban parks, old tree-lined pathways, solitary trees, grazed forests with plenty of old hollow trees.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 80,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U2

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U2

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include inappropriate management of forest habitats, especially of oak forests (in the Pannonian Bioregion this is more than 80 % and in the Alpine more than 67 %), spreading of invasive tree species (black locust), planting of non-native tree species (*Pinus sylvestris*, *Pinus nigra*, *Larix decidua*) and negative changes in the water regime in lowland deciduous forests with the occurrence of oaks, old willows and poplars.

Assessment and notes on the monitoring results: The quality of the habitat, of the population and the future prospects of the habitat in the Alpine Bioregion for *Osmoderma eremita* are much more favourable than in the Pannonian Bioregion. In the Alpine Bioregion the habitat quality in the monitored PMLs is in 23 % favourable and in 77 % unfavourable-inadequate. In the Pannonian Bioregion the habitat quality in the monitored PMLs is 71 % bad and in 29 % inadequate. *Osmoderma eremita* inhabits old tree hollows in original oak forests that can be found only on trees older than 150 years! In the commercially managed forests such old trees have virtually disappeared. The population quality of *Osmoderma eremita* in the monitored PMLs depends on the habitat quality. In the Pannonian Bioregion, due to inappropriate management of native oak forests (felling, removal of old hollow deciduous trees, especially oaks and willows, conversion of native deciduous stands to monoculture stands of pine or black locust, growing dense stands with high crop density) the habitats of *Osmodera eremita* are gradually disappearing. The vegetation on the stream banks, old pathways and municipal parks are also endangered, as here the old deciduous trees with cavities are removed. In order to maintain a stable population of the species, the most important localities seem to be small-scale protected sites in areas of the native deciduous forests with appropriate management and protective forests that are economically unattractive for the forestry sector. To support the species also in commercially managed forests we can clearly recommend the retention of old, multi-generation deciduous trees with hollows in the forest stands, with a minimum of 5 individuals/ha.

Other significant species of beetles were recorded in the monitored localities, such as *Elater ferrugineus ferrugineus, Liocola lugubris, Brachygonus megerlei, Megopis scabricornis, Velleius dilatattus, Cetonischema aeruginosa, Lacon querceus, Gnorimus variabilis, Rhamnusium bicolor, Stictoleptura erythoptera.*

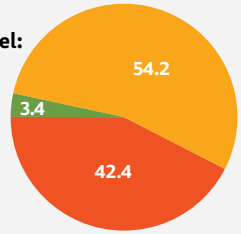
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Probaticus subrugosus (Duftschmid, 1812)
(*Coleoptera, Tenebrionidae*)

In the territory of Slovakia *Probaticus subrugosus* reaches the northern boundary of its distribution. Only very old findings from the vicinity of Štúrovo are published in Slovakia. Over the last 50 years the presence of *Probaticus subrugosus* was not confirmed in Slovakia. It should inhabit habitats of dry and thermophilous orchards, vineyards, pastures and steppes.

Number of PMLs: 2 **PML average area size:** 299 ha

Number of involved experts: 1 **Number of PML field visits:** 12

The most common accompanying species: *Gnaptor spinimanus*, *Blaps lethifera*, *Pedinus femoralis*, *Dorcadion aethiops aethiops*, *Dorcadion fulvum fulvum*, *Dorcadion pedestre pedestre*, *Carabus scabriusculus*, *Carabus convexus convexus.*

Monitoring method: Individual collection of specimen under the bark of dead trees, by sieving the soil substrate/ litter near trees and tussocks of grass. Also monitoring on every PML using non-lethal pitfall traps with bait installed in transects from 1st of April to 30th of June.

PMLs distribution and localization: Forest steppe and steppe localities, old orchards, vineyards, pastures in the warmest localities of southern Slovakia.

Monitoring results:

Estimate of the population size in the Pannonian Bioregion: for more than 50 years there have been no positive records of the species in Slovakia.

Estimate of the population development trend: ALP: PAN: –

Population quality in PMLs:

ALP:
PAN: 100

Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:

ALP:
PAN: 100

Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

ALP:
PAN: 100

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include the use of pesticides (24 %), spreading of invasive species of trees (16 %), construction activities (12 %), succession by tree species and the abandonment of traditional management of steppes (absence of mowing, grazing).

Assessment and notes on the monitoring results: The quality of the habitat and the future prospects of the habitat in the monitored localities are unfavourable-inadequate. Forest steppe or steppe localities, old orchards, vineyards and pastures are more intensively managed with application of chemicals and with only a few natural hiding places left: old trees with hollows and dead trees with bark, leaf litter and decomposing biomass in the localities are practically not present. The invasive Black Locust *Robinia pseudoacacia* intensively infiltrates into the localities and the non-forest areas are being overgrown by tree species. The population in the monitored PMLs is in bad status; during the monitoring the presence of *Probaticus subrugosus* was not confirmed. Therefore it is not possible to set specific measures for maintaining a stable population of the species at the present time. However, it would be appropriate to support extensive management in the steppe localities without using chemicals, such as grazing, mowing, mosaic removal of woods and removal of invasive alien wood species.

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(The Atlas of Species of European Interest for NATURA 2000 Sites in Slovakia)

In the monitored localities other significant species of beetles were recorded, such as *Gnaptor spinimanus, Pilemia hirsutula, Pedostrangalia revestica, Callimoxys gracilis, Capnodis tenebrionis, Tetrabrachys connatus, Carabus scabriusculus, Carabus convexus convexus.*

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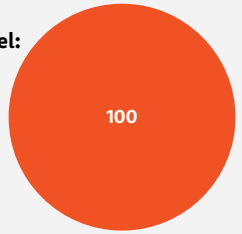
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

ALP:
PAN: 100

*Pseudogaurotina excellens (Brancsik, 1874)
(Coleoptera, Cerambycidae)

Carpathian endemic species, which occurs in the montane and sub-montane forests. It is closely connected to its host plant – *Lonicera nigra.* Often it occurs near streams, but also in other locations in colder habitats, up to altitude of 1,300 m above sea level.

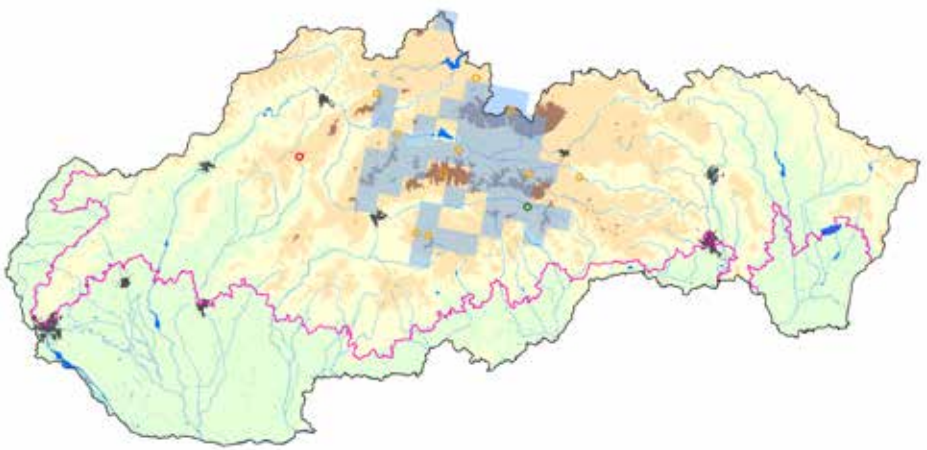
Number of PMLs: 12 **PML average area size:** 9,320 ha

Number of involved experts: 3 **Number of PML field visits:** 47

The most common accompanying species: *Agrilus cyanescens*, *Oberea pupillata.*

Monitoring method: Visual registration of imagoes, larvae and habitual signs of various ages, from 1st of May to 30th of November.

PMLs distribution and localization: Forests with preserved structure and undergrowth (especially shrub layer) in the north and in the central part of the country – special-purpose forests (protected areas) and commercial forests, the condition is the presence of a host plant *Lonicera nigra.*



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: – PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: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Pressures and threats: The most frequent pressures and threats of high to moderate intensity include forestry management, such as: clear cutting, salvage felling, modification of water courses and of the surrounding roads in valleys and clearing of the forest undergrowth, thus eliminating natural habitats with the occurrence of the host plant. Large-scale aerial application of insecticides against bark beetles destroys entire local populations, which, thanks to the fragmentation of the species' range and weak migratory and regenerative capacity of the species, restore very slowly or more often they completely disappear.

Assessment and notes on the monitoring results: In most localities, the quality and future prospects of the habitat, as well as the population quality of the species is unfavourable. This is due to forestry management practices, as well as ignorance of the species and of the need to protect its habitats. The status of knowledge of the owners and managers of forests, but also of the public, on the species, its presence in the localities, but above all on its relation to its host plant is alarming. The host plant is being removed from the forest stands without any justifiable reason during the timber felling, modification of roads, the so-called clearing of the forest undergrowth and the construction of logging roads etc. *Lonicera nigra* as a tree species is economically uninteresting, therefore overlooked, underrated, undesirable in the forest from purely economic point of view. But only one vital bush of *Lonicera nigra* is capable of breeding generations of *Pseudogaurotina excellens* without suffering any larger damages to itself. An appropriate measure would be to ensure the legal protection of *Lonicera nigra* as a protected species. *Pseudogaurotina excellens* is the most vulnerable in the larval stage, which constitutes most of its life. Its vulnerability is even increased by the fact that the imagoes rarely fly and hardly ever to greater distances. The distribution of the species is therefore discontinuous and if the habitats of the local populations are destroyed there is little chance for the recolonization of the localities after the restoration of conditions.


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Snow and wind calamities are among the natural impacts that may threaten the species, because they cause loss of the host plant. The remaining plants might be destroyed by the subsequent salvage felling. In light of the above mentioned major threats, collecting of imagoes by entomologists can be considered negligible.

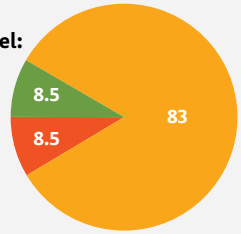
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Rhysodes sulcatus (Fabricius, 1787)
(*Coleoptera, Carabidae*)

This species occurs locally in the sub-montane zone, where it occupies fallen trunks of fir, spruce, pine, or oak, beech, maple and ash with red rot. It occurs very rarely in the lowlands, where it occupies mainly fallen trunks of oak, alder and pine with red rot.

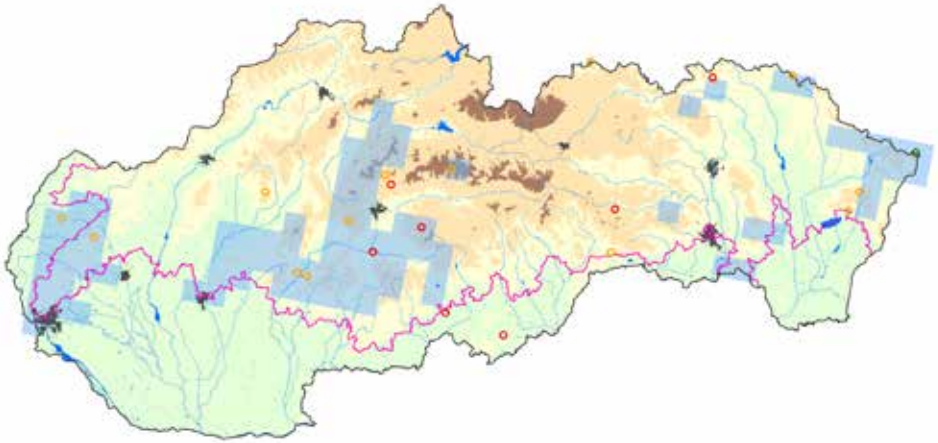
Number of PMLs: 21 **PML average area size:** 1,555 ha

Number of involved experts: 4 **Number of PML field visits:** 73

The most common accompanying species: *Cucujus cinnaberinus*, *Aesalus caraboides*, *Eurythyrea austriaca*, *Ampedus elegantulus*, *Cerambyx cerdo cerdo*, *Peltis grossum*, *Prostimus mandibularis*, *Rosalia alpina alpina*, *Ceruchus chrysomelinus*, *Sinodendron cylindricum*.

Monitoring method: Visual registration of imagoes under the bark of dead wood on transects from 1st of April to 30th of November.

PMLs distribution and localization: Old preserved forests with plenty of dead wood, often protective forests or forests of special purpose (protected areas).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 10,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include inappropriate management of forest habitats, especially timber felling (99 % in the Alpine Bioregion and 85 % in the Pannonian Bioregion), spreading of invasive tree species (black locust) – this is problematic in warmer regions of Slovakia (over 15 %); planting of non-native tree species (*Pinus sylvestris, Pinus nigra, Larix decidua*) is another threat.

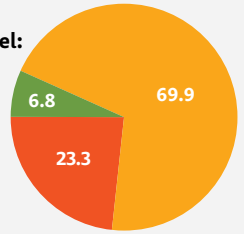
Assessment and notes on the monitoring results: The habitat quality in most of the monitored localities is unfavourable. The reason for this is the lack of older forest stands with the presence of coarse dead wood. Most of the localities are in unfavourable conservation status because of the small area of older forest stands that are often very fragmented. Good habitat quality is found only in the Alpine Bioregion (9 %), in the Pannonian Bioregion the habitat quality is 93 % inadequate and 7 % bad. The quality of the population in both bioregions is evaluated as inadequate, the bad quality of the population reaches 14 % in the Pannonian Bioregion and 25 % in the Alpine Bioregion, the only population with favourable status is in the Alpine Bioregion (9 %). The natural negative factors affecting the presence of *Rhysodes sulcatus* include unsuitable weather conditions (2015), particularly the drought which adversely affects the substrate of the larvae. In order to maintain a stable population of the species, the most important localities seem to be the small-scale protected areas in places where plenty of coarse dead wood exists and non-intervention regime is applied, such as Stužica, Komárnická jedlina, Mláčik and protective forests that are economically unattractive for the forestry sector. To support the species also in commercially managed forests we can clearly recommend the retention of coarse dead wood in forests with a minimum of 5 pieces/ha. When harvesting the forest use of small-scale felling should be preferred, to keep the original woody species composition even after the renewal of vegetation, spreading of invasive wood species must also be prevented. For the survival of the species the most important thing is the maintaining a sufficiently large area of forests (over 50 ha) with the occurrence of coarse dead wood in non-intervention regime, such as in the small-scale protected areas. *Rhysodes sulcatus* is a typical species of primeval forests and natural forests with plenty of coarse dead wood; in commercially managed forests it has very bad future prospects.

Other significant species of beetles were recorded in the monitored localities, such as *Aesalus caraboides, Eurythyrea austriaca, Ampedus elegantulus, Ampedus melanurus, Lacon lepidopterus, Peltis grossum, Prostimus mandibularis, Ipidia binottata, Ceruchus chrysomelinus, Platypus oxyurus.*

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

*Rosalia alpina (Linnaeus, 1758)
(Coleoptera, Cerambycidae)

In the territory of Slovakia this species occurs from lowland floodplain forests near Bratislava to the sub-montane and montane zones' beech forests. It is a typical species of old beech forests with plenty of dead trees.

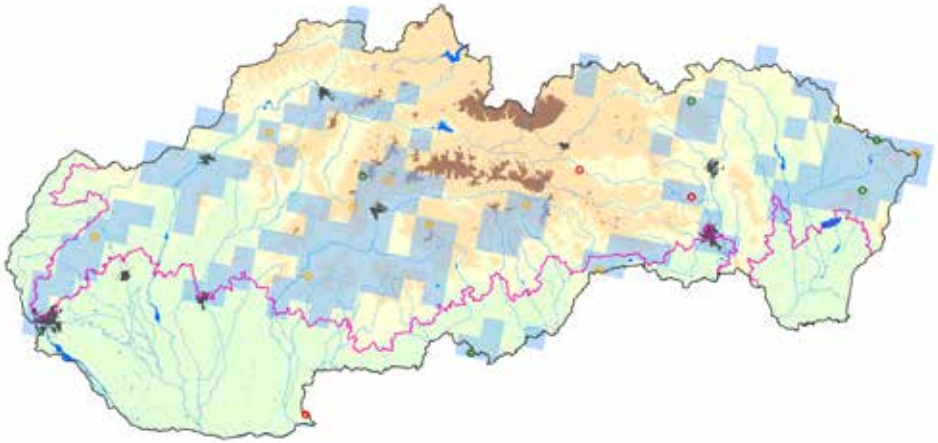
Number of PMLs: 17 **PML average area size:** 4,429 ha

Number of involved experts: 15 **Number of PML field visits:** 43

The most common accompanying species: *Ceruchus chrysomelinus, Eurythyrea austriaca, Peltis grossum, Sinodendron cylindricum, Liodopria serricornis, Hallomenus binotatus, Grynocharis oblonga, Dorcus parallelipipedus, Eupotosia affinis, Dicerca berolinensis, Cucujus cinnaberinus.*

Monitoring method: Visual registration of imagoes on dead beeches, wood stores, or indirectly on the basis of habitual signs on transects from 15th of June to 31st of July.

PMLs distribution and localization: Old preserved forests with plenty of dead wood, often protective forests or forests of special purpose (protected areas).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 500,000 – 1,000,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most frequent pressures and threats of high or moderate intensity include inappropriate management of forest habitats, especially of beech woods (in the Pannonian Bioregion this occurs more than 86 % of cases, in the Alpine it is 100 %), spreading of invasive tree species (black locust) and planting of non-native tree species (*Pinus sylvestris, Pinus nigra, Picea abies*).

Assessment and notes on the monitoring results: The habitat quality and the future prospects of the habitat in the Alpine and Pannonian Bioregions are very similar. However the quality of the population of *Rosalia alpina* in PMLs in the Pannonian Bioregion is much worse than in the Alpine Bioregion. In the Pannonian Bioregion up to 33 % of the population have bad conservation status and the other 67 % are favourable. In the Alpine Bioregion the quality of the population is bad in only 3 % of PMLs, while 65 % are in inadequate and 32 % are in favourable status. *Rosalia alpina* is a species of original old beech forests. Due to inappropriate management of native deciduous forests (timber harvesting, removal of old beech trees, bad structure and composition of the forest stands, conversion of native deciduous stands to monocultures of pine or black locust), the habitats of *Rosalina alpina* are gradually disappearing. In order to maintain a stable population of the species, the most important localities seem to be the small-scale protected areas in areas of the native deciduous forests with appropriate management, and protective forests that are economically unattractive for the forestry sector. To support the species also in commercial forests we can clearly recommend the retention of old beech trees in the forest stands, with a minimum of 5 individuals/ha. When harvesting the forests use of small-scale forms of felling should be preferred, maintaining the native tree species composition even after the forest renewal, cultivation of structured forests with lower density and preventing the spread of invasive tree species.


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Other significant species of beetles were recorded in the monitored localities, such as *Sinodendron cylindricum, Liodopria serricornis, Hallomenus binotatus, Grynocharis oblonga, Eupotosia affinis, Dicerca berolinensis, Necydalis ulmi, Stictoleptura erythroptera, Leptura thoracica.*

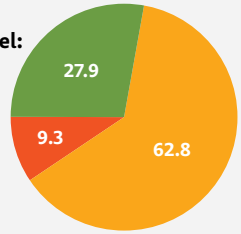
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Callimorpha quadripunctaria (Poda, 1761)
(*Lepidoptera, Noctuidae*)

Callimorpha quadripunctaria prefers sunlit edges of the forests, forest roads, clearings and meadows abundant in flowering plants, especially in middle altitudes.

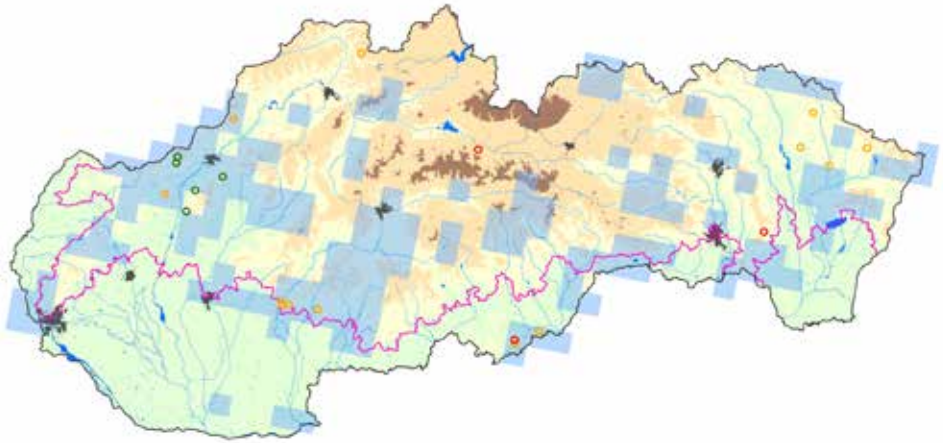
Number of PMLs: 21 **PML average area size:** 2.6 ha

Number of involved experts: 8 **Number of PML field visits:** 45

The most common accompanying species: *Argynnis paphia, Maniola jurtina, Pieris napi, Polyommatus icarus, Leptidea sinapis, Argynnis adippe, Pieris rapae, Vanessa atalanta, Araschnia levana, Minois dryas.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: The species is distributed in the Alpine as well as Pannonian Bioregions, it occurs in areas with mostly continuous forest.



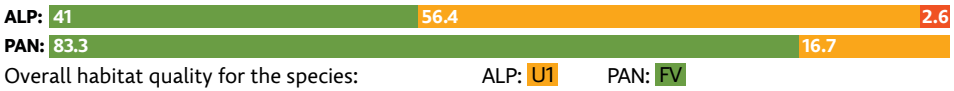
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: FV

Pressures and threats: The most significant negative pressures and threats in the Alpine Bioregion include vegetation succession (54 %), change of the climatic conditions (drought and heat) (17 %) and unsuitable timing and methods of mowing (8 %). In the Pannonian Bioregion no negative pressures and threats with medium or high intensity were recorded.

Assessment and notes on the monitoring results: Monitoring results reflect the bionomic demands of the species. It is mainly a species of medium altitudes and therefore its numbers in the Pannonian Bioregion are lower than in the Alpine Bioregion. Paradoxically, the status and prospects of the habitat are better in the Pannonian Bioregion than in the Alpine Bioregion. But it should be said that *Callimorpha quadripunctaria* is a widespread and also relatively abundant species in Slovakia. It occurs almost everywhere there are suitable habitats. Despite the described threats, of which the most commonly recorded is succession, we currently do not consider it necessary to propose special protection and management measures for the species. But the preservation of forest edges during timber harvest and sensitive maintenance of (forest) roads may significantly help to maintain suitable habitats for the species.

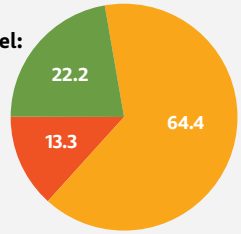
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Coenonympha hero (Linnaeus, 1761)
(*Lepidoptera, Nymphalidae*)

Coenonympha hero is a species of peat bogs and fens, as a secondary habitat it is also colonising forest edges and clearings.

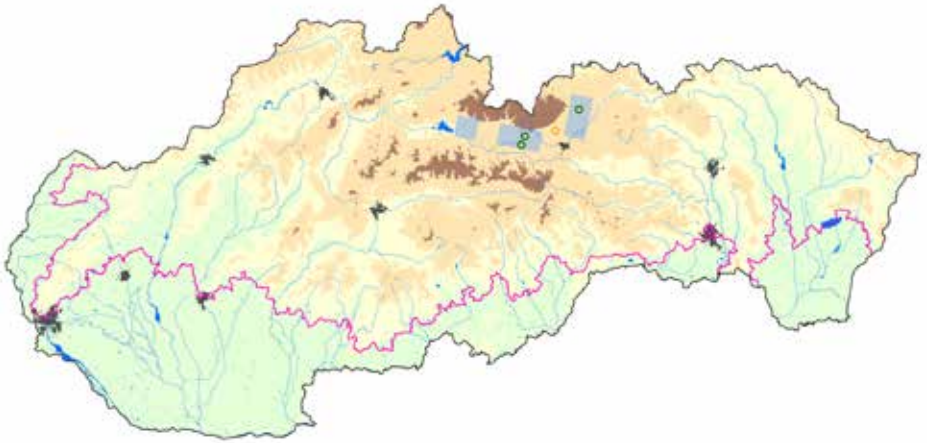
Number of PMLs: 4 **PML average area size:** 1.6 ha

Number of involved experts: 2 **Number of PML field visits:** 12

The most common accompanying species: *Melitaea diamina, Erebia medusa, Aglais urticae, Erebia medusa, Lycaena hippothoe, Diacrisia sanio, Pieris napi, Coenonympha glycerion, Coenonympha pamphilus, Inachis io.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: Bogs and fens in the broader surroundings of the Nízke Tatry and Vysoké Tatry Mountains.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: 0 PAN:

Population quality in PMLs:

Overall population quality: ALP: FV PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN:

Pressures and threats: The most significant negative pressures and threats include succession (68 %), inappropriate forest management (17 %) and invasive species of plants spreading in the habitats of the species (17 %).

Assessment and notes on the monitoring results: Only four PMLs were designated for this species, but they cover most of its current distribution. In the PMLs the situation of the species is favourable in all monitored parameters, the populations are abundant and the habitats are still in good condition. But even these localities are gradually threatened by succession, so in the near future it will be necessary to adopt and implement appropriate management measures, especially the elimination of wood encroachment. It is also essential to preserve the original hydrological regime of the species' habitats and in the near future it will probably be necessary to deal with the problems of invasive alien plants and their spread.

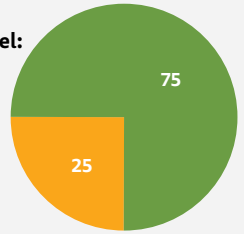
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN:

Conservation status in SCIs: FV

Overall conservation status on national level: FV



By bioregion:

Colias myrmidone (Esper, 1781)
(*Lepidoptera, Pieridae*)

It prefers drier forest steppe pastures communities on loess, limestone and dolomite substrate. In the area of Biele Karpaty Mountains, it occurs mainly in mesophilic, extensively managed meadows, orchards and pastures.

Number of PMLs: 11 **PML average area size:** 1.2 ha

Number of involved experts: 3 **Number of PML field visits:** 104

The most common accompanying species: *Polyommatus icarus*, *Leptidea sinapis*, *Maniola jurtina*, *Coenonympha pamphilus*, *Pieris napi*, *Pieris rapae*, *Erynnis tages*, *Boloria dia*, *Colias alfacariensis*, *Lycaena hippothoe.*

Monitoring method: Visual registration of imagoes of both generations.

PMLs distribution and localization: At the present, it occurs very sporadically, on the limit of observability, in the northern part of Malé Karpaty Mountains. And the southern part of Javorníky Mountains. The last remnants of a diminishing meta-population, that is a bit more abundant, are found in central part of Biele Karpaty Mountains and in Považský Inovec Mountains.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10 – 100 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: – PAN:

Population quality in PMLs:

Overall population quality: ALP: U2 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most significant negative pressures and factors include unsuitable and intensive livestock grazing (32 %), succession (29 %) and improper timing of mowing, especially at the time of imago emergence (21 %).

Assessment and notes on the monitoring results: In the territory of Slovakia *Colias myrmidone* is a critically endangered species, the abundance of its populations are on the border of extinction! Despite the fact that the status of its habitat, as well as the future prospects of the habitat, is relatively good, the abundance of the population is decreasing every year. In 2015 no individuals were observed at all. The years 2014 and 2015 were very unfavourable in terms of climatic conditions, in 2014 there were torrential rains just at the time of the imagoes emergence and in the year 2015 the weather was extremely dry and warm at this period of the species' life cycle. These factors contributed to the negative result of monitoring. In any case, this situation is very critical and it is necessary to immediately take all necessary measures to rescue the species. *Colias myrmidone* is a typical meta-population species and for its survival it requires a relatively large territory with suitable conditions. The causes of the direct threat and loss are mainly successional changes in the localities where the species occurs related to the absence of traditional extensive grazing and mowing. Misdirected subsidies for large-scale intensive mowing and mulching of grasslands have led to the destruction of the caterpillars and their food plants at the same time. The immediate prerequisite for the survival of this species is to preserve the traditional way of management of the remaining localities. At the same time it is necessary to extend this way of management to sites within reach of the residual populations, which will ensure the revitalisation of the of food-plant stands and the gradual expansion of the inhabited area.

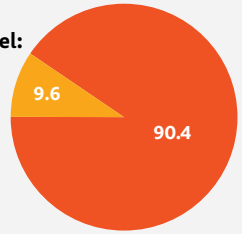
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN:

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Dioszeghyana schmidtii (Dioszeghy, 1935)
(*Lepidoptera, Noctuidae*)

In the territory of Slovakia *Dioszeghyana schmidti* occurs in thermophilic oak forests and their margins, especially those with south and south-westerly aspects.

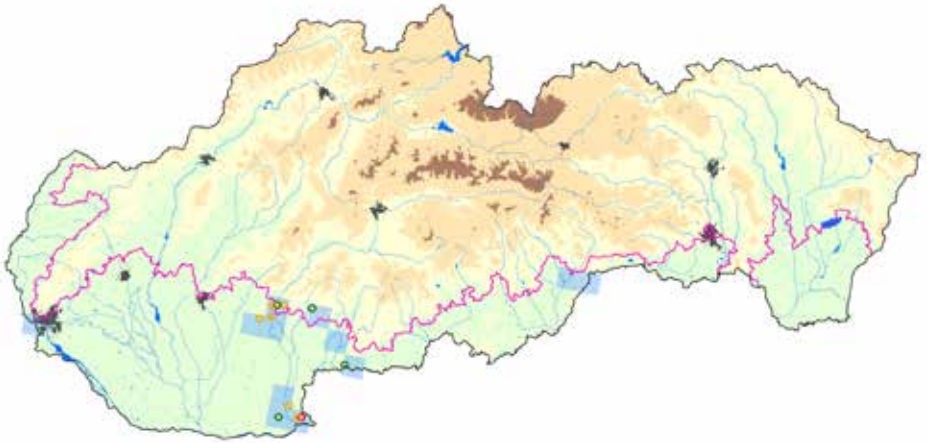
Number of PMLs: 11 **PML average area size:** 4.8 ha

Number of involved experts: 3 **Number of PML field visits:** 28

The most common accompanying species: *Eupithecia dodoneata, Orthosia gothica, Orthosia cerasi, Conistra vaccinii, Diurnea fagella, Eupithecia abbreviata, Orthosia cruda, Orthosia incerta, Polyploca ridens, Eupsilia transversa.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: The current known distribution of *Dioszeghyana schmidti* in the territory of Slovakia covers most of the southern half of the country.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 3,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: During the monitoring, there were no pressures and threats of high or moderate intensity recorded. Inappropriate or intensive forest management represents a potential threat as it is associated with several factors reported under threats and pressures of low intensity (for now): clear-cutting, thinning of forest layers etc. The species may also be threatened by vegetation succession, which currently affects mainly habitats of open oak forests, which were previously maintained by grazing.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Assessment and notes on the monitoring results: All the monitored parameters are classified as unfavourable-inadequate, but it must be said that this monitoring was the first systematic survey of this kind in Slovakia. *Dioszeghyana schmidtii* is likely to occur over a much larger area than is covered by current PMLs and its actual distribution in Slovakia is not known. Its situation is better in the Alpine Bioregion; in the Pannonian Bioregion there is a high degree of degradation and fragmentation of suitable forest habitats. More detailed and systematic research is necessary for this species.

Regarding the current state of knowledge, as an appropriate management measure we can particularly recommend the preservation of natural forests with *Quercus cerris*, which, in our region, is the most important food-plant for the species. It is also necessary to remember the preservation and maintenance of the habitats of open oak forests by means of grazing.


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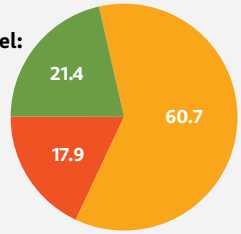
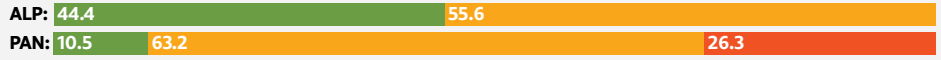
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:



Eriogaster catax (Linnaeus, 1758)
(*Lepidoptera, Lasiocampidae*)

The occurrence of *Eriogaster catax* is connected to the occurrence of warm, dry hillsides, sparsely vegetated by bushes, as well hedges and forest edges overgrown by shrubs of *Crataegus* sp. and *Prunus spinosa*.

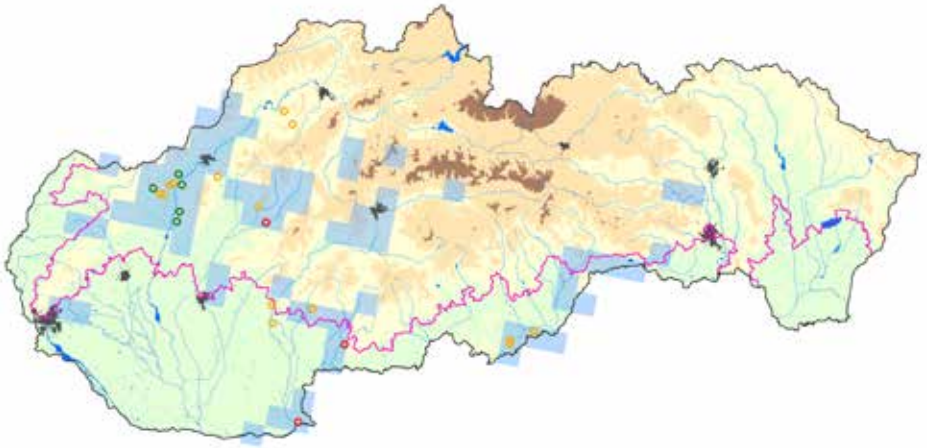
Number of PMLs: 22 **PML average area size:** 15.1 ha

Number of involved experts: 6 **Number of PML field visits:** 58

The most common accompanying species: *Pieris napi*, *Anthocharis cardamines*, *Pyrgus malvae*, *Leptidea sinapis*, *Polygonia c-album*, *Erynnis tages*, *Pieris rapae*, *Callophrys rubi*, *Iphiclides podalirius*, *Gonepteryx rhamni*.

Monitoring method: Visual registration of caterpillars.

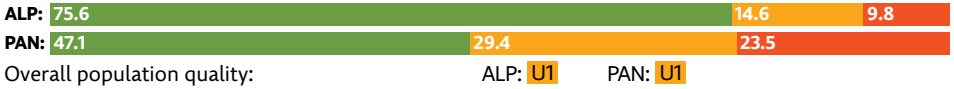
PMLs distribution and localization: *Eriogaster catax* is a species of steppes and forest steppes at lower and middle elevations.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 20,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most significant negative pressures and threats in the Alpine Region include intensive livestock grazing (45 %), succession (38 %) and planting of trees in the habitats of the species (13 %). In the Panonnian Bioregion the major threat is the vegetation succession (100 %).

Assessment and notes on the monitoring results: In both bioregions the monitored parameters are evaluated as unfavourable-inadequate. The fundamental problem for this species is emerging and uncontrolled succession that threatens most kinds of steppe and forest steppe habitats. The population quality is in relatively good status (especially in the Alpine Bioregion), but the quality of habitats, as well as their prospects are unfavourable-inadequate. In this case, it is necessary to quickly implement appropriate management measures to prevent succession. *Eriogaster catax* is a species of early successional stages and it avoids closed shrub stands in a higher level of succession.


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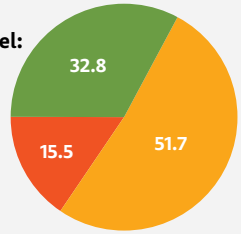
Overall assessment of the conservation status of species

Conservation status on national level:



Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U1

By bioregion:

Euphydryas aurinia (Rottemburg, 1775)
(*Lepidoptera, Nymphalidae*)

A species of mosaic habitats of wet meadows with scattered woody plants and the occurrence of *Succisa* sp. – the food-plant of the caterpillars, as well as with plenty of plants with nectar for the imagoes.

Number of PMLs: 1 **PML average area size:** 1.2 ha

Number of involved experts: 1 **Number of PML field visits:** 2

The most common accompanying species: *Melitaea cinxia*, *Erebia medusa*, *Papilio machaon*, *Melitaea trivia*, *Melitaea didyma.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: At the present time it is considered extinct in the territory of Slovakia. Very large populations used to live in the area of Záhorská nížina Lowland not long ago. The species was monitored on only one PML that had been selected in the core of the past distribution, where the species reached high population density and suitable habitat was preserved till today.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:
Estimate of the population size in the Pannonian Bioregion: 0 individuals
Estimate of the population development trend: ALP: PAN: –

Population quality in PMLs:

ALP:
PAN: 100

Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:

ALP:
PAN: 100

Overall habitat quality for the species: ALP: PAN: FV

Future prospects of habitat for the species in PMLs:

ALP:
PAN: 100

Overall future prospects of habitat for the species: ALP: PAN: FV

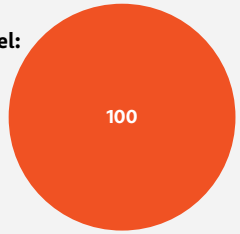
Pressures and threats: At the present times there are no threats or pressures known. The PML is part of the Záhorie military training area and there are no negative activities present.

Assessment and notes on the monitoring results: A large meta-population, living approximately in the area between municipalities of Senica, Rohožník and Malacky, was numerous and had stable character until the first half of the 1990s. In 1992 the population was still abundant and the marsh fritillary was a dominant species. In 1995 only a single individual was recorded in the same territory, and since 1998 its presence has not been confirmed at all. Since then, only sporadic findings of single imagoes have been recorded. The last time was in the vicinity of Rohožník village in 2001. The monitoring results confirmed the fact that *Euphydryas aurinia* probably does not occur in the territory of Slovakia at the present time.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: **U2**



By bioregion:

ALP:
PAN: 100

Hypodryas maturna (Linnaeus, 1758)
(*Lepidoptera, Nymphalidae*)

A species of forest habitats with a semi-open forest structure, the presence of sun-lit forest roads and small forest clearings. It is a typical species of open deciduous forests of lowlands and highlands; it requires early successional stages of forest with a large number of young trees, with a height of up to 7 m, and open forest canopy.

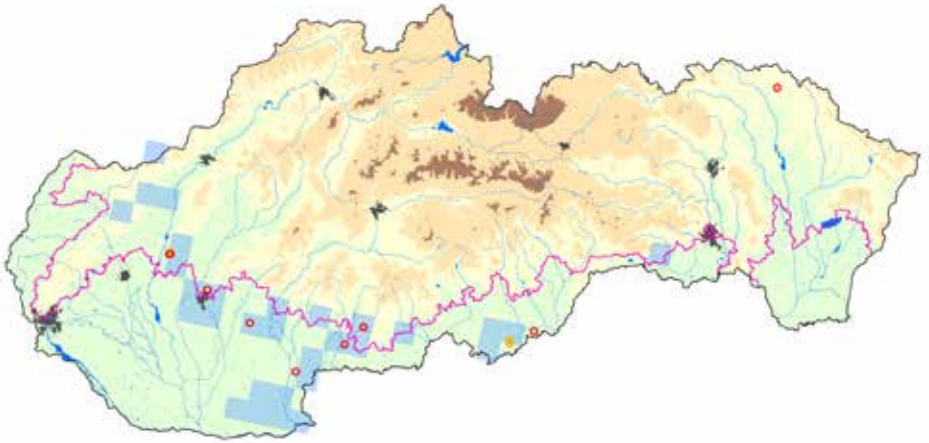
Number of PMLs: 12 **PML average area size:** 25.4 ha

Number of involved experts: 5 **Number of PML field visits:** 55

The most common accompanying species: *Pieris napi, Maniola jurtina, Polyommatus icarus, Issoria lathonia, Pararge aegeria, Polygonia c-album, Vanessa atalanta, Pieris rapae, Coenonympha arcania, Melanargia galathea.*

Monitoring method: Visual registration of imagoes and caterpillars' nests.

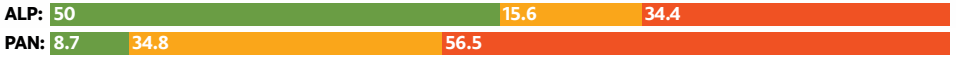
PMLs distribution and localization: The species is found mainly in western Slovakia and in the south of central Slovakia; isolated populations are also found in eastern Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 500 – 2,000 individuals
Estimate of the population size in the Pannonian Bioregion: 500 – 2,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

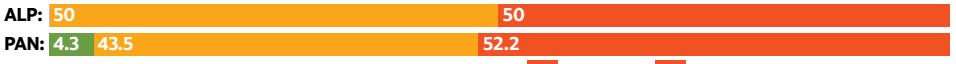


Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U2 PAN: U2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Pressures and threats: The main negative pressures and threats in the Alpine Bioregion include succession (43 %), planting of non-native woody species and the presence of invasive species (19 %), and improper mowing (10 %). In the Pannonian Bioregions these include mainly succession (77 %), improper mowing (18 %) and inappropriate management of forests (5 %).

Assessment and notes on the monitoring results: The quality of populations of the species is very different in the two bioregions. In the Alpine Bioregion it is favourable in 50 % of PMLs, but in the Pannonian Bioregion only in 9 % of PMLs. This is caused mainly by the lack of suitable habitats there, they are highly fragmented and have only small areas. In such conditions, only remnants of the populations can survive and they have low number of individuals. The habitat quality in both bioregions is already unfavourable-inadequate, although the results show that in the Alpine Bioregion there are still large populations present. It is evident that the present management of forests does not conform to this species' needs and that its overall status in Slovakia is bad and it continues to decline. To improve the situation and to protect the species it is necessary to adopt management measures as soon as possible. In the places where it occurs it is necessary to maintain the semi-open forest structure, to eliminate large-scale clear-cutting, to remove invasive plants and to stop planting of non-native tree species. Similarly important is the maintenance of the shrub layer in the forests, especially the growths of *Ligustrum vulgare*.


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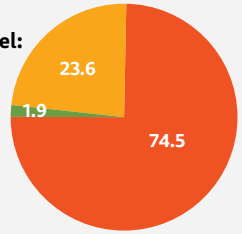
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: U2



By bioregion:

Leptidea morsei (Fenton, 1881)
(*Lepidoptera, Pieridae*)

Leptidea morsei prefers mesophilic meadows, forest edges, edges of forest roads, forest clearings and forest steppes.

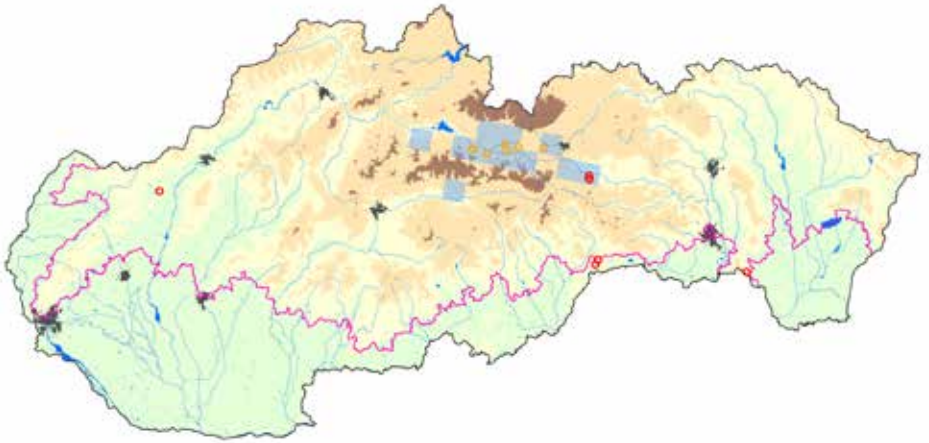
Number of PMLs: 13 **PML average area size:** 5.2 ha

Number of involved experts: 5 **Number of PML field visits:** 39

The most common accompanying species: *Pieris napi, Pararge aegeria, Anthocharis cardamines, Polygonia c-album, Gonepteryx rhamni, Araschnia levana, Aglais urticae, Erebia medusa, Issoria lathonia, Lycaena dispar.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: The species occurs in a few localities in the middle altitudes of the central and eastern parts of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 500 – 2,000 individuals
Estimate of the population size in the Pannonian Bioregion: 0 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U2

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U2

Pressures and threats: The most significant negative pressures and threats in the Alpine Bioregion include succession (38 %), inappropriate management of forest stands (23 %) and forestry activities that result in the degradation of suitable habitats (23 %). In the Panonnian Bioregion the only negative pressure and threat is succession (100 %).

Assessment and notes on the monitoring results: In the Alpine Bioregion all the observed characteristics are evaluated as unfavourable-inadequate. The numbers of the individual populations are not very high and only in 9 % of all records (visits) the quality of the population was evaluated as good. The species inhabits habitats whose existence is directly dependent on human activities, particularly forestry, and they are under great pressure. In the Pannonian Bioregions the species was not recorded at all. The last discovery dates back to 2001 from the area of Slovenský Kras (Slovak Karst) where this species inhabited forest steppe habitats. Most likely it is already extinct there, because it has not been recorded yet, despite intensive research over the last 10 years.

The protection of species includes primarily the preservation of forest clearings, open forest edges, forest meadows and their non-intensive management.

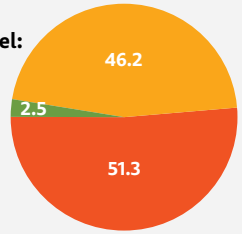
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Lopinga achine (Scopoli, 1763)
(*Lepidoptera, Nymphalidae*)

Lopinga achine requires a semi-open forest structure, where it inhabits small clearings and forest edges with open forest canopy; it also occurs along the edges of forest roads. It is a typical species of forest ecotones.

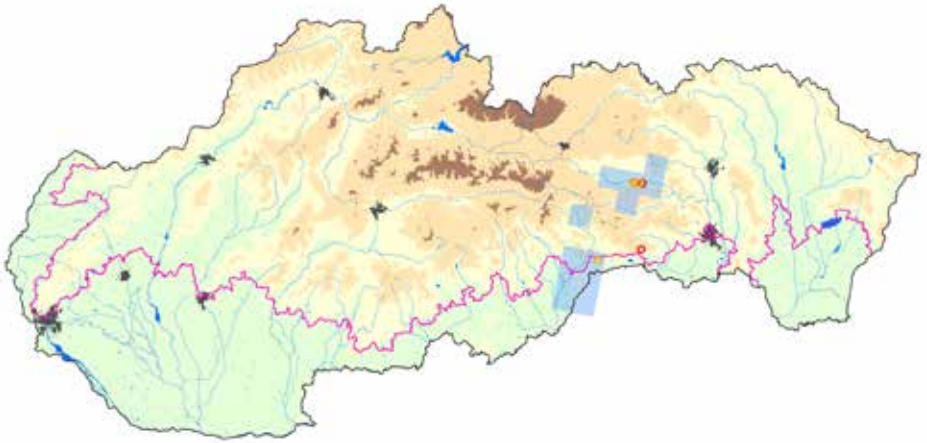
Number of PMLs: 6 **PML average area size:** 20.6 ha

Number of involved experts: 4 **Number of PML field visits:** 17

The most common accompanying species: *Pieris napi*, *Aphantopus hyperanthus*, *Coenonympha arcania*, *Polygonia c-album*, *Limenitis camilla*, *Lycaena virgaureae*, *Brenthis ino*, *Maniola jurtina*, *Coenonympha glycerion*, *Gonepteryx rhamni*.

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: At the present time, *Lopinga achine* occurs only in the area of Slovenský kras (Slovak Karst) and on the frontier of Hornádska kotlina basin and Volovské vrchy Mountains.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 1,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: FV

Pressures and threats: The most significant pressures and threats in the Alpine Bioregion include succession (47 %), inappropriate management of forests (13 %) and the presence of human settlements in the vicinity of the species' habitats, or the extension of the urbanised areas into the habitats of the species (10 %). In the Panonnian Bioregion succession (100 %) represents the major negative factor.

Assessment and notes on the monitoring results: The situation in the two bioregions is quite different. In the Pannonian Bioregion most of the population is in good status, as the habitats are in good condition too. At the present time, the species finds its optimal conditions within the territory of Slovakia in the Slovenský kras, although its habitats are threatened here by succession and it will be necessary to take appropriate management measures (e.g. extensive grazing of goats). In the Alpine Bioregion, the situation is considerably different; the populations have low numbers, which is directly related to the insufficient status of their habitats. Succession has become a major phenomenon and *Lopinga achine* ceases to find optimal conditions there. The inappropriate forestry activities also degrade the suitable habitats. In the Alpine Bioregion it is therefore necessary needed to begin immediately the appropriate habitat management (maintenance and creation of forest clearings and forest edges).

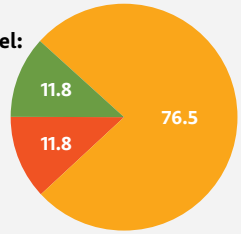
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Lycaena dispar (Haworth, 1803)
(*Lepidoptera, Lycaenidae*)

Lycaena dispar is bound to wet meadows and marshlands and the fringe vegetation on riverbanks.

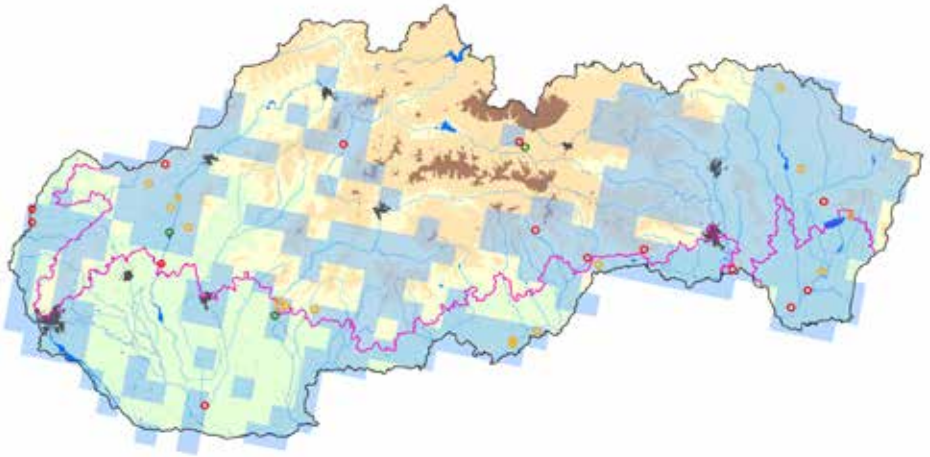
Number of PMLs: 33 **PML average area size:** 13.2 ha

Number of involved experts: 11 **Number of PML field visits:** 146

The most common accompanying species: *Maniola jurtina, Polyommatus icarus, Coenonympha pamphilus, Pieris napi, Pieris rapae, Coenonympha glycerion, Vanessa atalanta, Melanargia galathea, Polygonia c-album, Plebejus argus.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: In the territory of Slovakia this is a relatively common species, it occurs in lower and medium altitudes, particularly on wet meadows.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most significant pressures and threats in the Alpine Bioregion include succession (34 %), intensive mowing, or mowing at the time of imagoes' emergence (24 %) and the spread of alien plant species at the expense of the native ones (8 %). In the Pannonian Bioregion these include succession (42 %), intensive mowing, or mowing at the time of imagoes' emergence (27 %) and change in the hydrological regimes of water courses (15 %).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Assessment and notes on the monitoring results: All monitored parameters in both bioregions are evaluated as unfavourable-inadequate, despite the fact that *Lycaena dispar* is a relatively common species across the territory of Slovakia, and that its habitat requirements are not very demanding. The results of monitoring may be distorted though, by the extremely dry year of 2015, when the abundance of many species of butterflies was very low in some areas and it stood out from the normal values in years with usual weather conditions. At present, *Lycaena dispar* is not endangered within the territory of Slovakia.


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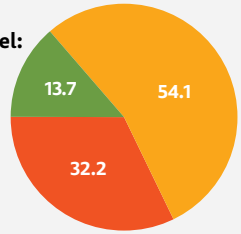
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Maculinea arion (Linnaeus, 1758)
(*Lepidoptera, Lycaeanidae*)

In Slovakia, *Maculinea arion* occurs in dry and warm habitats, especially on limestone and aeolian sands with the occurrence of *Thymus* spp. and *Origanum vulgare*.

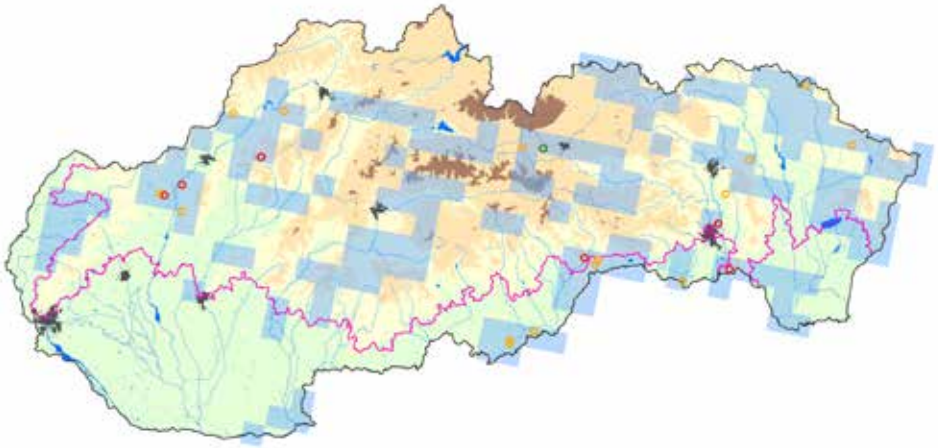
Number of PMLs: 21 **Prierná veľkosť TML:** 16.4 ha

Number of involved experts: 8 **Number of PML field visits:** 67

The most common accompanying species: *Maniola jurtina, Melanargia galathea, Polyommatus icarus, Pieris napi, Pieris rapae, Papilio machaon, Aphantopus hyperanthus, Lycaena dispar, Argynnis paphia, Gonepteryx rhamni.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: *Maculinea arion* has currently a dispersed distribution across almost entire territory of Slovakia. The most abundant populations are located in Borská nížina Lowland and Slovenský kras karst area.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 3,000 individuals
Estimate of the population size in the Pannonian Bioregion: 2,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most significant pressures and threats in the Alpine Region include succession (53 %), intensive or inappropriate livestock grazing (24 %), inappropriate planting of woody species and the deterioration of open habitats (12 %). In the Pannonian Region it is mainly succession (82 %) and intensive mowing, or mowing at the time of the imagoes' emergence (19 %).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Assessment and notes on the monitoring results: All the monitored parameters are classified as unfavourable-inadequate; mainly the low numbers of the species in the habitat are alarming. *Maculineas arion* is currently one of the most endangered butterfly species; decline of its population has been rapid in recent years. It is threatened mainly by the succession of suitable habitats, which took over after the rapid decrease of livestock production and the reduction in the use of land as pasture. The situation is critical in the Pannonian Bioregion where only remnants of the original populations survive in several places. The future prospects are better in the Alpine Bioregion where the species occurs in multiple locations together with *Parnassius apollo*, which has recently received increased attention leading to the appropriate management measures being implemented.


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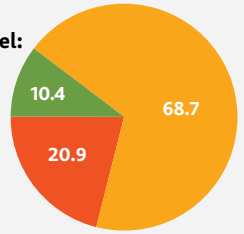
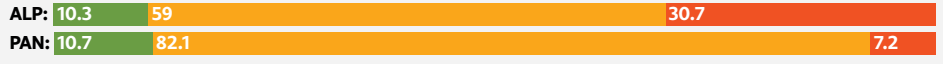
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:



Maculinea nausithous (Bergsträsser, 1779)
(*Lepidoptera, Lycaeanidae*)

Maculinea nausithous is bound to mesophilic and hydrophilic meadows with the stands of great burnet (*Sanguisorba officinalis*).

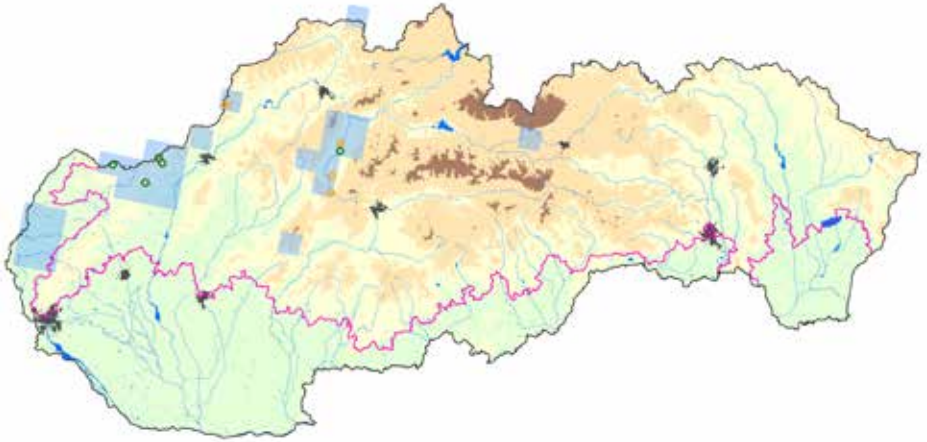
Number of PMLs: 9 **PML average area size:** 3 ha

Number of involved experts: 9 **Number of PML field visits:** 23

The most common accompanying species: *Maniola jurtina, Maculinea teleius, Inachis io, Melanargia galathea, Pieris rapae, Aglais urticae, Argynnis adippe, Brenthis ino, Heteropterus morpheus.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: *Maculinea nausthous* is found in the territory of Slovakia mainly on the alluvial and wet meadows of western and central Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 2,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 2,000 individuals
Estimate of the population development trend: ALP: – PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most significant negative pressures and threats in the Alpine Bioregion include inappropriate methods of mowing meadows (intensive mowing, mowing at the time of imago emergence) (50 %), succession (36 %) and intensive livestock grazing (14 %).

Assessment and notes on the monitoring results: The species was monitored only in the Alpine Bioregion. All the monitored parameters are classified as unfavourable-inadequate, but a relatively large portion of populations (mainly in Biele Karpaty Mountains and in the basin of the Turiec River) are in a favourable status. The greatest danger for this species is inappropriate methods of meadow mowing, especially when it takes place precisely at the time of the emergence of imagoes, which thereby lose their source of food and particularly the possibility of laying eggs in the flowers of the great burnet (*Sanguisorba officinalis*). However, the situation is not critical, the majority of the habitats are in a proper condition and the future prospects of the habitats are still good (70 % of PMLs).

Maculinea nausithous also occurs in the Pannonian Bioregion; in Borská nížina Lowland it has a very large and stable populations. However, due to administrative reasons, the monitoring of the species was not carried out there (Bratislava Region).

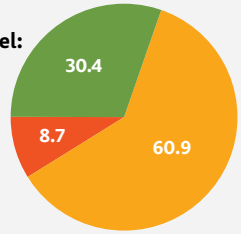
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Maculinea teleius (Bergsträsser, 1779)
(*Lepidoptera, Lycaeanidae*)

Maculinea teleius is bound to mesophilic and hydrophilic meadows and pastures with the stands of great burnet (*Sanguisorba officinalis*).

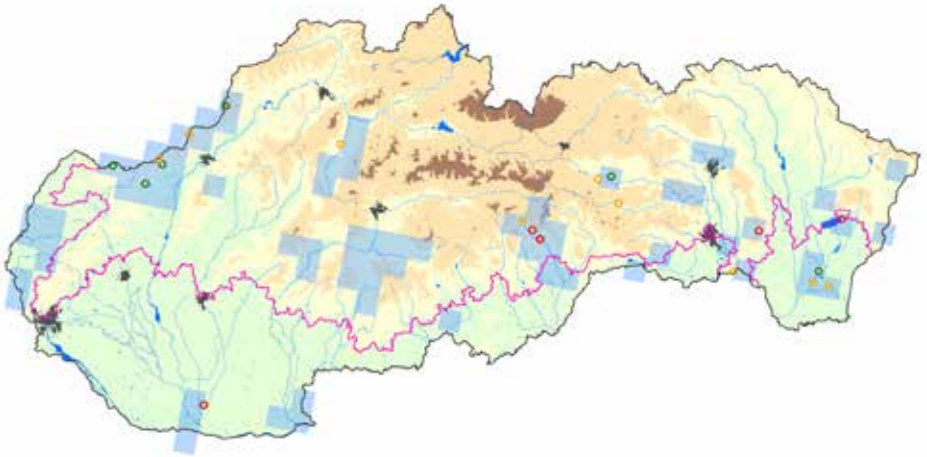
Number of PMLs: 20 **PML average area size:** 3.9 ha

Number of involved experts: 10 **Number of PML field visits:** 43

The most common accompanying species: *Maniola jurtina, Melanargia galathea, Pieris rapae, Aphantopus hyperanthus, Pieris napi, Polyommatus icarus, Brenthis ino, Maculinea nausithous, Coenonympha pamphilus, Cynthia cardui.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: In the territory of Slovakia *Maculinea teleius* is present mainly in lower and middle altitudes, especially in the alluvia of larger water-courses.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 20,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most significant pressures and threats in the Alpine Bioregion include inappropriate methods of meadow mowing – intensive mowing, or mowing at the time of imago emergence (43 %), succession (30 %) and meadows being overgrown by invasive plants (10 %). In the Pannonian Bioregion these are also inappropriate methods of mowing (40 %), changes in the hydrological regime of water-courses that causes the destruction of suitable habitats (27 %) and succession (20 %).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Assessment and notes on the monitoring results: All the monitored parameters are classified as unfavourable-inadequate but the situation in the Alpine bioregion is much better than in the Pannonian bioregion. In the Pannonian bioregion, most of the suitable habitats were destroyed by the disruption of the hydrological regime and the subsequent conversion of meadows to arable land, or intensive pastures. In the Alpine bioregion, the situation is relatively good, although the consequences of the abandonment of traditional management are already visible as well as the subsequent degradation of habitats. The greatest threat for this species is the inappropriate mowing of meadows, which takes place precisely at the time of the emergence of imagoes, which thereby lose their source of food and any possibility for laying eggs on the flowers of great burnet (*Sanguisorba officinalis*).


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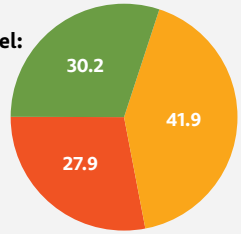
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Parnassius apollo (Linnaeus, 1758)
(*Lepidoptera, Papilionidae*)

Parnassius apollo occurs only in warm and sunlit habitats with the occurrence of food-plants for its caterpillars, especially *Sedum album* and *Hylotelephium maximum*. The best conditions are found on south-facing mountain slopes with mainly limestone substrates. Its typical habitats are non-forest screes and cliffs with adjacent flower growths, which the imagoes use as a food source.

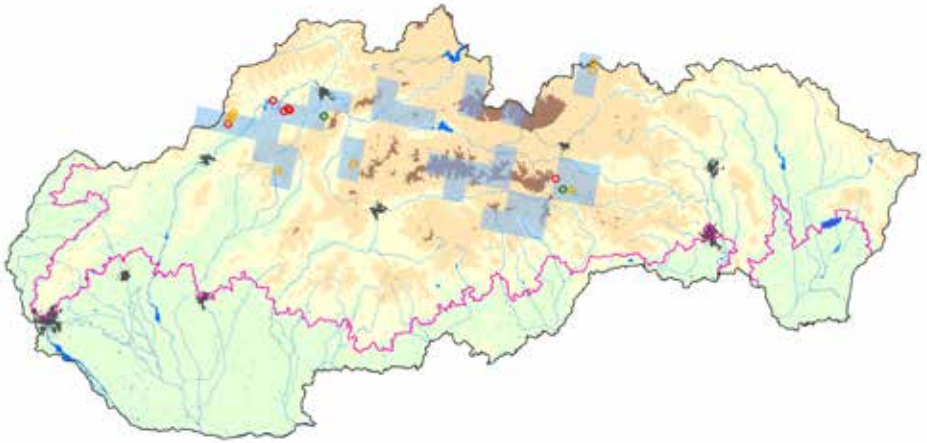
Number of PMLs: 16 **PML average area size:** 1.6 ha

Number of involved experts: 5 **Number of PML field visits:** 31

The most common accompanying species: *Melanargia galathea, Maniola jurtina, Thymelicus sylvestris, Polyommatus coridon, Aglais urticae, Papilio machaon, Polyommatus icarus, Aphantopus hyperanthus, Gonepteryx rhamni, Brintesia circe.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: The current distribution of *Parnassius apollo* is only a fragment of its original range in the territory of Slovakia. It occurs mainly on barely accessible hillsides of limestone mountains in Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: – PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

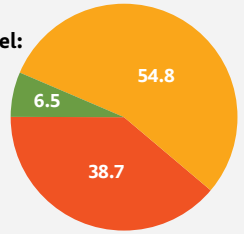
Pressures and threats: The most serious pressures and threats include succession (50 %), but unfortunately the commercial collection and killing of individuals (28 %) also has a significant impact, as well as afforestation (9 %).

Assessment and notes on the monitoring results: In both bioregions all the monitored parameters are classified as unfavourable-inadequate. In the past, *Parnassius apollo* occurred on almost every mountain range in Slovakia, except the easternmost part of the republic, and belonged to the relatively common species. At present, the situation is completely different. Its total range has been reduced by more than half, the population density has decreased significantly in most of the localities and the situation starts to be alarming. The population quality is favourable only in 19 % of records and the habitat quality is sufficient only in 26 % of the monitoring records.

To improve this situation it is essential to implement suitable management measures. It is necessary to immediately begin clearing of spontaneous growths of trees and to ensure permanent management so as to prevent their recurring ingrowth. Also livestock grazing should be strictly regulated and last, but not least, a way to effectively prevent the commercial capture of *Parnassius apollo* is needed.

Overall assessment of the conservation status of species

Conservation status on national level:



Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: U1

By bioregion:

Parnassius mnemosyne (Linnaeus, 1758)
(*Lepidoptera, Papilionidae*)

This species prefers the margins of forests, meadows and forest clearings, and the fringes of wide forest roads; in higher mountains it is relatively abundant on ski slopes.

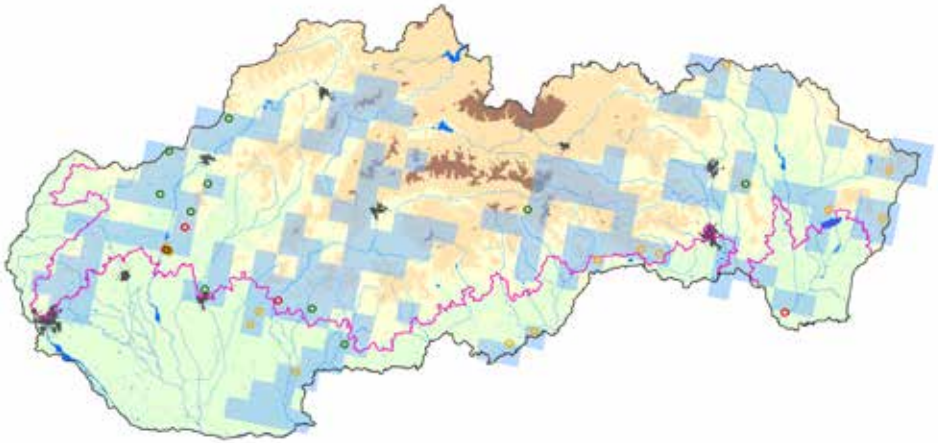
Number of PMLs: 29 **PML average area size:** 14.4 ha

Number of involved experts: 9 **Number of PML field visits:** 70

The most common accompanying species: *Pieris napi, Anthocharis cardamines, Coenonympha pamphilus, Leptidea sinapis, Pararge aegeria, Pyrgus malvae, Polyommatus icarus, Erynnis tages, Cynthia cardui, Pieris rapae.*

Monitoring method: Visual registration of imagoes.

PMLs distribution and localization: In the territory of Slovakia it is widespread, in the mountains it occurs almost anywhere there are deciduous forests, though in higher vegetation zones it is rare.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most significant pressures and threats in the Alpine bioregion include succession (44 %), intensive livestock grazing (13 %) and mowing (9 %). In the Pannonian bioregion it is succession (63 %) and inappropriate agricultural use (25 %).

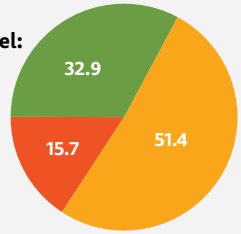
Assessment and notes on the monitoring results: The results clearly show that the species is doing much better in the Alpine bioregion. This is mainly due to the lack of appropriate conditions in the Pannonian bioregion where there are few suitable forest habitats, the forests here are significantly fragmented with only few suitable forest meadows. Despite this, the species reaches a relatively high population density and in 40 % of monitoring records in the Pannonian bioregion the population quality was assessed as favourable. In the Alpine bioregion, the situation is relatively good in all evaluated parameters.

Parnassius mnemosyne needs an open landscape for its existence, in dense and developed forest stands with closed canopy, it does not occur. For its protection, it is necessary to create or maintain a mosaic of forest meadows, clearings and glades with proper management (extensive mowing or grazing).

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Proserpinus proserpina (Pallas, 1772)
(*Lepidoptera, Sphingidae*)

Proserpinus proserpina prefers herbal communities of lowland riverbanks, as well as thermophilic fringes, but also steppes and forest steppes.

Number of PMLs: 3 **PML average area size:** 3.1 ha

Number of involved experts: 1 **Number of PML field visits:** 8

The most common accompanying species: *Cabera exanthemata, Deilephila porcellus, Cabera pusaria, Cupido argiades, Deilephila elpenor, Deltote bankiana, Deltote deceptoria, Erynnis tages, Furcula furcula, Harpyia milhauseri.*

Monitoring method: Visual registration of imagoes and caterpillars; data were collected during the monitoring of other species in the PMLs selected for them, as well as during the transfers of the mapper between the particular PMLs.

PMLs distribution and localization: *Proserpinus proserpina* is very rare in the territory of Slovakia and nowhere it forms permanent populations.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The only pressure and threat, determined by the monitoring, was succession affecting the suitable non-forest habitats (100 %).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Assessment and notes on the monitoring results: Three PMLs were designated for this species on the basis of findings during the monitoring of other species. It prefers a variety of non-forest habitats (mostly mesophilic), including ruderals, but also vegetation on riverbanks with the occurrence of the caterpillars' food-plants (*Epilobium* spp. and *Oenothera* spp.).

In both bioregions the monitored parameters are classified as unfavourable-inadequate. This is caused mainly by the fact that these are more or less accidental observations of the species and more individuals have never been recorded. The results of monitoring of this species are therefore only indicative and do not reflect the overall status of the species in Slovakia. We do not have even the most the basic information on *Proserpinus proserpina* and the executed monitoring in this case represent only a partial mapping of the species in Slovakia.


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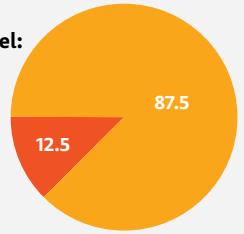
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Zerynthia polyxena (Denis et Schiffermüller, 1775)
(*Lepidoptera, Papilionidae*)

Zerynthia polyxena has no strong habitat preference, but prefers warm and sunlit habitats. It occurs on flood barrages, the banks of larger as well as smaller water-courses, railway embankments, the margins of vineyards and the raised edges of roads, but also on edges of meadows, steppes and forest steppes.

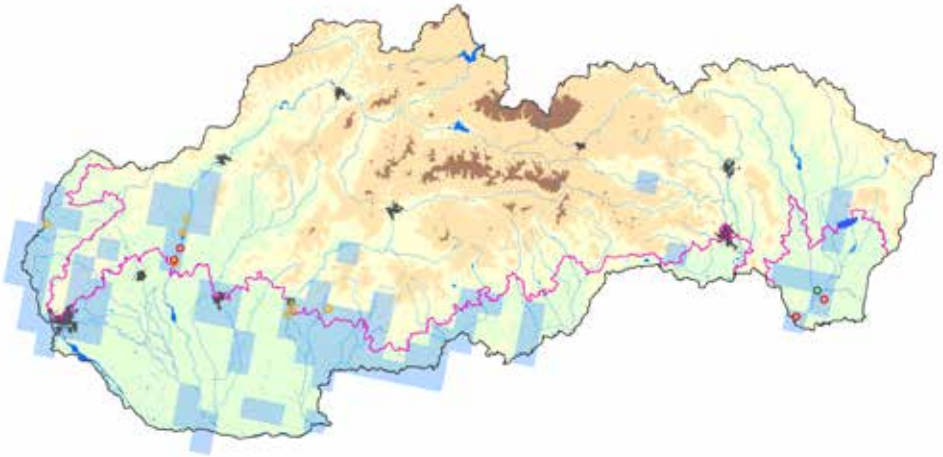
Number of PMLs: 13 **PML average area size:** 5 ha

Number of involved experts: 5 **Number of PML field visits:** 64

The most common accompanying species: *Pieris rapae*, *Coenonympha pamphilus*, *Pieris napi*, *Polyommatus icarus*, *Maniola jurtina*, *Coenonympha glycerion*, *Pyrgus malvae*, *Lycaena tityrus*, *Leptidea sinapis*, *Issoria lathonia*.

Monitoring method: Visual registration of imagoes and caterpillars.

PMLs distribution and localization: Slovakia is crossed by the northern boundary of the range of *Zerynthia polyxena*. The species occurs mainly in the lowlands and warmer regions of Slovakia. Its distribution in Slovakia is increasing as the species spreads, mainly through river valleys gradually, to the north.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most significant pressures and threats in the Alpine bioregion include succession (74 %) and intensive mowing, or mowing at the time of the imagoes' and caterpillars' occurrence (26 %). In the Panonnian Region it is intensive mowing or mowing at the time of imagoes' and caterpillars' occurrence (100 %) that threatens the species.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Assessment and notes on the monitoring results: The overall status of the species is at a relatively good level in both bioregions. But the future prospects of the habitats, especially in the Alpine Region are inadequate; they are threatened mainly by succession. The unsuitable timing of mowing, especially at the time of caterpillar occurrence, is a significant negative factor in both bioregions. We can say that *Zerynthia polyxena* is still relatively numerous and widespread in Slovakia and does not require specific protection measures. But more attention should be given to its population in the Alpine bioregion and to monitor the development of the habitats in which the species is occurring.


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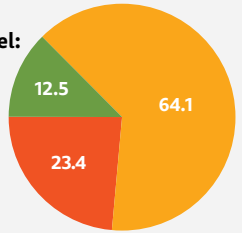
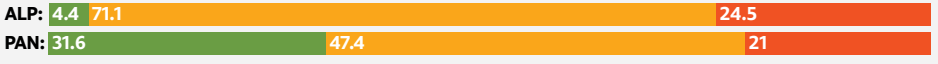
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:



Coenagrion ornatum (Sélys, 1850)
(*Odonata, Coenagrionidae*)

Its occurrence in Slovakia is situated in warmer parts of lowlands and basins. In the basins it is bound to calcareous spring fens, in the lowlands to a wider range of habitats (especially overgrown canals).

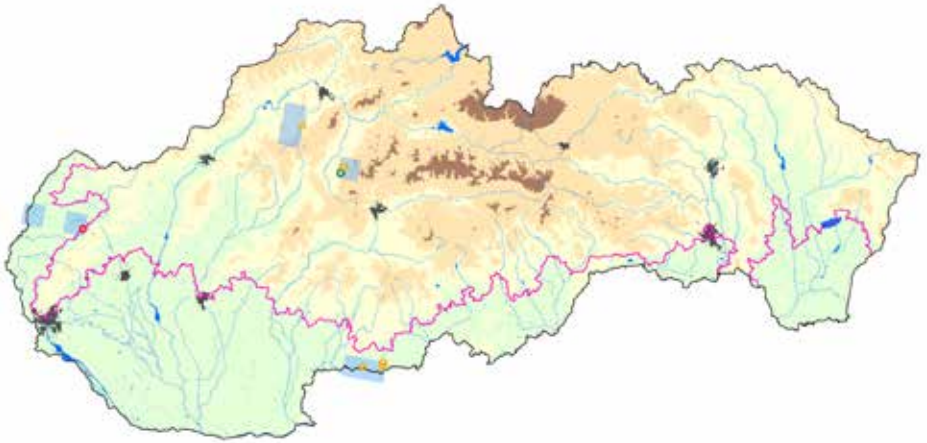
Number of PMLs: 7 **PML average area size:** 1.1 ha

Number of involved experts: 3 **Number of PML field visits:** 50

The most common accompanying species: *Orthetrum coerulescens, Ischnura pumilio, Pyrrhosoma nymphula, Calopteryx splendens, Libellula depressa, Coenagrion puella, Orthetrum brunneum, Cordulegaster bidentata, Platycnemis pennipes, Ischnura elegans.*

Monitoring method: Two monitoring methods were developed and used: collection of exuviae (three field visits with an interval of approximately 3 weeks in the hatching period) and the counting of imagoes (three field visits with an interval of approximately 3 weeks in the period of imagoes emergence).

PMLs distribution and localization: All known reproducing populations are included. In the Alpine Bioregion there are three PMLs in the habitats of alkaline fens. Three PMLs in the Panonnian Bioregion and one PML on the border of the Panonnian and Alpine Bioregions are situated on overgrown canalized streams.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: FV

Pressures and threats: In the Alpine Bioregion the most significant pressures include secondary succession (mainly overgrowing by reeds) and grazing. In the Panonnian Bioregion there are changes in the hydrological and abiotic conditions, and secondary succession.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Assessment and notes on the monitoring results: Two methods were chosen for the monitoring of the species. The method of counting the imagoes was used in all localities. The method of collecting exuviae was used for monitoring the species in three localities in the Alpine Bioregion only. This method is significantly more laborious and difficult, but it is less dependent on the actual weather conditions. It resulted in the determination of the population density in the range of 0.6-2.4 exuviae/m of the water course.

According to the field data and their analysis it appears that *Coenagrion ornatum* is in unfavourable-inadequate status in the Panonnian as well as in the Alpine Bioregions. In the Panonnian Bioregion the main risk for its population is the alteration of the water regime, in the Alpine Bioregion it is the overgrowing of localities by reeds. The dynamics of the populations influences their status as well. For example in the locality near Plavecký Peter the number of the individuals declined sharply from year to year, while at the same time new localities were discovered in Poiplie Region. The status of the population on national level seemed to be similar at the first look, but there can be dramatic changes in the particular localities.

The results of the monitoring were partially influenced by subjective and objective factors. The objective ones include extremely rainy weather in 2014 or later beginning of the field monitoring in the year 2013 due to the preparation phase of the monitoring.

Other significant species of dragonflies recorded in the monitored localities include *Orthetrum coerulescens, O. brunneum* or *Cordulegaster bidentata.*


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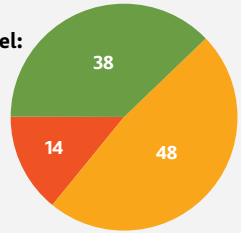
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Cordulegaster heros Theischinger, 1979
(*Odonata, Cordulegastridae*)

In Slovakia it occurs in Záhorie Region, Malé Karpaty Mountains, Považský Inovec Mountains, Revúcka vrchovina Highlands and Stolické vrchy Hills. It inhabits the upper sections of mountain streams with slowly flowing water where the stream bed is formed of sandy sediments.

Number of PMLs: 8 **PML average area size:** 1,660 ha

Number of involved experts: 4 **Number of PML field visits:** 24

The most common accompanying species: *Calopteryx virgo.*

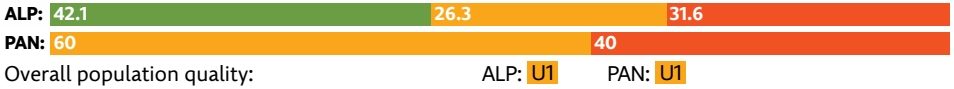
Monitoring method: Two monitoring methods were developed and used: collection of exuviae (three field visits with an interval of approximately 3 weeks in the hatching period) and the capture of larvae (three field visits during the season).

PMLs distribution and localization: PMLs were established in all regions with known occurrences (except the Bratislava Region) as well as in areas where occurrence of the species was expected.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: In the Alpine Bioregion the species is most threatened by forest management, changes in abiotic conditions, by agriculture and surface water pollution. In the Panonnian Bioregion it is threatened by changes in abiotic conditions (drought).


© Ladislav Racko

Assessment and notes on the monitoring results: Two methods were suggested for the monitoring of the species. The method of counting the exuviae should be more reliable in theory, but, for unknown reasons only a minimum number of exuviae were found during the whole period of monitoring. Their number did not correspond to the number of larvae (also larvae in the last instar) in the PMLs. Therefore in most cases monitoring was based on the method of counting the larvae in combination with recording the imagoes. Using this method the number of the individuals could be slightly overestimated (the observed density was 2.4-132 larvae/100 m) because the larvae of young instars were also counted, but some of these die before adulthood.

The evaluation of the estimated size of the population based on field data shows significant increase in comparison with the previous period of reporting, especially in the Alpine Bioregion. The reason is probably mainly the discovery of new localities of the species and the refining of the size of its distribution area in Slovakia as well as the population density in the localities. We can think about the expansion of the species too, but due to the lack of older data, this cannot be evaluated so far.

Cordulegaster heros occupies a special type of habitat where other rare species of dragonflies do not accompany it.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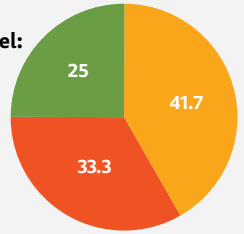
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U2

Overall conservation status on national level: U1



By bioregion:

Gomphus flavipes (Charpentier, 1825)
(*Odonata, Gomphidae*)

Species connected to lowland rivers with sandy and muddy bottoms: Morava, the Danube, Malý Dunaj, Ipeľ, Ondava, Latorica.

Number of PMLs: 15 **PML average area size:** 95.5 ha

Number of involved experts: 3 **Number of PML field visits:** 38

The most common accompanying species: *Calopteryx splendens*, *Ophiogomphus cecilia*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Orthetrum albistylum*, *Anax imperator*, *Libellula depressa*, *Ischnura elegans*.

Monitoring method: The main method is the collection of exuviae (three field visits with an interval of approximately 3 weeks in the hatching period). Due to concern about the safety of the mappers and the difficulty of movement in some of the PMLs an additional method was used: observation of imagoes with an interval of approximately 3 weeks in the period of the imagoes emergence.

PMLs distribution and localization: In all regions with known populations of the species except for the Bratislava Region.

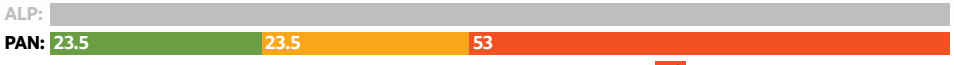
Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals

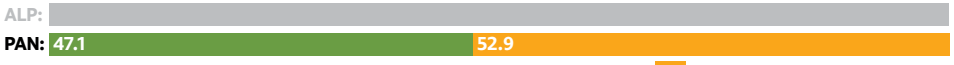
Estimate of the population development trend: ALP: PAN: 0

Population quality in PMLs:



Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most significant factor threatening the habitat for the species is the change in the hydrological conditions. Besides that also a threat from biological processes was identified.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Assessment and notes on the monitoring results: The method of collecting the exuviae had shown good results in Morava and Malý Dunaj Rivers, but in the conditions of Ipeľ, Ondava and Latorica Rivers the involved experts preferred the methods of observing the imagoes or the collection of larvae. The results of these methods are less useful for determination of the populations' size. On the rivers with steep, slippery banks or with very deep water it would be appropriate to carry out the monitoring from boats in the future, this would allow the use of the method of collecting the exuviae in these PMLs.

The monitoring of *Gomphus flavipes* was significantly influenced by subjective as well as objective factors. Mainly in the first year of monitoring, due to the later beginning of the field works, it was not possible to carry out all the planned field visits. The objective factors, that influenced the ongoing monitoring, included the weather and the hydrological conditions. For example in 2014 the summer was rainy and in several localities the exuviae were washed away. During the monitoring other significant species of dragonflies were recorded such as *Ophiogomphus cecilia*.


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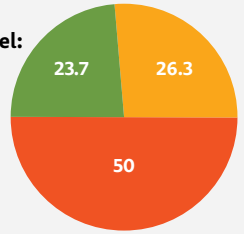
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: U2



By bioregion:

Leucorrhinia pectoralis (Charpentier, 1825)
(*Odonata, Libellulidae*)

Species with a mosaic, discontinuous distribution in Slovakia, the core of the occurrence is in Záhorie Region. It inhabits peatlands in the lowlands and basins with well-developed littoral vegetation and protection from wind by the surrounding trees, as well as other water bodies with similar characteristics.

Number of PMLs: 10 **PML average area size:** 10.6 ha

Number of involved experts: 3 **Number of PML field visits:** 44

The most common accompanying species: *Coenagrion puella, Libellula quadrimaculata, Cordulia aenea, Anax imperator, Brachytron pratense, Coenagrion hastulatum, Libellula depressa, Aeshna juncea, Ischnura elegans, Aeshna isoceles.*

Monitoring method: Two monitoring methods were developed and used: collection of exuviae (three field visits with an interval of approximately 3 weeks in the hatching period) and the counting of imagoes (three field visits with an interval of approximately 3 weeks in the period of imagoes' emergence).

PMLs distribution and localization: PMLs were established in all regions with known localities of the species except the Bratislava Region. Some of the PMLs were established to verify the data on occurrence in the literature.

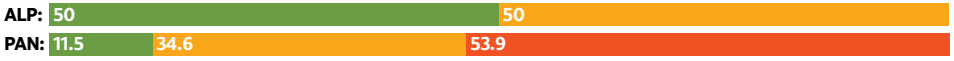
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 500 – 1,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

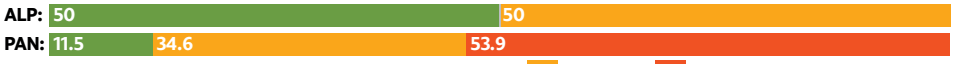
Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U2

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U2

Pressures and threats: In the Alpine Bioregion the most significant factors are abiotic processes (drought), biological processes (vegetation overgrowing, silting) and fishing. In the Panonnian Bioregion there are changes in abiotic conditions, grazing and biological processes.

Assessment and notes on the monitoring results: Two methods were developed for the monitoring of the species. Their use was limited by the safety of mappers because in some of the PMLs it was not possible to access the shore line of a water body and the method of collecting exuviae could not be therefore used. For this reason, the most frequently used method was the observation of imagoes, which provides less precise data. In the future it would be appropriate to consider equipping the mappers with boats.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According to the field data and their analysis it appears that *Leucorrhinia pectoralis* has unfavourable – inadequate conservation status in the Alpine Bioregion and in the Pannonian Region the conservation status is assessed as unfavourable – bad. The results are influenced by the combination of several factors. Firstly, there are objective factors, the summer of 2014 was very rainy and the field work almost could not be done, while the summer of 2015 was extremely dry and some of the localities dried up (e.g. Strážne), but in other localities the populations remained on the same level as in the past. The second factor is the selection of PMLs, when some localities were included in the monitoring in order to verify the presence of a population of the species. However the result was negative in several PMLs (e.g. Klinské rašelinisko peatbog), which has influenced the results of the overall evaluation of the species' status.

In general it can be assumed that the status of this species will be significantly influenced by its population dynamics. In "bad" years the population in the affected localities may become extinct (dry-up of the location), however if the habitats are restored in the following years, and if in the surrounding areas there are source populations, the probability of recolonisation is quite high.


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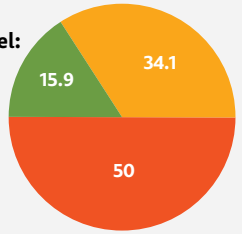
In the monitored localities some other significant species of dragonflies were recorded, such as *Brachytron pratense, Coenagrion hastulatum, Leucorrhinia dubia* or *L. rubicunda.*

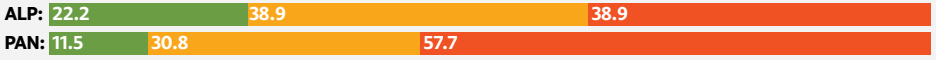
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: **U2**



By bioregion:



Ophiogomphus cecilia (Fourcroy, 1785)
(*Odonata, Gomphidae*)

Species of submontane rivers with a sandy bottom: Morava, Rudava, Danube near Bratislava, Turiec, Ipeľ, Ondava.

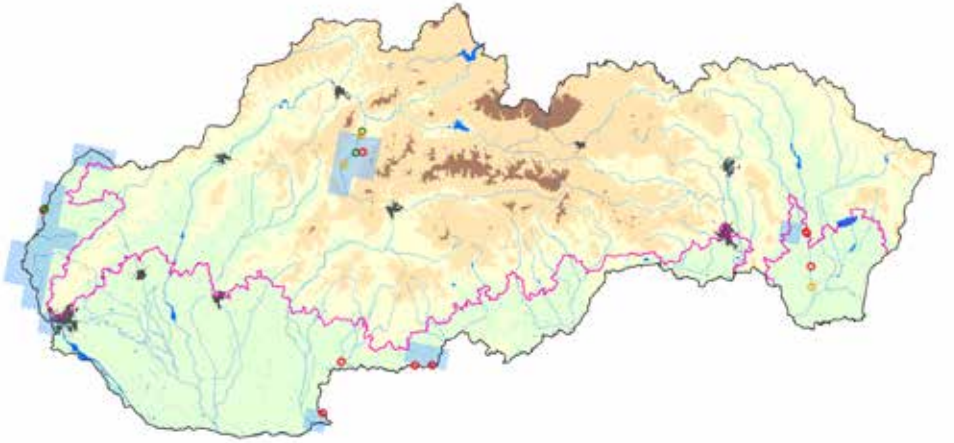
Number of PMLs: 15 **PML average area size:** 58.4 ha

Number of involved experts: 4 **Number of PML field visits:** 46

The most common accompanying species: *Calopteryx splendens*, *Calopteryx virgo*, *Platycnemis pennipes*, *Gomphus flavipes*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Orthetrum albistylum*, *Libellula depressa*, *Aeshna grandis*.

Monitoring method: The main method was the collection of exuviae (three field visits with an interval of approximately 3 weeks in the hatching period). Considering the safety of the mappers and the difficulty of movement in some of the PMLs an additional method for the observation of imagoes was uses with an interval of approximately 3 weeks in the period of the imagoes emergence.

PMLs distribution and localization: In all regions with known populations of the species except of the Bratislava Region.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most significant negative factors in the Alpine Bioregion include urbanisation and settlements. The most frequently recorded pressure, but with low intensity, was surface water pollution produced by agriculture, forestry, waste etc. In the Panonnian Bioregion the most significant pressures include changes in the hydrological conditions – dams, dredging of river sediments, small hydropower plants etc. Surface water pollution was recorded too.

Assessment and notes on the monitoring results: The main method (counting of exuviae) proved to be very suitable for Turiec River where it was possible to record approximately 80 % of the local population. It was equally successfully used on Morava River. In the conditions of Ipeľ, Ondava and Latorica Rivers the involved mappers preferred the method of observing the imagoes or the collection of the larvae. The results of these methods are less useful for determination of the populations' size. On the rivers with steep, slippery banks or with very deep water it would be appropriate in the future to carry out the monitoring by using of boats, which would allow the use of the method of collecting the exuviae in these PMLs as well.

The population of *Ophiogomphus cecilia* shows significant fluctuations in the abundance at least in some localities (Turiec Region). The maximum abundance of individuals was 5-6 times higher than the minimum. The reasons may include the natural fluctuation in numbers (the differences between the particular cohorts) and the drift (the decrease of the abundance in the upper section and the parallel increase in the middle and lower sections of the water course). The determination of reasons for this and of the fact if this is a rare or common phenomenon in this population, but also in other populations, will require further surveys.


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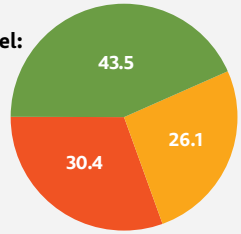
The results of monitoring were influenced by subjective as well as objective factors. The objective ones include weather that was extremely unfavourable in 2014 (rainy summer with a high probability of washing away the exuviae).

Other significant species of dragonflies were also recorded in the monitored localities, such as *Gomphus flavipes* or *Onychogomphus forcipatus*. Their occurrence is linked to the diversity of the habitats, because these species inhabit another type of river bottom than *Ophiogomphus cecilia*.

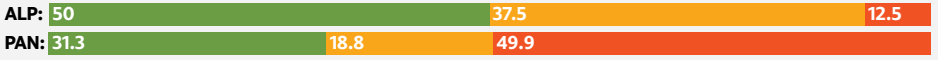
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:



Sympecma paedisca (Brauer, 1877)
(*Odonata, Lestidae*)

There are only two records of the species in Slovakia – in Slovenský kras (Slovak Karst) and Podtatranská kotlina Basin. Probably in both cases it was an accidental occurrence of the species, the population has not been discovered yet.

Number of PMLs: 3 **PML average area size:** 7.8 ha

Number of involved experts: 2 **Number of PML field visits:** 9

The most common accompanying species: *Sympecma fusca, Ischnura elegans, Cordulia aenea, Coenagrion puella, Erythromma najas, Enallagma cyathigerum, Libellula quadrimaculata, Pyrrhosoma nymphula, Epitheca bimaculata, Anax imperator.*

Monitoring method: The search for the populations of the species (in case of their discovery the monitoring method will be the counting of imagoes).

PMLs distribution and localization: The localities where the species was recorded in the past.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 0 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: × PAN:

Population quality in PMLs:

Overall population quality: ALP: U2 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The negative factors (influencing the habitat) include species invasions, human-induced changes in the habitats, grazing, changes in the abiotic conditions (dry-up) and biological processes (overgrowing). Mowing has a positive impact.

Assessment and notes on the monitoring results: Considering the time and space interval of the published records of the species and the negative result of the monitoring it is likely that *S. paedisca* has no reproducing population in Slovakia. The existing data on the presence of this species likely represent an accidental element of our fauna – flown-in or wind-blown individuals. However, *Sympecma paedisca* could be part of our fauna; therefore the future monitoring should be carried out extensively with the aim to find its populations.

Other significant species of dragonflies were recorded in the monitored localities, such as *Sympecma fusca* or *Epitheca bimaculata*.

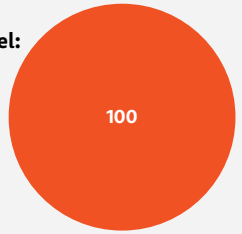
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN:

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Isophya stysi Čejchan, 1957 (*Orthoptera, Tettigoniidae*)

Carpathian endemic species with the core of its distribution in the Eastern Carpathians, mainly in Romania, Ukraine and Slovakia, but also marginally in the south-east of Hungary and south-east of Poland. It could be relatively easily confused with related species of the genus *Isophya* (e.g. *I. posthumoidalis*, *I. kraussii, I. pienensis*), with which it can occur in the same localities (e.g. Východné Karpaty Mountains, Vihorlat Mountains, Zemplínske vrchy and Slanské vrchy Hills).

Number of PMLs: 16 **PML average area size:** 32.5 ha

Number of involved experts: 4 **Number of PML field visits:** 29

The most common accompanying species: *Leptophyes albovittata, Euthystira brachyptera, Phaneroptera falcata, Chorthippus parallelus, Decticus verrucivorus, Pholidoptera griseoaptera, Oecanthus pellucens, Stenobothrus lineatus, Chorthippus biguttulus, Chorthippus brunneus.*

Monitoring method: Sweeping of shrubs and herbaceous vegetation, individual collection (especially males because females are hardly distinguishable from related species) on the edge of forests on shrubs and herbs using a sweeping net, on transects usually in the period from 15th of June (less than 500 m above sea level) to 15th of August (more than 500 m above sea level).

PMLs distribution and localization: In Slovakia it is a species of European importance with probably the most extensive range and the largest known number of localities and PMLs, unlike, e.g. the species *Stenobothrus eurasius* with low population density. It occurs

only in the east of the country from the lowlands to the zone of submontane and montane forests. It is typical species of high herbs and bushy stands on the edges of old beech and oak forests, old orchards, forest clearings and meadows.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 100,000 imagoes
Estimate of the population size in the Pannonian Bioregion: 5,000 – 20,000 imagoes
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include insensitive forest management in the localities and secondary succession driven by abandonment of grazing and mowing in the localities.

Assessment and notes on the monitoring results: Despite the relatively large number of known localities, in most of them the quality of the habitat and species population is inadequate with low abundance. In order to maintain a stable population of the species, the most important localities are, in the Pannonian Bioregion, the edges of light oak and riparian forests (Zemplínske vrchy Mountains, Kolibabovce) and, in the Alpine Bioregion, the light beech and mixed forests and their edges, e.g. PMLs in Východné Karpaty Mountains, Laborecká vrchovina Highland, Vihorlat Mountains and Slanské vrchy Hills. To support the preservation of the populations it is advisable to maintain sensitive forest management, especially on the edges of forest, and periodic mowing and grazing of forest meadows to prevent secondary succession of forest.

In the monitored localities some other species of orthopterans of European importance were recorded, e.g. *Pholidoptera transsylvanica, Odontopodisma rubripes* (Vihorlat Mountains),then e.g. East-Carpathian species *Poecilimon schmidti, Leptophyes discoidalis* (Vihorlat Mountains, Laborecká vrchovina Highland), Ponto-Mediterranean species, such as *Ephippiger ephippiger, Isophya modesta, Poecilimon fussi* (Zemplínske vrchy Mountains) as well as montane species such as *Metrioptera brachyptera, Pseudopodisma nagyi, Omocestus viridulus* (Slanské vrchy Hills, Vihorlat Mountains).

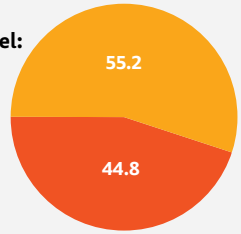
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U1

Conservation status in SCIs: U2

Overall conservation status on national level: U1



By bioregion:

Odontopodisma rubripes Ramme, 1931 (*Orthoptera, Acrididae*)

Carpathian endemic species with the core of its distribution in the Eastern and Southern Carpathians. It occurs mainly in the northern and central parts of Romania, in the Carpathian and the Sub-Carpathian parts of Ukraine, in Slovakia and Hungary on the easternmost edge of the territory only. It is relatively easily confused with related species *Odontopodisma decipiens*, which, however occurs only in one isolated population in Malé Karpaty Mountains. It is also similar to the species of the genuses *Miramella* and *Pseudopodisma*, but their habitats do not overlap.

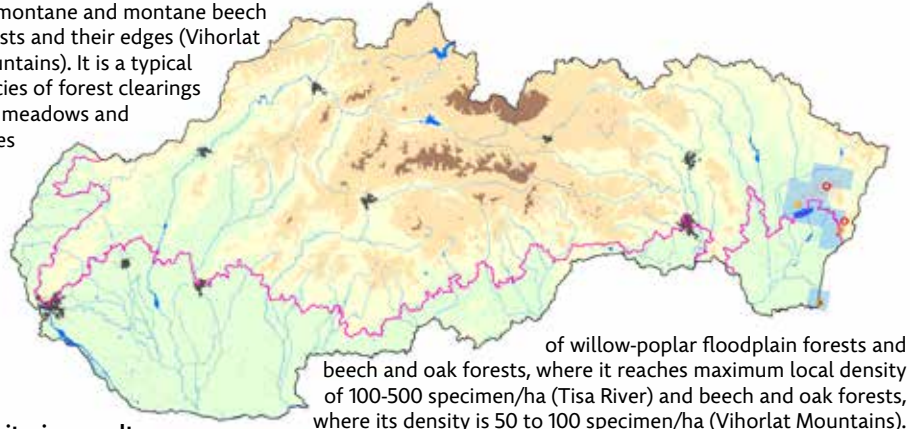
Number of PMLs: 5 **PML average area size:** 15.3 ha

Number of involved experts: 2 **Number of PML field visits:** 10

The most common accompanying species: *Leptophyes albovittata, Chorthippus parallelus, Oecanthus pellucens, Phaneroptera falcata, Ruspolia nitidula, Chorthippus biguttulus, Chrysochraon dispar, Conocephalus fuscus, Euthystira brachyptera, Pholidoptera griseoaptera.*

Monitoring method: Sweeping with a net on bushy stands (mainly *Rubus* spp.) on forest meadows and forest edges especially in the period from 15th of June (less than 400 m above the sea level) to 30th of August (more than 400 m above the sea level).

PMLs distribution and localization: In Slovakia it occurs only in the eastern part of the country, from the lowland floodplain forests and their edges (Tisa, Východoslovenská nížina Lowland) to the zone of submontane and montane beech forests and their edges (Vihorlat Mountains). It is a typical species of forest clearings and meadows and edges

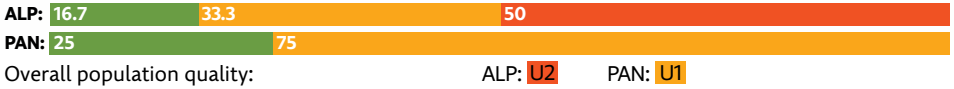


of willow-poplar floodplain forests and beech and oak forests, where it reaches maximum local density of 100-500 specimen/ha (Tisa River) and beech and oak forests, where its density is 50 to 100 specimen/ha (Vihorlat Mountains).

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 imagoes
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 imagoes
Estimate of the population development trend: ALP: 0 PAN: 0

<u>Population quality in PMLs:</u>



Overall population quality: ALP: U2 PAN: U1

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: U1 PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include insensitive management of forest and its edges, overgrowing of the localities (due to abandonment of grazing and mowing), construction of forest roads and ruderalisation of localities in lower altitudes.

Assessment and notes on the monitoring results: In Slovakia the species occurs on the north-eastern border of its range, and in the far east of the country only. In most localities, the habitat quality and the species populations are in inadequate or bad conservation status. The quality of the population in the Pannonian Bioregion is still inadequate, while in the Alpine Bioregion it was evaluated already as being in a bad conservation status. The localities along the Tisa River are significantly isolated from the populations in Vihorlat Mountains. In order to maintain a stable population of the species, the most important localities in the Pannonian Bioregion are the light floodplain willow-poplar forests and their edges near the Tisa River, and in the Alpine Bioregion the well-lit beech and oak forests and their edges covered with tall-herb vegetation (the species prefers the growths of *Rubus* sp.) are most important, e.g. all PMLs in Vihorlat Mountains. To support the preservation of the populations we can recommend extensive forest management and periodic mowing and extensive grazing of light forests and their edges.

In the monitored localities also other species of orthopterans of European importance were recorded, such as: *Isophya stysi* and *Pholidoptera transsylvanica* (Vihorlat Mountains). It is worth to mention also the east-Carpathian species *Poecilimon schmidti, Leptophyes discoidalis* (Tisa, Vihorlat Mountains, Priekopa), Ponto-Mediterranean species *Ephippiger ephippiger, Ruspolia nitidula, Euchorthippus declivus* and *Aiolopus thalassinus,* as well as mountain species *Metrioptera brachyptera* and *Omocestus viridulus* (Vihorlat Mountains).

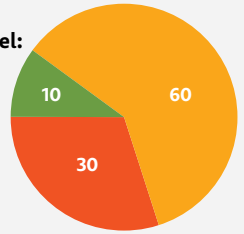
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U1

Conservation status in SCIs: U2

Overall conservation status on national level: **U1**



By bioregion:

Paracaloptenus caloptenoides (Brunner von Wattenwyl, 1861) (*Orthoptera, Acrididae, Catantopinae*)

It is a south-eastern European species of Ponto-Mediterranean origin, with the core of its distribution in the Balkans. In Slovakia, Austria and Hungary it lives in small, isolated populations. It is easily confused with the nymphs of *Calliptamus italicus*, with which it occurs regularly in common localities. It is probably the reason why this species has not been noticed earlier.

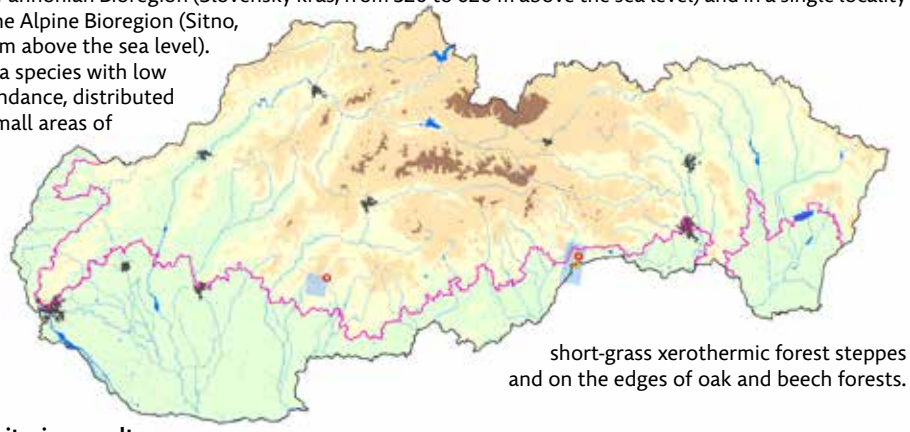
Number of PMLs: 4 **PML average area size:** 3.7 ha

Number of involved experts: 1 **Number of PML field visits:** 21

The most common accompanying species: *Chorthippus brunneus, Metrioptera bicolor, Decticus verrucivorus, Stenobothrus crassipes, Stenobothrus lineatus, Leptophyes albovittata, Omocestus haemorrhoidalis, Pholidoptera fallax, Euthystira brachyptera, Oecanthus pellucens*.

Monitoring method: Visual registration of nymphs and imagoes, as well as sweeping with nets on xerothermic forest steppes and forest meadows and on the edges of forests, on transects preferably in the period from 15th of June to 30th of July, exceptionally till 31st of August.

PMLs distribution and localization: Its occurrence in the territory of Slovakia was recorded only in 2004, probably due to the increased efficiency of mapping. Currently, it is known only in 3 localities in the Pannonian Bioregion (Slovenský kras, from 520 to 620 m above the sea level) and in a single locality in the Alpine Bioregion (Sitno, 610 m above the sea level). It is a species with low abundance, distributed in small areas of short-grass xerothermic forest steppes and on the edges of oak and beech forests.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 30 – 100 imagoes
Estimate of the population size in the Pannonian Bioregion: 100 – 500 imagoes
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U2 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U2 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include land abandonment, with consequent lack of mowing and grazing followed by secondary succession of vegetation on the localities. The isolation of some small local populations is a serious threat too, especially in the Alpine Bioregion.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Assessment and notes on the monitoring results: Considering the fact that the only occurrence of this species in the Alpine Bioregion is one very small and isolated locality with a small population size its conservations status is bad. Even in the three known localities in the Pannonian Bioregion the quality of the habitat and of the population is mainly unfavourable. In order to maintain a stable population of the species, the most important localities are in the Pannonian Bioregion – xerothermic forest steppes on grike limestone fields and karst sink holes in the warmest parts of Silická planina Plain in Slovenský kras. To support the preservation of the populations and the quality of open short-stalk grassland habitats it is necessary to maintain extensive grazing without sheep folds in the localities and in their close proximity. In case of more intensive overgrowing with shrubs and trees and when abandoning the management, periodic removal of such secondary succession vegetation is necessary.


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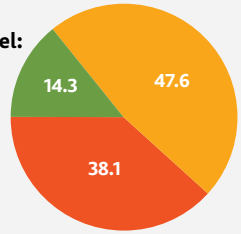
In the monitored localities some other rare and zoogeographically significant species of orthopterans were recorded, e.g. Ponto-Mediterranean species *Ephippiger ephippiger Melanogryllus desertus, Calliptamus italicus, Stenobothrus crassipes, Euchorthippus declivus* (Sitno), as well as mountain species *Metrioptera brachyptera, Psophus stridulus* (Slovenský kras).

Overall assessment of the conservation status of species

Con. status of species: ALP: U2 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1

Conservation status on national level:



By bioregion:

Pholidoptera transsylvanica (Fischer, 1853)
(*Orthoptera, Tettigoniidae*)

Carpathian endemic species with the core of its distribution in the Eastern Carpathians, mainly in Romania, Ukraine and Slovakia, but also marginally in Hungary and Serbia. It is relatively easily confused with related species *Pholidoptera aptera*, with which it can rarely occur in the same region (e.g. Slovenský kras, Slovenský raj).

Number of PMLs: 15 **PML average area size:** 15.8 ha

Number of involved experts: 4 **Number of PML field visits:** 21

The most common accompanying species: *Tettigonia cantans*, *Decticus verrucivorus*, *Pholidoptera griseoaptera*, *Phanetoptera falcata*, *Leptophyes albovittata*, *Chorthippus apricarius*, *Ch. biguttulus*, *Ch. parallelus*, *Euthystira brachyptera*, *Omocestus viridulus*.

Monitoring method: Visual registration of nymph and imagoes, with additional sweeping with net and acoustic monitoring of males on forest meadows and edges, on transects especially in the period from 15th of June (less than 400 m above the sea level) to 30th of August (more than 400 m above the sea level). In warm years the monitoring should be carried out mainly in June and July.

PMLs distribution and localization: In the territory of Slovakia it occurs only in the east of the country, from the lowland forests to the zone of submontane and montane forests. It occurs in fragments in the localities on the Ukrainian border (Vihorlatské vrchy Mountains) in the east to the mountain meadows in the beech forests of Čergov Mountains in the north, on meadows in mixed spruce forests in Slovenský raj Mountains in the west

and on meadows in oak and mixed forests of Slovenský kras in the south. It is a typical species of forest clearings and meadows and the edges of old beech and oak forests with maximum local density of 50 to 100 males/ha (Bubeník, Inovce).

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 imagoes
Estimate of the population size in the Pannonian Bioregion: 1,000 – 10,000 imagoes
Estimate of the population development trend: ALP: 0 PAN: 0

<u>Population quality in PMLs:</u>

Overall population quality: ALP: U2 PAN: U1

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: U1 PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include insensitive forest management (42 %), construction of recreational facilities and ski lifts in the localities and secondary succession of localities with abandoned grazing and mowing.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Assessment and notes on the monitoring results: In most of the localities in the Pannonian Bioregion the quality of the habitat and population of the species is favourable; in a smaller portion it is unfavourable – inadequate. In the localities in the Alpine Bioregion the status of the population is evaluated as inadequate or even bad, which may be due to methodological reasons. From the experience of monitoring, it will probably be necessary to carry out visits to PMLs in this region at earlier dates. The localities where the species was not registered were the PML Pusté pole in Slanské vrchy Hills (probably due to a late date of the field visit) and Stinská – Zboj (probably due to the low abundance or extinction of the population). In order to maintain a stable population of the species, the most important localities are, in the Pannonian Bioregion, light oak forests and forest meadows in Silická planina Plain in Slovenský kras, and in the Alpine Bioregion, meadows in beech and mixed forests, e.g. in Vihorlat Mountains, Slanské vrchy Hills, Čergov Mountains and Slovenský raj Mountains. To support the preservation of the populations we can recommend extensive forest management and extensive mowing and grazing of forest meadows.

In the monitored localities other species of orthopterans of European importance were also recorded, such as the species *Isophya stysi* and *Odontopodisma rubripes;* the Eastern Carpathians species *Poecilimon schmidti* and *Leptophyes discoidalis* (Vihorlat Mountains); Ponto-Mediterranean species such as *Pachytrachis gracilis* and *Ephippiger ephippiger* (Slovenský kras) as well as mountain species such as *Metrioptera brachyptera, Pseudopodisma nagyi* and *Psophus stridulus* (Čergov Mountains, Slovenský kras, Slovenský raj Mountains).


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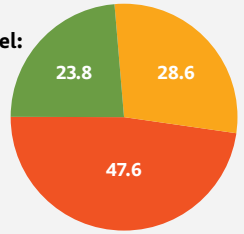
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Saga pedo (Pallas, 1771) (*Orthoptera, Tettigoniidae*)

One of the largest insect species (12 cm) in Central Europe. It's unmistakable, but variable in colouration (yellow-brown to green). It is a predatory species that consumes mainly other species of orthopterans. Its distribution is of Paleo-Aegean origin, in Slovakia and Moravia it occurs on the northern boundary of its range in Europe, the core of its distribution is in the Mediterranean and in the Balkans.

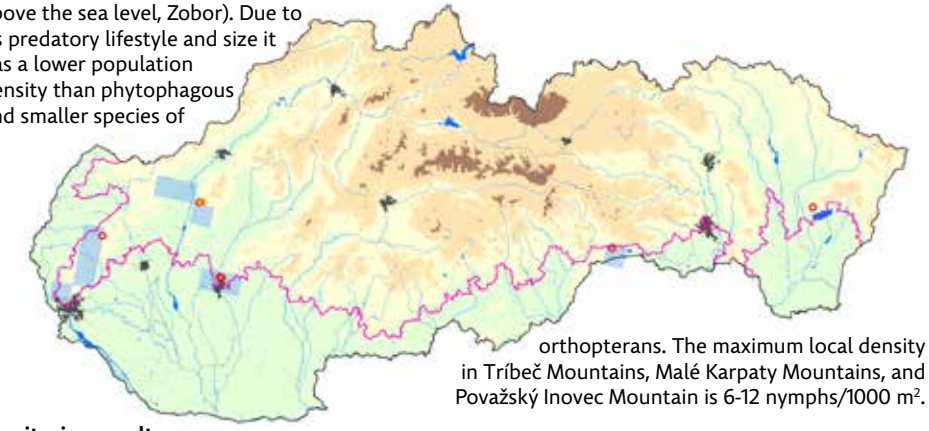
Number of PMLs: 7 **PML average area size:** 7.2 ha

Number of involved experts: 2 **Number of PML field visits:** 23

The most common accompanying species: *Leptophyes albovittata, Platycleis grisea, Pholidoptera griseoaptera, Calliptamus italicus, Oedipoda caerulescens, Decticus verrucivorus, Euthystira brachyptera, Stenobothrus lineatus, Metrioptera bicolor.*

Monitoring method: Sweeping with a net in transects with parallel visual registration of nymphs and imagoes, in xerothermic forest steppes and on the edge of forests, primarily in the period from 20th of May (nymphs) to 30th of August (imagoes).

PMLs distribution and localization: In the territory of Slovakia, at the present time it occurs discontinuously in about twenty, mostly isolated localities, in xerothermic forest steppes and on the edges of oak and beech forests. It prefers westerly and south-westerly oriented hillsides, especially between 400 and 500 m above the sea level (lowest at 220 m above sea level, Bahorec, Tríbeč Mountains, highest 585 m above the sea level, Zobor). Due to its predatory lifestyle and size it has a lower population density than phytophagous and smaller species of orthopterans. The maximum local density in Tríbeč Mountains, Malé Karpaty Mountains, and Považský Inovec Mountain is 6-12 nymphs/1000 m².



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 500 – 1,000 imagoes
Estimate of the population size in the Pannonian Bioregion: 0 – 100 imagoes
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U2

Pressures and threats: The most common pressures and threats of high or moderate intensity include changes in the structure and management of forest steppes, meadows and pastures, abandonment of grazing and mowing and subsequent overgrowing by trees and in some place also intensive hiking (Zoborská lesostep, Viniansky hradný vrch Peak).

Assessment and notes on the monitoring results: In most of the localities the quality of the habitat and so of the population is inadequate or bad. The localities where the species was not registered at all, are PMLs Viniansky hradný vrch Peak and Hrušovská lesostep (all sites with historical records), this was probably due to the low abundance or extinction of the population. The population quality is bad in both bioregions based on the current surveillance. In order to maintain a stable population of the species, the most important localities are, in the Alpine Bioregion, xerothermic forest steppes in oak and beech forests and their edges, e.g. in PMLs in Malé Karpaty Mountains, in Tríbeč Mountain and Považský Inovec Mountains. To support the preservation of the populations we can recommend periodic grazing of forest steppes to avoid them being overgrown (Viniansky hradný vrch Peak, Slovenský kras), as well as sound forest management after the growing season.

In the monitored localities some other species of orthopterans of European importance were recorded, e.g. *Stenobothrus eurasius,* furthermore the Ponto-Mediterranean species *Ephippiger ephippiger, Phaneroptera nana, Euchorthippus declivus* and *Stenobothrus crassipes* as well as mountain species such as *Metrioptera brachyptera, Pseudopodisma nagyi* and *Psophus stridulus*. In the localities in the Slovenský kras the endemic species *Isophya beybienkoi* was also recorded.

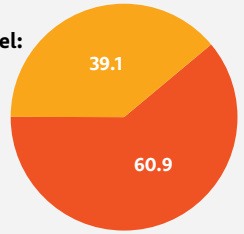
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Stenobothrus eurasius Zubowski, 1898 (*Orthoptera, Acrididae*)

It is the only long-winged species of Orthoptera of European importance present in the territory of Slovakia. It has a European and Siberian type, Angarsk origin, of distribution. In the north-west part of its range, i.e. in the Czech Republic, Slovakia, Austria and Hungary lives in isolated populations. It is easily confused with similar species of the *Stenobothrus* genus with long wings (*S. lineatus, S. Fischer, S. nigromaculatus*) with which it can also occur in the same localities.

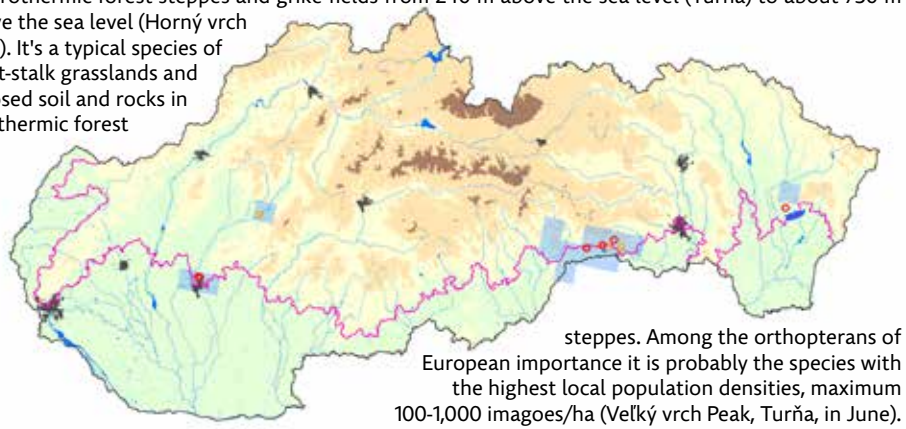
Number of PMLs: 9 **PML average area size:** 13.8 ha

Number of involved experts: 3 **Number of PML field visits:** 30

The most common accompanying species: *Stenobothrus lineatus*, *Leptophyes albovittata*, *Chorthippus brunneus*, *Euthystira brachyptera*, *Metrioptera bicolor*, *Oedipoda caerulescens*, *Decticus verrucivorus*, *Platycleis grisea*, *Oecanthus pellucens.*

Monitoring method: Sweeping with a net in xerothermic forest steppes and visual and acoustic registration of individuals on transects, especially in the period from 15th of June to 30th of July.

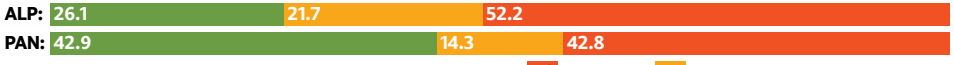
PMLs distribution and localization: In the territory of Slovakia it most coherently occurs in Slovenský kras (especially Zádielska planina Plain and Hrhovská planina Plain) only and elsewhere in isolated populations (Veľký vrch Peak near Partizánske, Viniansky hradný vrch Peak, Zobor Mountain). It occurs in xerothermic forest steppes and grike fields from 240 m above the sea level (Turňa) to about 750 m above the sea level (Horný vrch Peak). It's a typical species of short-stalk grasslands and exposed soil and rocks in xerothermic forest steppes. Among the orthopterans of European importance it is probably the species with the highest local population densities, maximum 100-1,000 imagoes/ha (Veľký vrch Peak, Turňa, in June).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 100,000 imagoes
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 imagoes
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:



Overall population quality: ALP: U2 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats of high or moderate intensity include land abandonment, lack of mowing and grazing and subsequent overgrowing of vegetation on localities. The isolation of some local populations is a serious threat too (Viniansky hradný vrch Peak, Veľký vrch Peak) and the overgrowing of localities by forest could lead to deterioration of populations of this heliophilous species.

Assessment and notes on the monitoring results: Since the species is found mostly in isolated localities, the quality of the habitat and of the population is mostly inadequate or even bad. The species may be abundant in suitable localities, but despite this the fragmented populations are threatened by isolation. In order to maintain a stable population of the species, the most important localities are xerothermic steppes on limestone grike fields in the warmest parts of Zádielská planina Plain and Hrhovská planina Plain of Slovenský kras and on Veľký vrch Peak near Partizánske. To support the preservation of the populations and preserve the quality of open short-stalk grassland habitats it is necessary to maintain extensively grazing in localities so at least the localities between Zádiel and Hrušovská lesostep are connected. In case of more intense overgrowing with shrubs and trees after abandoning the management, periodic removal of such secondary vegetation is necessary.

In the monitored localities some other rare and zoogeographically significant species of orthopterans were recorded, e.g. the endemic species *Isophya beybienkoi* (Zádielsky kras Karst and Hrhovský kras Karst), the species of European significance *Saga pedo* (Zobor Mountain), *Isophya stysi* (Vinné), Ponto-Mediterranean species *Ephippiger ephippiger, Phaneroptera nana, Calliptamus italicus, Stenobothrus crassipes, Stenobothrus nigromaculatus* and *Euchorthippus declivus* (Zobor Mountain, Veľký vrch Peak) as well as some mountain species such as *Metrioptera brachyptera, Pholidoptera fallax, Arcyptera fusca* and *Psophus stridulus* (Slovenský kras).

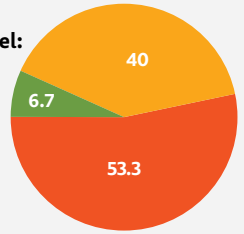
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U1

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Astacus astacus (Linnaeus, 1758)
(*Decapoda*, *Astacidae*)

Astacus astacus inhabits a wide range of habitats, including flowing and standing waters. In general it is regarded to be an indicator of good water quality and especially of good morphological and structural status of water bodies.

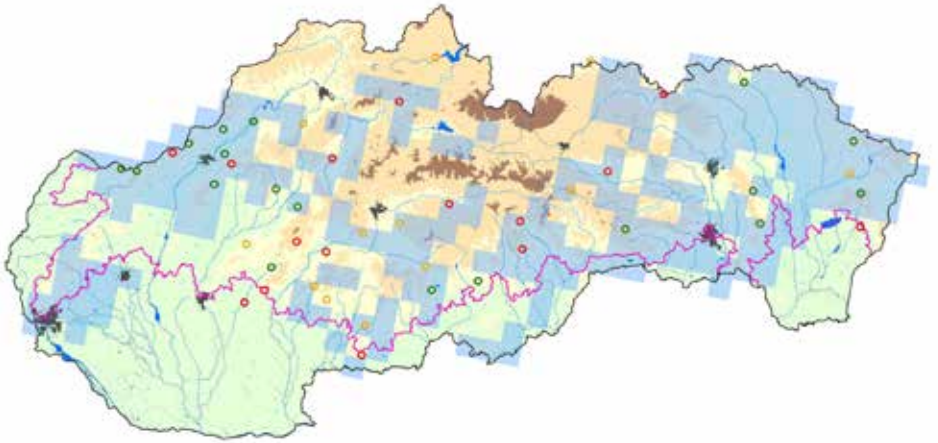
Number of PMLs: 45 **PML average area size:** 763 ha

Number of involved experts: 5 **Number of PML field visits:** 118

The most common accompanying species: *Lutra lutra*, *Castor fiber*, *Natrix tessellata*, *Natrix natrix*.

Monitoring method: Manual searching of potential hiding places (stones or other objects on the stream bottom), catching using aquatic net, catching using a free bait or bait traps once a year from April to October. The particular method or combination of methods is chosen according to the type of habitat.

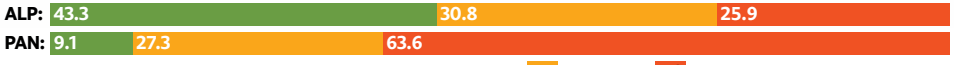
PMLs distribution and localization: PMLs are distributed scattered almost over the whole territory of Slovakia. Flowing waters range from smaller montane and submontane streams to submontane rivers as well as standing waters mostly in the form of artificial reservoirs.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 20,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: × PAN: –

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: U1

Pressures and threats: During the monitoring of *Astacus astacus* the most frequently recorded pressures and threats included surface water pollution and human-induced changes in the hydrological conditions (both types about 30 % in Alpine Bioregion, pollution up to 50 % in Pannonian Bioregion). Less common pressures and threats included activities related to forestry. Among the impacts that were not directly evaluated during the monitoring, a significant predation of the species by otters can be mentioned.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Assessment and notes on the monitoring results: Despite the recorded unfavourable – inadequate – bad population quality of *Astacus astacus* the habitat quality and the future prospects were evaluated as favourable in general. This result is most likely caused by the fact that during the monitoring in the field it is not always possible to sufficiently record the whole range of negative impacts and threats (mainly the various forms of pollution). Because of this habitats which seem to be visually good for the species presence (hydromorphology of the habitat in terms of number and the quality of possible micro habitats etc.) were described as favourable, even though the recorded absence or low abundance of the crayfish may be caused by other factors. For some habitats it was not possible to predict the circumstances, which deteriorate the status.

The population quality was favourable in approximately 43 % of PMLs in the Alpine Bioregion. These were mainly the localities on smaller water courses of a lower altitude with greater substrate diversity (rocks, stones, tree roots on the banks). In general, it is known, that the abundance of the crayfish is closely related to diversity of substrate and sufficiency of hiding places. Anyhow, the estimates of the population quality are really only rough estimates because they are based on one visit per year and locality only and the success of monitoring is thus influenced by a lot of factors, such as current hydrological conditions, season of the year, specific timing of the monitoring during the day etc. It will be possible to obtain a more reliable picture on the status of the populations in the monitored PMLs over a longer period of monitoring and additional corrections and modification in the monitoring methodology. The monitoring period should be limited to May – first half of September. In other times of the year the results of the monitoring may be greatly influenced by natural inactivity of *Astacus astacus*.


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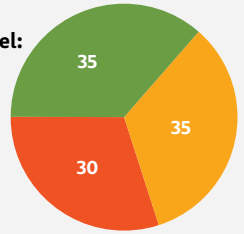
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

*Austropotamobius torrentium (Schrank, 1803)
(Decapoda, Astacidae)

Austropotamobius torrentium is the smallest crayfish present in the territory of Slovakia. The typical places for its occurrence are the submontane and montane streams with a rocky bottom. In Slovakia, its occurrence is documented in the streams of the Malé Karpaty Mountains. It is a priority species of Community interest.

Number of PMLs: 3 **PML average area size:** 87.8 ha

Number of involved experts: 1 **Number of PML field visits:** 6

The most common accompanying species: *Gammarus fossarum*, *Cordulegaster heros*, *Cottus gobio*, *Lutra lutra*.

Monitoring method: Manual searching of potential hiding places (stones, dead wood, submerged tree roots etc.) and catching using aquathic net.

PMLs distribution and localization: PMLs are localised in the southern part of the Malé Karpaty Mountains.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 2,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: 0 PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN:

Pressures and threats: The monitored populations of *Austropotamobius terrentium* are not directly threatened, or no threatening factors were documented, human impacts are low in the locations.

Assessment and notes on the monitoring results: The largest and most stable population lives in the Vydrica Stream, which is a Site of Community Importance. The habitat quality in the monitored localities is favourable. The potential limiting factor is a sufficiency of suitable hiding places, especially larger stones and submerged tree roots. The preserved morphological and structural features of the monitored localities and the original hydrological regime are the reasons of the current good status of the populations and together with the low anthropic impact they provide favourable future prospects. The unregulated nature of streams with plenty of hiding places and good water quality are essential for the maintenance of stable population of this species.

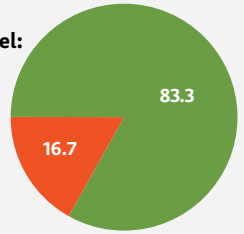
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Eudontomyzon danfordi Regan, 1911
(*Cephalaspidomorphi*, *Petromyzontidae*)

In the territory of Slovakia *Eudontomyzon danfordi* occurs in montane and sub-montane streams and smaller rivers. The larvae stay in the fine detrital sediments of the bed, that develop in the locations with a weaker current.

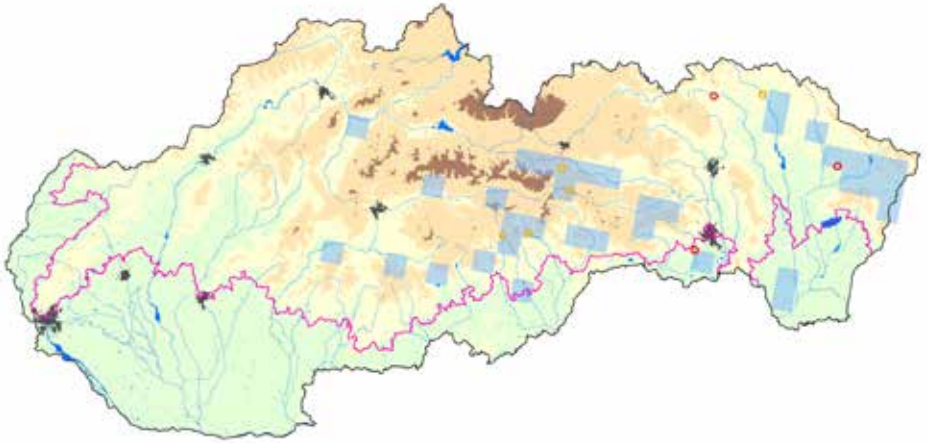
Number of PMLs: 8 **PML average area size:** 1,854 m²

Number of involved experts: 3 **Number of PML field visits:** 16

The most common accompanying species: *Salmo trutta morpha fario*, *Phoxinus phoxinus*, *Barbus meridionalis*, *Barbatula barbatula*, *Alburnoides bipunctatus*, *Leuciscus cephalus*, *Gobio gobio*, *Cottus poecilopus*, *Chondrostoma nasus*, *Thymallus thymallus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using method an electro-fishing device in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: In the sub-montane zone of mostly smaller or mid-sized water courses in the Alpine Bioregion, in the Pannonian Bioregion it only occurs in the eastern part of Slovakia. It occurs in the upper sections of rivers in the central and northern parts of Slovakia, e.g. Váh, Hron, Slaná, Štítnik, Muráň, Zdychava, Laborec, Hornád, Hnilec, Bodva, Ida, Ulička, Ublianka, Íľovnica.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 20 %, PAN 100 %) and surface water pollution (ALP 60 %).

Assessment and notes on the monitoring results: In most of the locations in the Alpine Bioregion the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of water-courses, barriers interrupting the continuity of water-courses and pollution. In the sampling of *Eudontomyzon danfordi* a powerful electro-fishing device with sufficient effectiveness should be used. In contrast to fish sampling, in the case of *Eudontomyzon danfordi* it is necessary to keep the anode active at least for 10 seconds until the individuals emerge from the sediment. Based on the monitoring results, the average number of the population of *Eudontomyzon danfordi* is approximately 8 individuals per 100 m of the water-course. It has to be taken into account that the spatial distribution of the species is often concentrated in clusters and is not regular along the length of the watercourse. In the Alpine Bioregion the habitats are threatened by hydromorphological changes resulting from the regulation of water-courses, and mainly by the construction of small hydroelectric power plants that, at the present, are the greatest threat for fish communities in both biogeographic regions. These small hydro-electric power plants change the characteristics of the water streams. It is associated with the loss of riffle habitats and in case of *Eudontomyzon danfordi* also with the loss of the fine-sedimentary substrate that is very important for their reproduction and therefore for the survival of their populations too. In smaller water courses the species may be threatened by climatic change that may cause a significant reduction of flow as well as swift fluctuations in their water-level.

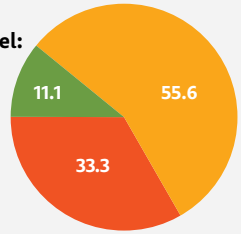
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Eudontomyzon mariae (Berg, 1931)
(*Cephalaspidomorphi*, *Petromyzontidae*)

In the territory of Slovakia *Eudontomyzon mariae* occurs in montane and sub-montane streams and smaller rivers where it prefers a strong current and hard bottom. The larvae stay in sandy and detrital sediments of the riverbed that develop in locations with a weaker current.

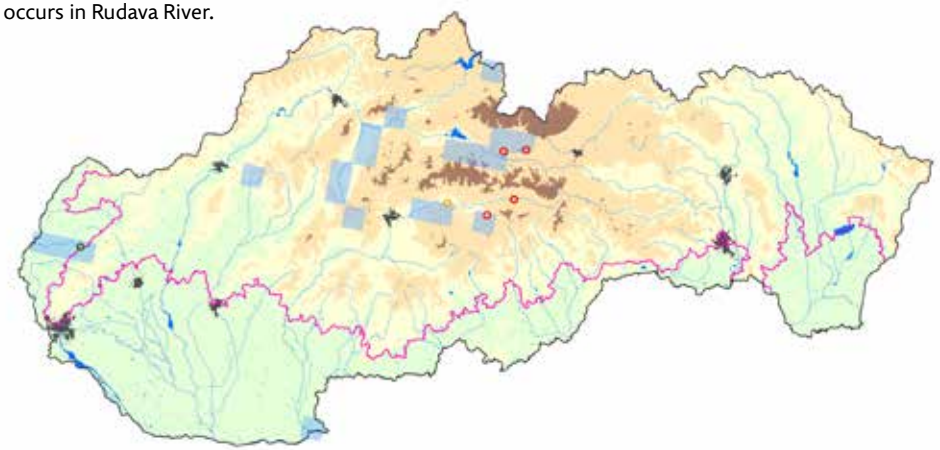
Number of PMLs: 6 **PML average area size:** 2,000 m²

Number of involved experts: 3 **Number of PML field visits:** 12

The most common accompanying species: *Salmo trutta morpha fario*, *Cottus poecilopus*, *Thymallus thymallus*, *Barbatula barbatula*, *Phoxinus phoxinus*, *Cottus gobio*, *Gobio gobio*, *Alburnoides bipunctatus*, *Cobitis taenia*, *Leuciscus cephalus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing device in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Montane and sub-montane zones mainly of smaller or mid-sized streams in the Alpine Bioregion, in the upper sections of rivers in the central and northern parts of Slovakia, e.g. Váh, Hron and Orava as well as in their tributary streams. In the Pannonian Bioregion it occurs in Rudava River.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U2 PAN: FV

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 29 %) and surface water pollution (ALP 21 %).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Assessment and notes on the monitoring results: In most of the locations of the Alpine Bioregion the habitat quality is highly unfavourable; this is caused mainly by inappropriate modifications of water courses, barriers interrupting the continuity of water courses and pollution. In the Pannonian Bioregion the current situation is favourable, but the number of localities with the occurrence of the species is limited. In the sampling of *Eudontomyzon mariae* a powerful electro-fishing device with sufficient effectiveness should be used. In contrast to fish sampling, in case of *Eudontomyzon* it is necessary to keep the anode turned on for at least for 10 seconds until the individuals start to emerge from the sediment. Based on the monitoring results, the average number of the population of *Eudontomyzon mariae* is approximately 4-8 individuals per 100 m of the length of the water course. It has to be taken into account that the spatial distribution of the species is often concentrated in clusters. In the Alpine Bioregion the habitats are threatened by hydromorphological changes resulting from the regulation of water courses and mainly by the construction of small hydro-electric power plants that, at the present, are the greatest threat for fish communities, in both biogeographic regions. These small hydro-electric power plants change the characteristics of the water-course. It is associated with the loss of riffle habitats and in case of this lamprey also with the loss of the substrate that is very important for their reproduction and therefore for their survival too. In smaller water courses the species may be threatened by a climatic change that may cause a significant reduction in the waterflow as well as sharp fluctuations in it.


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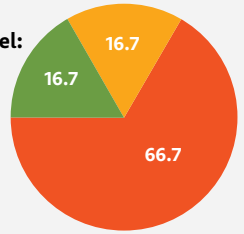
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: FV
Conservation status in SCIs: U1
Overall conservation status on national level: U2



By bioregion:

Lampetra planeri (Bloch, 1784)
(*Cephalaspidomorphi*, *Petromyzontidae*)

In the territory of Slovakia *Lampetra planeri* occurs in montane and sub-montane streams with a stony bottom and with clean, well-oxygenated water. The larvae live in fine sandy and detrital sediments of the streambed that develop in the locations with a weaker current.

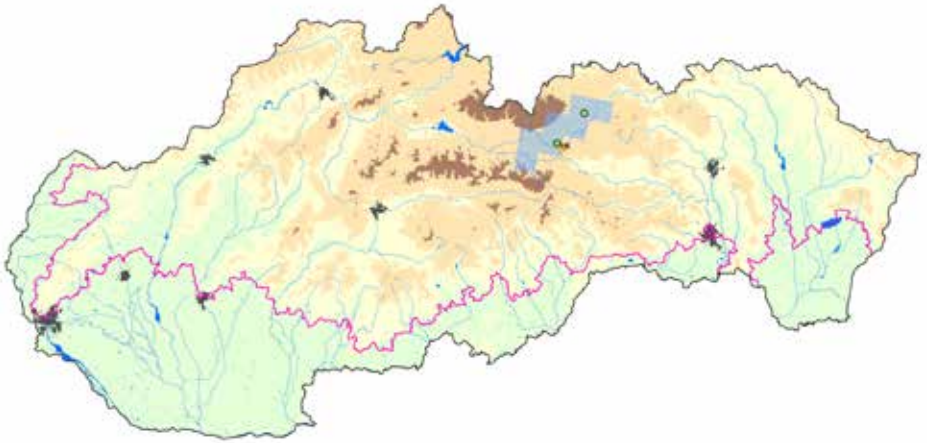
Number of PMLs: 3 **PML average area size:** 2,000 m²

Number of involved experts: 1 **Number of PML field visits:** 6

The most common accompanying species: *Salmo trutta morpha fario*, *Cottus poecilopus*, *Thymallus thymallus*, *Rutilus rutilus*, *Barbatula barbatula.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Montane or sub-montane zones mainly of smaller or mid-sized streams of the Alpine Bioregion in the river basin of Poprad River.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: 0 PAN:

Population quality in PMLs:

ALP: 100

PAN:

Overall population quality: ALP: FV PAN:

Habitat quality for the species in PMLs:

ALP: 66.7 | 33.3

PAN:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

ALP: 66.7 | 33.3

PAN:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 67 %) and management of recreational fishing (ALP 17 %).

Assessment and notes on the monitoring results: The habitat quality in most of the monitored locations is favourable. Based on the monitoring results, the average number of the population of *Lampetra planeri* is approximately 34 individuals per 100 m of the length of the watercourse. It should be taken into account that the spatial distribution of the species often occurs in a cluster pattern, which means that the species does not evenly occur in the entire section of the watercourse. Despite the current favourable status, the future prospects of the habitats may be problematic because they are threatened primarily by hydromorphological changes, resulting from the modification of water courses and mainly from the increasing number of small hydroelectric power plants. The ongoing shortening of sections between these constructions has a particularly negative impact. The small hydroelectric power plants change the characteristics of the watercourses and are associated with the loss of riffle habitats and in case of *Lampetra planeri* also with the loss of substrate that is very important for their reproduction and therefore for their survival too. It should also be emphasized that the range of *Lampetra planeri* is exclusively limited to Poprad River basin so if the habitats in this river are disrupted it will not be possible to replace them and the species will disappear from the territory of Slovakia. In smaller water courses the species may be threatened by climatic change that may cause a significant reduction of the water flow as well as sharper fluctuations.

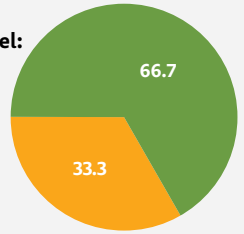
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

ALP: 66.7 | 33.3

PAN:

Aspius aspius (Linnaeus, 1758)
(*Osteichthyes*, *Cyprinidae*)

Aspius aspius occurs in the lowland and sub-montane zones of the mid-sized and large rivers as well as in their tributaries mainly in the riffle sections of water-courses, but also in habitats with standing water. It stays mainly in the water column, rarely near the riverbed.

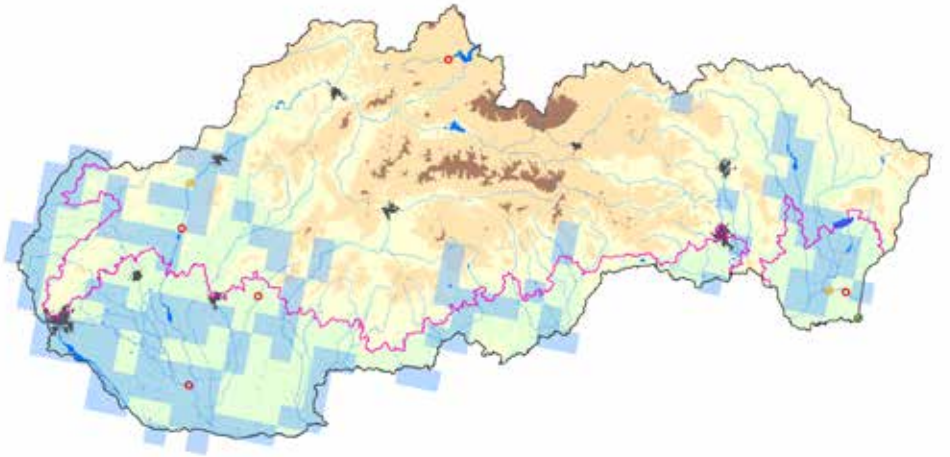
Number of PMLs: 8 **PML average area size:** 1,625 m^2

Number of involved experts: 4 **Number of PML field visits:** 16

The most common accompanying species: *Alburnus alburnus*, *Leuciscus cephalus*, *Alburnoides bipunctatus*, *Gobio albipinnatus*, *Leuciscus leuciscus*, *Rutilus rutilus*, *Gymnocephalus schraetser*, *Gobio gobio*, *Perca fluviatilis*, *Chondrostoma nasus.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane and lowland sections of larger water courses, e.g. Morava, the Danube, Váh, Hron, Ipeľ, Slaná, Hornád, Ondava, Bodrog, Latorica, Tisa and their tributary streams.



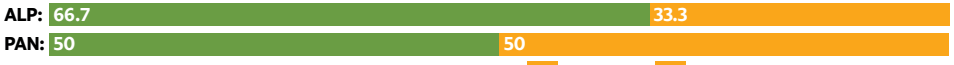
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 500,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

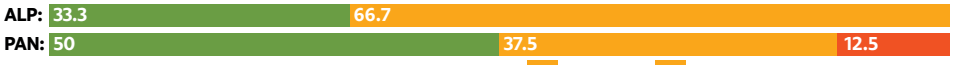
Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 33 %, PAN 19 %) and surface water pollution (ALP 33 %; PAN 19 %).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Assessment and notes on the monitoring results: In several locations the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of water-courses (including disrupting vegetation on the banks) and the consequent lack of suitable spawning habitats of this lithophilic species. In the territory of Slovakia the overall status of the *Aspius aspius* population is undoubtedly better than the monitoring results indicate. The unfavourable result of the evaluation is influenced by the selection of PMLs on the basis of data from SNC SR, but also the difficulty of the monitoring. Based on the monitoring results, the average number of the population of *Aspius aspius* (in the locations where it occurred) is approximately 10-20 individuals per 100 m of the length of the water-course. The quality of the management of recreational fishing by the local organizations of Slovak Anglers' Union (SRZ) may have a certain impact on the population of *Aspius aspius*.


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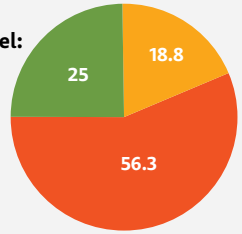
The future prospects of the habitats are alarming because they are threatened mainly by hydromorphological changes resulting from the modification of water courses and mainly by the construction of small hydro-electric power plants that, at the present, are the greatest threat for fish communities, in both biogeographic regions. The small hydro-electric power plants change the characteristics of the water courses and are associated with the loss of riffle habitats and in case of *Aspius aspius* also with the loss of spawning substrate (a clean sandy or gravel river bed), that is very important for their reproduction and therefore for their survival too.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U1
Overall conservation status on national level: U2



By bioregion:

Barbus barbus (Linnaeus, 1758)
(*Osteichthyes*, *Cyprinidae*)

Barbus barbus occurs mainly in the sub-montane zones of mid-sized and large rivers, mainly in the riffle sections with a gravel bottom but it also likes sections with the stream speed of 3 $m.s^{-1}$. Typical of the benthic species, it stays mainly on the bottom at a depth of up to 10 m.

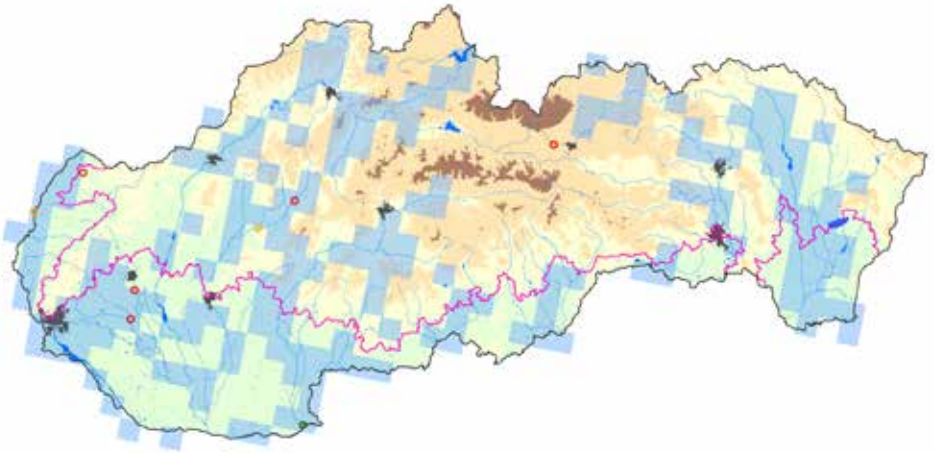
Number of PMLs: 8 **PML average area size:** 2,000 m^2

Number of involved experts: 4 **Number of PML field visits:** 16

The most common accompanying species: *Leuciscus cephalus*, *Alburnus alburnus*, *Rutilus rutilus*, *Gobio gobio*, *Carassius auratus*, *Rhodeus sericeus*, *Alburnoides bipunctatus*, *Blicca bjoerkna*, *Esox lucius*, *Barbatula barbatula.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

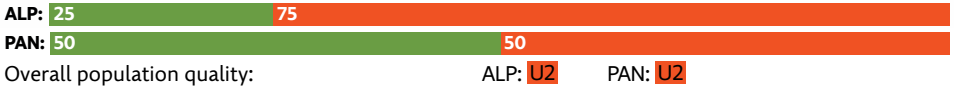
PMLs distribution and localization: Sub-montane and lowland sections of larger and middle-sized water courses, e.g. Morava, the Danube, Váh, Hron, Ipeľ, Slaná, Dunajec, Poprad, Hornád, Ondava, Bodrog, Latorica, Tisa and their tributary streams.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 500,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:



Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 16 %, PAN 15 %) and surface water pollution (ALP 23 %).

Assessment and notes on the monitoring results: In most locations in the Alpine Bioregion the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of water-courses (including the disruption of vegetation on the banks) and the consequent lack of suitable spawning habitats of this lithophilic species. There are also barriers that are interrupting the continuity of the water-courses. Some of the PMLs were suggested on the basis of older and not always reliable data on the occurrence of the species, but at the present these represent unsuitable habitats for the species and therefore it is necessary to designate some other appropriate sites for monitoring. Based on the monitoring results, the average density of the *Barbus barbus* population (in the localities where it occurs) is approximately 11-22 individuals per 100 m of the length of the water-course but the status of the *Barbus barbus* populations are significantly worse in the Alpine Region than in the Pannonian Region. The quality of the management of recreational fishing by the local organizations of Slovak Anglers' Union (SRZ) may have a significant impact on the population of *Barbus barbus*. The habitats for this species has unfavourable prospects in the future because they are highly threatened by hydromorphological changes resulting from the alteration of water courses and mainly by the construction of new barriers connected with the construction of small hydro-electric power plants that, at the present, are the greatest threat for fish communities in both biogeographic regions. The small hydro-electric power plants change the characteristics of the streams, which is associated with the loss of riffle habitats and in case of *Barbus barbus* also with the fragmentation of habitats, isolation of sub-populations and the loss of spawning sites (gravel banks) whose preservation is essential for the reproduction and long-term survival of the population.


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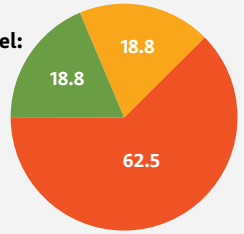
Overall assessment of the conservation status of species

Conservation status on national level:

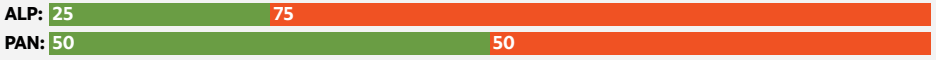


Con. status of species: ALP: U2 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2

By bioregion:



Barbus meridionalis Risso, 1827
(*Osteichthyes*, *Cyprinidae*)

Barbus meridionalis occurs mainly in the sub-montane zone of mid-sized and large rivers in Slovakia, especially in riffle sections with a gravel bottom. As a typical benthic species, it stays mainly on the bottom. The monitored taxon has an ambiguous identity according to the published molecular analyses it could be *Barbus carpathicus* or some other taxon.

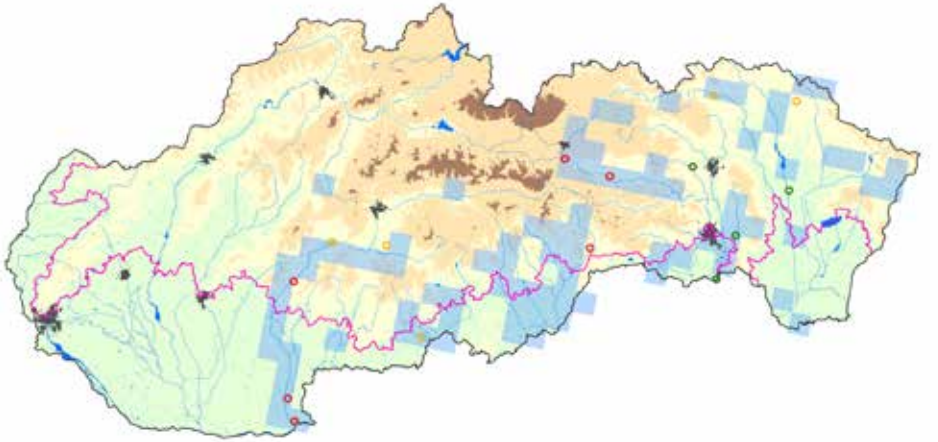
Number of PMLs: 15 **PML average area size:** 1,867 m^2

Number of involved experts: 3 **Number of PML field visits:** 30

The most common accompanying species: *Alburnoides bipunctatus*, *Barbatula barbatula*, *Leuciscus cephalus*, *Gobio gobio*, *Barbus barbus*, *Phoxinus phoxinus*, *Chondrostoma nasus*, *Alburnus alburnus*, *Salmo trutta morpha fario*, *Leuciscus leuciscus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane and lowland sections of mid-sized and large water courses (including their larger tributaries), e.g. Slaná, Dunajec, Poprad, Hornád, Ondava, Bodrog, Uh, Latorica, but also the Danube and Ipeľ rivers. It is not present in the western part of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 40 %, PAN 40 %), the management of recreational fishing (ALP 40 %) and surface water pollution (PAN 40 %).

Assessment and notes on the monitoring results: In most localities the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of water-courses (including the disruption of bankside vegetation) and the consequent lack of suitable spawning habitats for this lithophilic species. There is also a problem with barriers interrupting the continuity of the water-courses. Based on the monitoring results, the average abundance in the populations of *Barbus meridionalis* is approximately 29-58 individuals per 100 m of the length of the water-course. This relatively high value is distorted by extremely high numbers in some localities while the population size in other localities is very low. The future prospects of the habitats are alarming because they are threatened mainly by hydromorphological changes resulting from the alteration of water courses, primarily by the construction of small hydro-electric power plants. Many of the projected small hydroelectric power plants will also cause backwater in several kilometres of the water-course that will be associated with the loss of riffle habitats. *Barbus meridionalis* is also negatively influenced by creating migration barriers and the fragmentation of habitats by hydroelectric power plants; these also cause the loss of spawning habitats (gravel banks) whose preservation is essential for the reproduction and long-term survival of the population. Consequently, there are significant negative changes in the fish communities. At the present times the construction of a large number of small hydro-electric power plants is a major threat for the quality of the environment in both biogeographic regions.


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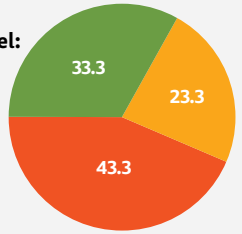
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: U1



By bioregion:

Cobitis taenia Linnaeus, 1758 / *Cobitis elongatoides* Băcescu & Mayer, 1969 (*Osteichthyes*, *Cobitidae*)

In the territory of Slovakia *Cobitis taenia*, or *Cobitis elongatoides*, occurs mainly in the sub-montane zones of streams and smaller rivers, mostly in slowly flowing sections with a sandy or fine gravel bottom. It is a typical a benthic species, it stays mainly on the stream bed. The monitored taxon has an ambiguous identity. According to the published analyses of chromosomes *C. taenia* does not occur in the territory of Slovakia – the populations of this fish are usually characterised as a diploid-polyploid hybrid complex of *C. elongatoides* × *C. tanaitica*.

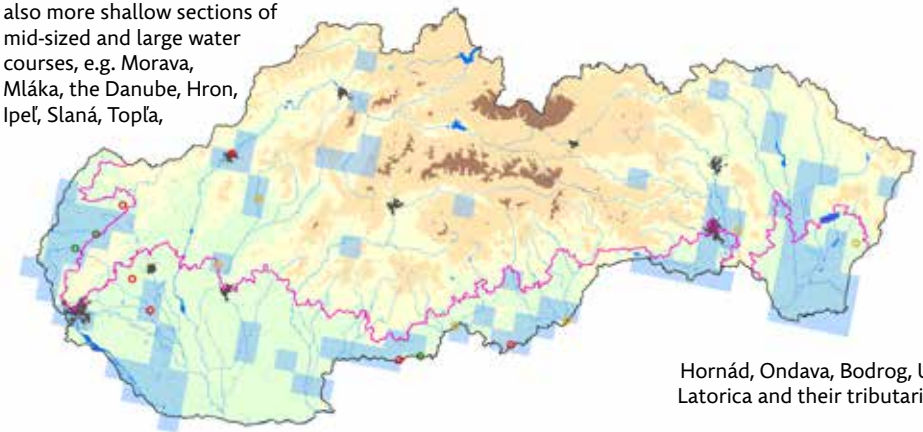
Number of PMLs: 15 **PML average area size:** 1,733 m²

Number of involved experts: 6 **Number of PML field visits:** 30

The most common accompanying species: *Gobio gobio*, *Leuciscus cephalus*, *Barbatula barbatula*, *Alburnus alburnus*, *Rhodeus sericeus*, *Alburnoides bipunctatus*, *Rutilus rutilus*, *Perca fluviatilis*, *Barbus barbus*, *Esox lucius*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane and lowland sections of small water courses, but also more shallow sections of mid-sized and large water courses, e.g. Morava, Mláka, the Danube, Hron, Ipeľ, Slaná, Topľa,



Hornád, Ondava, Bodrog, Uh, Latorica and their tributaries.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 500,000 individuals
Estimate of the population development trend: ALP: – PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 40 %, PAN 67 %) and surface water pollution (PAN 40 %).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Assessment and notes on the monitoring results: In most of the locations, mainly in the Alpine Bioregion, the habitat quality is unfavourable; this is caused mainly by inappropriate modification of water courses. Based on the monitoring results, the average abundance of the population of *Cobitis taenia*, or *Cobitis elongatoides* (in the localities where it occurred) is approximately 13-27 individuals per 100 m of the length of the water-course. This abundance may be underestimated because this is a species that often burrows in the substrate and its quantitative monitoring involves a relatively high degree of uncertainty. Even if the population quality of the monitored species is not the worst, the future prospects of its habitats which are threatened mainly by hydromorphological changes resulting from the alteration of water courses, and mainly from the construction of small hydro-electric power plants, are problematic. The small hydro-electric power plants change the characteristics of the water streams and are associated with the loss of riffle habitats and in case of *Cobitis* sp. also with the loss of sandy substrate that is very important for their survival. In smaller water courses the species may be threatened by a climate change that may cause a significant reduction of water flow as well as temporarily drying-up. Regarding the unclear identity and geographical spread of the *Cobitis* populations in Europe, the monitoring of these taxa should be re-evaluated on a European level.


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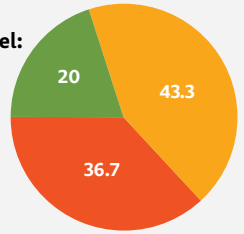
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U2
Overall conservation status on national level: **U1**



By bioregion:

Cottus gobio Linnaeus, 1758
(*Osteichthyes*, *Cottidae*)

Cottus gobio occurs in montane and sub-montane streams and rivers of Slovakia where it prefers micro-habitats with a strong current. It is a typical benthic species, it stays on the river bed.

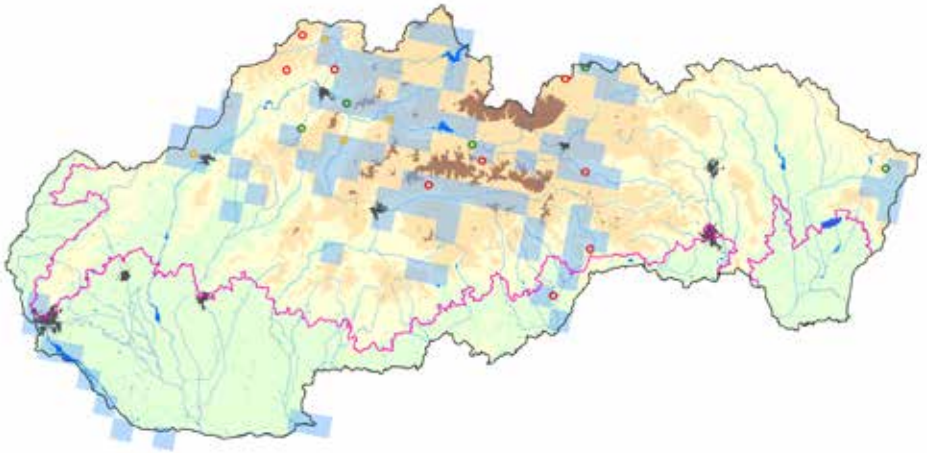
Number of PMLs: 18 **PML average area size:** 1,833 m²

Number of involved experts: 5 **Number of PML field visits:** 36

The most common accompanying species: *Phoxinus phoxinus, Salmo trutta morpha fario, Barbatula barbatula, Alburnoides bipunctatus , Thymallus thymallus, Leuciscus cephalus, Cottus poecilopus, Chondrostoma nasus, Gobio gobio, Alburnus alburnus.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Montane and sub-montane zones mainly of smaller or mid-sized streams in the Alpine Bioregion, in the upper sections and tributary streams of rivers, e.g. Váh, Kysuca, Orava, Hron, Slaná, Hornád or Poprad. It occurs also in the Pannonian Bioregion, mainly in the river Danube.



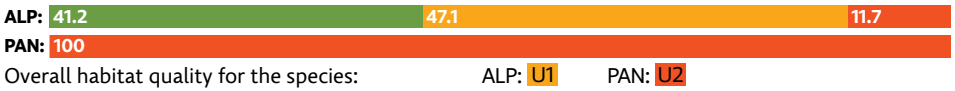
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U2

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 13 %) and surface water pollution (ALP 11 %) as well as biological invasions (PAN).

Assessment and notes on the monitoring results: In most of the localities the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of water-courses and barriers interrupting the continuity of water-courses. In the territory of Slovakia the overall status of the *Cottus gobio* population is probably better that the monitoring results indicate. The unfavourable result of the evaluation is influenced by the selection of PMLs because, at the present, some of them do not represent suitable habitats for the species (we do not know the situation in the past) so in the future it will be necessary to add more locations, with the potential for occurrence of the species, into the monitoring. Based on the monitoring results, the average abundance of the *Cottus gobio* population (in the localities where it occurs) is approximately 32-74 individuals per 100 m of the length of the water-course, this relatively high value is distorted by extremely high numbers in some localities while the abundance in other localities is very low. The quality of the management of recreational fishing by the local anglers' organizations (SRZ) may have a significant impact on the population of *Cottus gobio*. Also the future prospects of the habitats are alarming because they are threatened mainly by hydromorphological changes resulting from the alteration of water courses – mostly from the construction of small hydro-electric power plants, which significantly influence the nature of the water courses, and which currently represent the greatest threat for fish communities, in both biogeographic regions.


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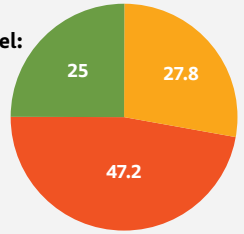
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Gobio albipinnatus Lukasch, 1933
(*Osteichthyes, Cyprinidae*)

In the territory of Slovakia *Gobio albipinnatus* occurs mainly in the sub-montane or lowland zone of mid-sized and large rivers, especially in riffle sections with a gravel or sandy bottom. A benthic species, it stays mainly on the riverbed, as it likes deeper water.

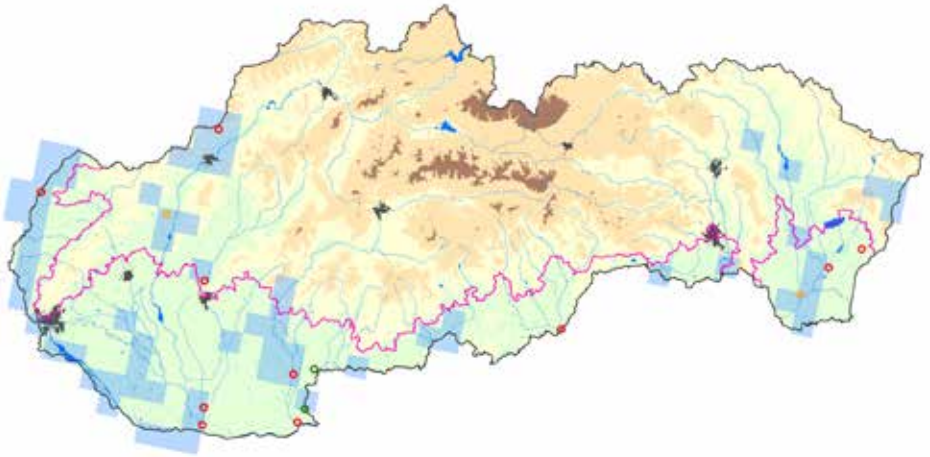
Number of PMLs: 14 **PML average area size:** 1,643 m^2

Number of involved experts: 5 **Number of PML field visits:** 28

The most common accompanying species: *Alburnus alburnus, Leuciscus cephalus, Chondrostoma nasus, Barbus barbus, Rutilus rutilus, Alburnoides bipunctatus, Perca fluviatilis, Carassius auratus, Rhodeus sericeus, Blicca bjoerkna.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane and lowland sections of larger and mid-sized water courses, e.g. Morava, the Danube, Malý Dunaj, Vlára, Váh, Dudváh, Hron, Slatina, Ipeľ, Bodva, Hornád, Torysa, Topľa, Ondava, Laborec, Uh, Latorica, Tisa, Bodrog, Ublianka and their tributaries.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 500,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 32 %, PAN 19 %), surface water pollution (ALP 16 %; PAN 23 %) and biological invasions (PAN 30 %).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Assessment and notes on the monitoring results: In most localities the habitat quality is unfavourable, this is caused mainly by inappropriate modifications of water courses (including the disruption of vegetation on the banks) and by existence of barriers that interrupt the continuity of the water-courses. Several PMLs were not suitable as a habitat for the species and therefore it will be necessary to extend the monitoring into other localities with existing populations of this species. Based on the monitoring results, the average abundance in the *Gobio albipinnatus* populations (in the localities where it occurs) is approximately 35-71 individuals per 100 m of the length of the water-course. The habitats of *Gobio albipinnatus* are, similarly to all other rheophile species (the majority of the monitored species), threatened mainly by hydromorphological changes, resulting from the modification of water-courses and mainly from the construction of small hydro-electric power plants. Many of the projected small hydroelectric power plants will also cause backwater in several kilometres of the water course that will be associated with the loss of riffle habitats. Consequently, there will be significant negative changes in the fish communities. Because of this, the construction of an unregulated number of small hydroelectric power plants in close proximity to each other is a major threat for aquatic ecosystems at the present time in both biogeographic regions. Another threat for *Gobio albipinnatus* are biological invasions, especially the penetration of *Neogobius* species into smaller rivers.


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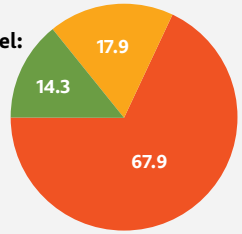
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U1
Overall conservation status on national level: U2



By bioregion:

Gobio kessleri Dybowski, 1862
(*Osteichthyes*, *Cyprinidae*)

Gobio kessleri inhabits mainly sub-montane zones of mid-sized streams and rivers of Slovakia, most often in the altitude of approximately 200 m. It lives mainly in slightly riffle sections with a gravel or sandy bottom. As a benthic species, it spends most of the time on the bed.

Number of PMLs: 12 **PML average area size:** 1,917 m^2

Number of involved experts: 5 **Number of PML field visits:** 24

The most common accompanying species: *Alburnoides bipunctatus*, *Barbus meridionalis*, *Leuciscus cephalus*, *Phoxinus phoxinus*, *Barbatula barbatula*, *Chondrostoma nasus*, *Gobio gobio*, *Alburnus alburnus*, *Barbus barbus*, *Leuciscus leuciscus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using electro-fishing equipment in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: In the sub-montane (in the river Danube also lowland sections) of larger and mid-sized water courses, especially in the Pannonian Bioregion and in the eastern part of the Alpine Bioregion, e.g. the Danube, Hron, Slaná, Bodva, Hornád, Torysa, Laborec, Ulička, Ublianka and their tributaries.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U2

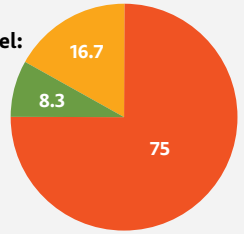
Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 30 %, PAN 50 %) and surface water pollution (ALP 16 %).

Assessment and notes on the monitoring results: In most of the localities the habitat quality is unfavourable which is primarily caused by inappropriate modifications of water courses, barriers that interrupt the continuity of water courses and in case of the Alpine Region also pollution. Several PMLs were not suitable as a habitat for the species and it is questionable to what extent the data on its occurrence in the past was reliable for these localities. In the future we suggest extending the monitoring to some other appropriate localities where the species occurs. Based on the monitoring results, the average abundance in the *Gobio kessleri* population (in the localities where it occurs) is approximately 6-8 individuals per 100 m of the length of the water course. The habitats of the species are threatened mainly by hydromorphological changes, i.e. by the modification of water-courses, especially by the construction of small hydro-electric power plants. Many of the small hydroelectric power plants cause backwater for several kilometres upstream and are associated with the loss of riffle habitats. Consequently, there are significant negative changes in the fish communities. At the present times the construction of unregulated number of small hydro-electric power plants is a major threat for aquatic ecosystems, in both biogeographic regions. Another threat for the further existence of *Gobio kessleri* is biological invasions, especially the high density of *Neogobius* species' populations and their eventual penetration into smaller rivers. In smaller water-courses the species may be threatened by climate change that may cause a significant reduction in waterflow as well as sharp fluctuations in water level.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: U2



By bioregion:

Gobio uranoscopus Vladykov, 1925
(*Osteichthyes*, *Cyprinidae*)

Gobio uranoscopus occurs mainly in the sub-montane sections of rivers where it especially likes the gravel banks with neap tide and shallow water. A benthic species, it spends most of the time on the riverbed.

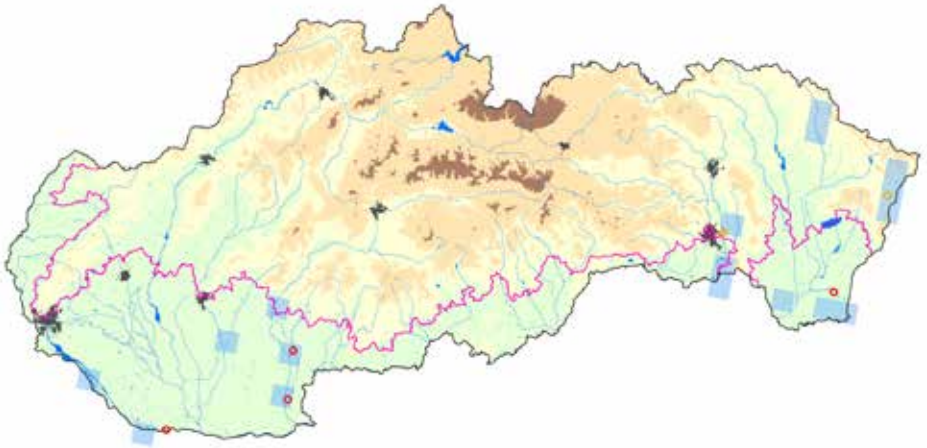
Number of PMLs: 6 **PML average area size:** 2,000 m²

Number of involved experts: 3 **Number of PML field visits:** 12

The most common accompanying species: *Alburnoides bipunctatus*, *Alburnus alburnus*, *Leuciscus cephalus*, *Gobio gobio*, *Barbus meridionalis*, *Leuciscus leuciscus*, *Barbus barbus*, *Rhodeus sericeus*, *Chondrostoma nasus*, *Rutilus rutilus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane, or also lowland, larger and mid-sized watercourses, especially in the Pannonian Bioregion and in the eastern part of the Alpine Bioregion, e.g. the Danube, Hron, Perec, Hornád, Torysa, Laborec, Tisa, Ulička, Ublianka and their tributaries.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 100 %, PAN 100 %).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Assessment and notes on the monitoring results: In most of the localities the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of watercourses. Based on the monitoring results, the average abundance of the *Gobio uranoscopus* population (in the localities where it occurs) is approximately 4-8 individuals per 100 m of the length of the watercourse. In several localities the species occurred only at one of two visits during the year. This can be explained by the fact that fish, in comparison with other groups of animals, are characterised by high mobility that, in addition, are subject to seasonal changes. Therefore, in the future it is necessary to maintain, within the methodology of fish monitoring, at least two visits to each PML every year. The habitats for the species are, similarly to all other rheophilous species, threatened mainly by hydromorphological changes, resulting from the modification of water courses and mainly by the construction of small hydro-electric power plants. Many of the small hydro-electric power plants cause backwater in several kilometres of the water course upstream and this is associated with the loss of riffle habitats. Consequently, there are significant negative changes in the fish communities in the water course in question. So at the present time the construction of unregulated number of small hydroelectric power plants is a major threat for the monitored species as well as for the whole aquatic ecosystems, in both biogeographic regions. Biological invasions and climate change pose a certain threat too.


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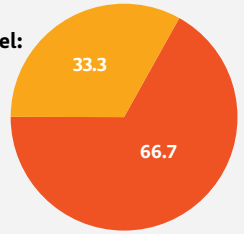
Overall assessment of the conservation status of species

Conservation status on national level:



Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2

By bioregion:

Gymnocephalus baloni Holčík et Hensel, 1974
(*Osteichthyes*, *Percidae*)

Gymnocephalus baloni occurs exclusively in the Pannonian Bioregion of Slovakia, mainly in lowland sections of larger rivers where it likes deeper flowing sections. A benthic species, it spends most of the time on the riverbed.

Number of PMLs: 3 **PML average area size:** 1,667 m²

Number of involved experts: 2 **Number of PML field visits:** 6

The most common accompanying species: *Alburnus alburnus*, *Gobio albipinnatus*, *Barbus barbus*, *Cobitis taenia*, *Rutilus rutilus*, *Alburnoides bipunctatus*, *Chondrostoma nasus*, *Esox lucius*, *Lota lota*, *Perca fluviatilis*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Lowland (in case of the river Danube also sub-montane) sections of larger or medium-sized water courses in the Pannonian Bioregion, e.g. Morava, the Danube, Váh, Hron, Ipeľ, Ondava, Latorica, Uh, Bodrog.

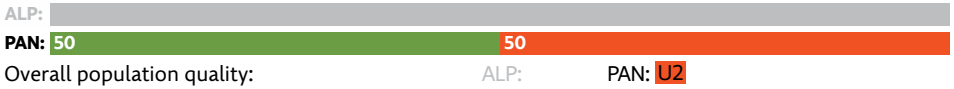
Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals

Estimate of the population development trend: ALP: PAN: –

Population quality in PMLs:



Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: FV

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (PAN 67 %) and surface water pollution (PAN 33 %).

Assessment and notes on the monitoring results: Based on the monitoring results, the average abundance of the population of *Gymnocephalus baloni* (in the localities where it occurs) is approximately 9-18 individuals per 100 m of the length of the water course. The occurrence of *Gymnocephalus baloni* is bound to particular habitats that are, equally as for all other rheophilous species, threatened by hydromorphological changes, resulting from the modification of watercourses, especially those connected to loss of riffle habitats. Consequently, there are significant negative changes in the composition of fish communities, including the decrease in the abundance of the monitored species. These trends should not be underestimated because processes on the level of communities take decades and the negative changes in their composition can only be recovered from with difficulty. Another significant risk, that may threaten the favourable population size in some localities, is pollution, even short-term pollution. *Gymnocephalus baloni* is a very sensitive species to various forms of pollution; it will be one of the first in the fish community to start dying. Biological invasions pose a certain threat too. In localities, that were not part of the monitoring, *Gymnocephalus baloni* occurs together with other rare species, e.g. *Gymnocephalus schraetser*, *Zingel streber*, *Zingel zingel* and *Stizostedion volgensis*.

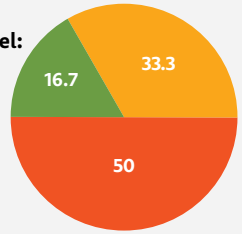
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: U2



By bioregion:

Gymnocephalus schraetser (Linnaeus, 1758) (*Osteichthyes*, *Percidae*)

In the territory of Slovakia *Gymnocephalus schraetser* occurs in lowland or sub-montane sections of larger rivers where it likes deeper riffle sections. A benthic species, it spends most of the time on the riverbed.

Number of PMLs: 6 **PML average area size:** 1,333 m²

Number of involved experts: 4 **Number of PML field visits:** 12

The most common accompanying species: *Alburnus alburnus*, *Leuciscus cephalus*, *Perca fluviatilis*, *Esox lucius*, *Rutilus rutilus*, *Aspius aspius*, *Barbus barbus*, *Chondrostoma nasus*, *Abramis brama*, *Gymnocephalus cernuus*.

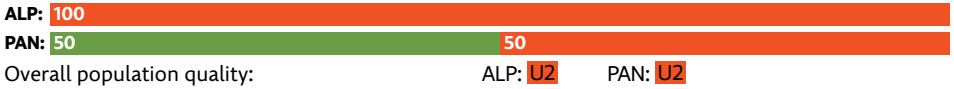
Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Lowland or sub-montane sections of larger or medium-sized water courses, e.g. Morava, the Danube, Malý Dunaj, Váh, Hron, Ipeľ, Ondava, Latorica, Uh, Tisa and Bodrog.

Monitoring results:

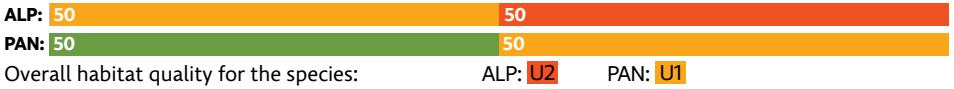
Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:



Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U2 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U2 PAN: U1

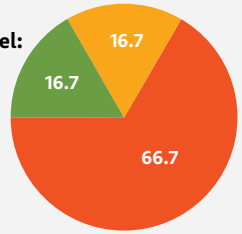
Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 43 %, PAN 75 %) and surface water pollution (ALP 29 %).

Assessment and notes on the monitoring results: Based on the monitoring results, the average abundance of the population of *Gymnocephalus schraetser* (in the localities where it was recorded) is approximately 15-30 individuals per 100 m of the length of the watercourse. The occurrence of *Gymnocephalus schraetser* is bound to particular habitats that may be threatened by hydromorphological changes, resulting from the modification of watercourses, mainly of those that are associated with the loss of riffle habitats. Consequently, there are significant negative changes in the fish communities, including the decrease in the abundance of the monitored species. These trends should not be underestimated because processes on the level of communities last for decades and the negative changes in their composition are recovered from slowly and with difficulty. Another significant risk, that may threaten the favourable abundance values of *Gymnocephalus schraetser* in some localities, is pollution, even short-term pollution. *Gymnocephalus schraetser* is very sensitive to various forms of pollution and it is one of the first species within the fish community to start dying. Biological invasions pose a certain threat for the species too. *Gymnocephalus schraetser* occurs, in locations that were not part of the monitoring, together with other rare species, e.g. *Gymnocephalus baloni*, *Zingel streber*, *Zingel zingel* and *Stizostedion volgensis*.

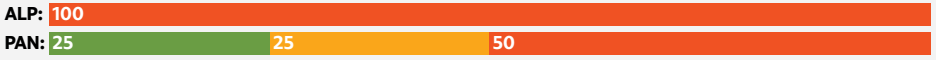
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U1
Overall conservation status on national level: U2



By bioregion:



Hucho hucho (Linnaeus, 1758)
(*Osteichthyes*, *Salmonidae*)

Hucho hucho inhabits sub-montane sections of mid-sized and large rivers. Its habitats include deeper liminal sections and deeper riffle sections with gravel, stony or rocky bottom, combined with shallower currents. It is very demanding of oxygen.

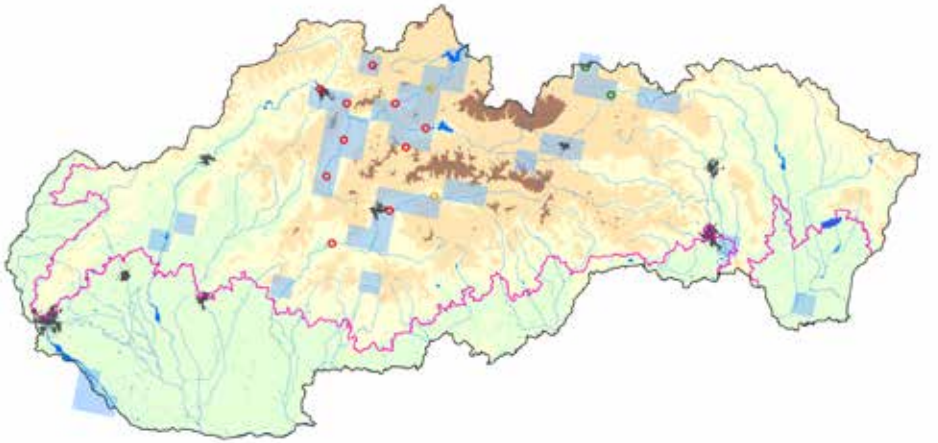
Number of PMLs: 14 **PML average area size:** 1,929 m²

Number of involved experts: 5 **Number of PML field visits:** 28

The most common accompanying species: *Phoxinus phoxinus*, *Cottus gobio*, *Salmo trutta morpha fario*, *Leuciscus cephalus*, *Gobio gobio*, *Alburnoides bipunctatus*, *Thymallus thymallus*, *Barbatula barbatula*, *Perca fluviatilis*, *Chondrostoma nasus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane sections of mid-sized and large water courses, e.g. the Danube, Váh, Hron, Orava, Turiec, Poprad, Dunajec, Hornád. PMLs were localised only in the Alpine Bioregion.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10 – 50 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U2 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 62 %) and surface water pollution (ALP 22 %).

Assessment and notes on the monitoring results: In most localities the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of water courses (including the disruption of vegetation on the banks) as well as the use of barriers interrupting the continuity of the watercourses. Based on the monitoring result, the average abundance of *Hucho hucho* (on localities where the presence was recorded) is approximately 1-2 individuals per 100 m of the length of the watercourse. In most of the monitored PMLs, that were known as typical watercourses for *Hucho hucho* in the recent past (e.g. Váh near Zamarovce or Nezbudská Lúčka, Rajčianka in Žilina, Turiec in Dubové or Košťany, Revúca near Jazierce), this species is absent at the present. The quality of the management of recreational fishing by the local organizations of anglers (SRZ) may have a significant impact on the population of *Hucho hucho*, but it should be emphasized that the occurrence of *Hucho hucho* is bound to particular habitats that are permanently threatened by fragmentation and hydrological changes, resulting from the alteration of watercourses and especially from the construction of small hydroelectric power plants. Unfortunately, such constructions are still being planned or built in several significant rivers with *Hucho hucho*, e.g. Hron, Váh, Poprad. If this trend does not stop, there is a real threat that *Hucho hucho* will virtually disappear from watercourses in Slovakia and any future restitution of the populations will be possible only if the damaged habitats are restored to their original status.

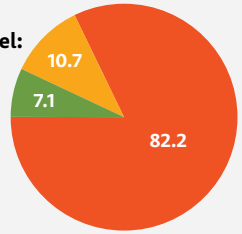
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN:

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Misgurnus fossilis (Linnaeus, 1758)
(*Osteichthyes*, *Cobitidae*)

In the territory of Slovakia *Misgurnus fossilis* occurs in the lowland zone of streams and smaller rivers, mainly in slowly flowing or standing water with a muddy bottom and dense aquatic vegetation. It can survive in shallow overheated water with a lack of oxygen and even in wet mud, i.e. in conditions that would kill other species of fish.

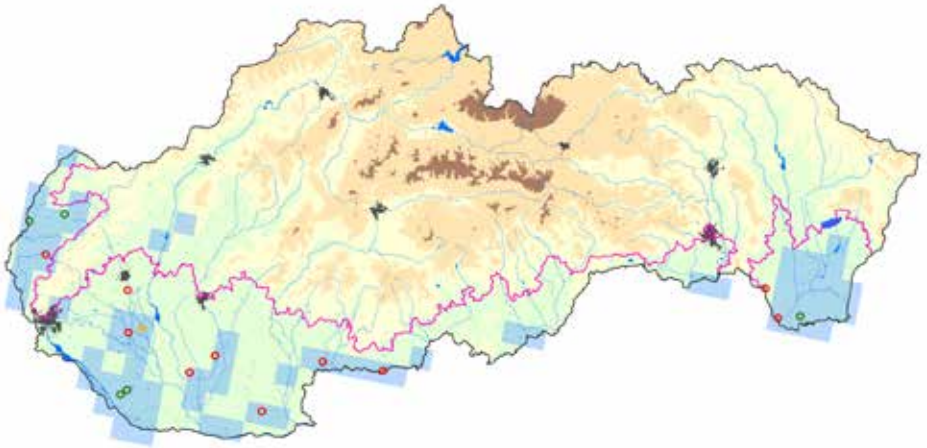
Number of PMLs: 16 **PML average area size:** 1,938 m^2

Number of involved experts: 4 **Number of PML field visits:** 32

The most common accompanying species: *Carassius auratus*, *Rutilus rutilus*, *Rhodeus sericeus*, *Esox lucius*, *Pseudorasbora parva*, *Alburnus alburnus*, *Cobitis taenia*, *Gobio gobio*, *Leuciscus cephalus*, *Perca fluviatilis*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Lowland pool sections of rivers, isolated river branches with standing water, canals, permanently flooded wetlands etc. e.g. Morava, Myjava, the Danube, Malý Dunaj, Nitra, Búr, Olvár, Šárd, Bodrog, Uh, Latorica and their branches.



Monitoring results:

Estimate of the population size in the Alpine Bioregion:

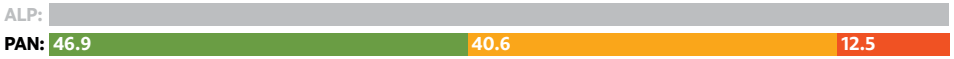
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals

Estimate of the population development trend: ALP: PAN: –

Population quality in PMLs:

Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (PAN 52 %) and biological invasions (PAN 10 %).

Assessment and notes on the monitoring results: In most of the localities the habitat quality is unfavourable, this is caused mainly by inappropriate modifications of water courses, drainage etc. Based on the monitoring results, the average abundance *of Misgurnus fossilis* (in localities, where its presence was confirmed) is approximately 6-12 individuals per 100 m of the length of the watercourse. This means that where *Misgurnus fossilis* has suitable habitats the density of its populations has adequate values. The future prospects of the species are very problematic, because, across virtually the whole territory of Slovakia, they are threatened by hydromorphological changes, resulting from the alteration of watercourses and the drainage of wetlands. To support the species it is necessary not only to preserve these shallow wetland waters but also to restore their connectivity with river systems. This can only be achieved through the restoration of the natural conditions of small water courses in the Pannonian Bioregion. Such task requires mainly the removal of pavement from the bottoms of these watercourses (existing sediments may be retained on the paved bottom in places where they had developed) and the restoration or preservation of the bankside vegetation. *Misgurnus fossilis* is often an accompanying species of *Umbra krameri* and *Carassius carassius,* which are among the most endangered species of the Slovak ichthyofauna. Other possible threats for the future existence of *Misgurnus fossilis* are biological invasions and climate change which may result in the complete extinction (dry-up) of its habitats.

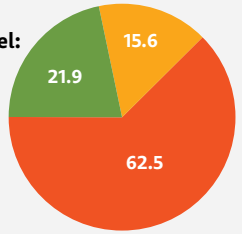
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: U2



By bioregion:

Pelecus cultratus (Linnaeus, 1758)
(*Osteichthyes*, *Cyprinidae*)

Pelecus cultratus occurs in the lowland zone of mid-sized and large rivers as well as in their branches, mainly in the slight flowing sections of watercourses, but also in open habitats with standing water. It stays mainly in the water column and near the water surface.

Number of PMLs: 4 **PML average area size:** 1,750 m²

Number of involved experts: 3 **Number of PML field visits:** 8

The most common accompanying species: *Alburnus alburnus*, *Blicca bjoerkna*, *Leuciscus cephalus*, *Proterorhinus marmoratus*, *Rutilus rutilus*, *Abramis brama*, *Barbus barbus*, *Perca fluviatilis*, *Chondrostoma nasus*, *Esox lucius*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using a branchial net and a fishing rod in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Lowland sections of larger watercourses in the Pannonian Bioregion, e.g. Morava, the Danube, Bodrog, Latorica, Tisa.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals

Estimate of the population development trend: ALP: PAN: 0

Population quality in PMLs:

Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (50 %) and surface water pollution (33 %).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Assessment and notes on the monitoring results: In most of the localities the habitat quality is unfavourable. This is caused mainly by inappropriate modifications of watercourses that limit the river continuity and the connectivity of habitats. In the territory of Slovakia the overall status of the *Pelecus cultratus* population is probably better than the monitoring results indicate. The unfavourable result numbers are influenced by the difficulty of the monitoring. *Pelecus cultratus* is a very agile pelagic species that, unlike the other species of fish, cannot be monitored using an electro-fishing device for fish sampling, so the evaluation of its abundance is influenced by high uncertainty. Based on the monitoring results, the average number of the population of *Pelecus cultratus* is approximately 3 individuals per 100 m of the length of the watercourse. This data should be treated with considerable scepticism because the spatial distribution of *Pelecus cultratus* is usually clustered and it is subject to seasonal variations. The future prospects of the habitats are threatened mainly by hydromorphological changes and surface water pollution. Besides the prevention of such interventions, the species does not need any specific measures to maintain or improve the status of its populations. To ensure more reliable data on the status of *Pelecus cultratus* populations we recommend applying more sophisticated monitoring methods in the future that are based on long-term observations using telemetry.


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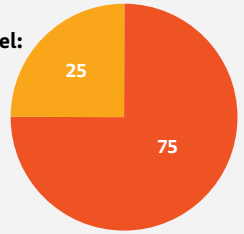
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Rhodeus sericeus (Bloch, 1783)
(*Osteichthyes*, *Cyprinidae*)

Rhodeus sericeus occurs mainly in lowland or sub-montane sections of watercourses with slowly flowing or standing water. It is plentiful in small lowland streams and canals.

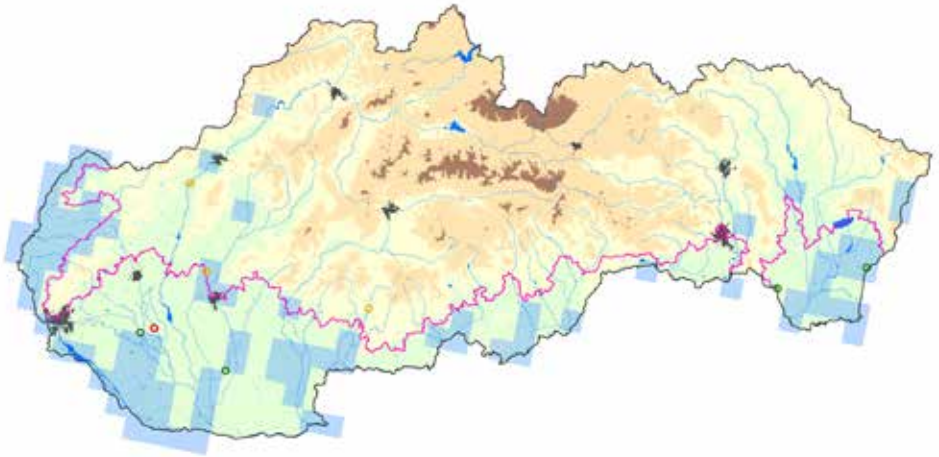
Number of PMLs: 8 **PML average area size:** 1,750 m²

Number of involved experts: 5 **Number of PML field visits:** 14

The most common accompanying species: *Gobio gobio*, *Leuciscus cephalus*, *Pseudorasbora parva*, *Alburnoides bipunctatus*, *Barbatula barbatula*, *Cobitis taenia*, *Alburnus alburnus*, *Carassius auratus*, *Rutilus rutilus*, *Silurus glanis.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Lowland, or sub-montane sections of smaller and mid-sized watercourses, side branches and canals, especially in the Pannonian Bioregion, e.g. Morava, the Danube, Malý Dunaj, Váh, Hron, Perec, Ipeľ, Slaná, Ondava, Bodva, Ida, Laborec, Tisa, Ublianka and their tributaries.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 500,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (ALP 33 %, PAN 63 %).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Assessment and notes on the monitoring results: The habitat quality is favourable in most of the localities, but this is the result of the fact that the species does not have specific habitat requirements and is adaptable. Unlike most of other species of fish, it is not hindered by hydromorphological changes of water courses, but on the contrary, it turns out that it occupies niches that become available after the loss of other species. Based on the monitoring results, the average number of the population of *Rhodeus sericeus* is approximately 30-60 individuals per 100 m of the length of the watercourse. The status of the *Rhodeus sericeus* population is trouble-free; it belongs to common and plentiful species of the ichthyofauna of Slovakia. The overall evaluation of the species in both bioregions is influenced mainly by the habitat quality and the future prospects of habitats that are in unfavourable or inadequate status. However, this evaluation relates only to the current and estimated future status of habitats, from the view point of the whole fish community rather than of the monitored species. It turns out that *Rhodeus sericeus* is also resilient to invasive species of fish. It occurs in many locations together with one of the most invasive species of fish in the world – *Pseudorasbora parva*. It is known about *Pseudorasbora parva* that in the habitats where it invades, sometimes significant changes happen in the composition of whole fish communities.


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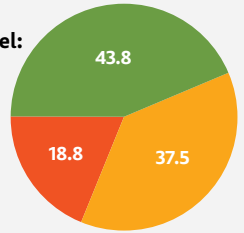
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: FV
Overall conservation status on national level: **U1**



By bioregion:

Rutilus meidingeri (Heckel, 1852)
(*Osteichthyes*, *Cyprinidae*)

Rutilus meidingeri does not occur in the territory of Slovakia. The supposed occurrence comes from the misidentification of an individual, actually belonging to another species. The area of the species occurrence includes the Alpine lakes Attersee, Mondsee, Wolfgangsee, Traunsee and Chiemsee as well as the upper section of the river Danube (Germany, Austria).

Number of PMLs: 2 **PML average area size:** 1,500 m^2

Number of involved experts: 1 **Number of PML field visits:** 4

The most common accompanying species: The species does not occur in Slovakia.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: *Rutilus meidingeri* does not belong to the native species of Slovakia. The dubious literature data on its occurrence in Slovakia suggest that it occurred in the river Danube. It was included into the monitoring based on the fact that at the time of the approval of the project (2009) it was listed in the Reference list of species of Community Interest for the Slovak Republic.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 0 individuals

Estimate of the population development trend: ALP: PAN: ×

Population quality in PMLs:

ALP:

PAN: 100

Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:

ALP:

PAN: 100

Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

ALP:

PAN: 50 50

Overall future prospects of habitat for the species: ALP: PAN: U2

Pressures and threats: *Rutilus meidingeri* does not belong to the native species of Slovakia.

Assessment and notes on the monitoring results: In the territory of Slovakia *Rutilus meindingeri* does not have viable populations and it has never had them. In theory, there may be some accidental occurrence of isolated individuals that have drifted from the upper section of the river Danube. *Rutilus meindingeri* was not recorded during the monitoring and consistently the population quality as well as the future prospects were evaluated as bad. Regarding the above-mentioned facts, it does not make sense to monitor *Rutilus meindingeri* in the future. It is necessary to exclude it from the list of monitored species.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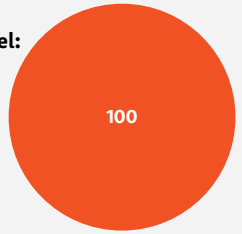
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

ALP:

PAN: 100

Rutilus pigus (Lacepède, 1803)
(*Osteichthyes*, *Cyprinidae*)

Rutilus pigus occurs in lowland or sub-montane sections of mid-sized and large rivers of Slovakia where it lives in more open habitats with a slight current.

Number of PMLs: 6 **PML average area size:** 1,667 m²

Number of involved experts: 4 **Number of PML field visits:** 12

The most common accompanying species: *Alburnus alburnus*, *Leuciscus cephalus*, *Rutilus rutilus*, *Chondrostoma nasus*, *Gobio albipinnatus*, *Abramis brama*, *Barbus barbus*, *Carassius auratus*, *Leuciscus idus*, *Leuciscus leuciscus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Wide lowland sections of larger water courses in the Pannonian Bioregion, e.g. Morava, the Danube, Hron, Bodrog, Latorica, Tisa.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 0 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U2 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U2 PAN: U2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Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (PAN 50 %) and surface water pollution (PAN 50 %).

Assessment and notes on the monitoring results: In most localities the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of watercourses and barriers interrupting the continuity of the watercourses. The overall status of the *Rutilus pigus* population in the Pannonian Bioregion, especially in the river Danube, is probably better than the monitoring results indicate. In the Alpine Bioregion is highly unlikely for the species to occur nowadays due to the construction of hydroelectric plants and the regulation of the river Váh. Based on the monitoring results, the average abundance of *Rutilus pigus* is approximately 8-16 individuals per 100 m of the length of the watercourse. The future prospects of the habitats for the species are problematic; they are threatened mainly by hydromorphological changes, especially the large number of small hydroelectric plants to be developed and the surface water pollution. Many of the small hydroelectric power plants are not only migration barriers but they also cause backwater in several kilometres of the water course that is associated with the loss of riffle habitats. In this regard, the fragmentation of habitats is devastating for many species, including *Rutilus pigus*. Consequently, there are significant negative changes in the fish communities, including the decrease in abundance of the monitored species. At the present times the construction of a large number of small hydroelectric power plants is the major threat for the quality of aquatic ecosystems, in both biogeographic regions.


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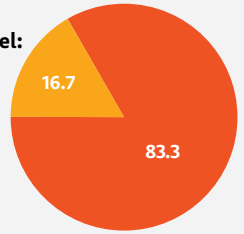
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: **U2**



By bioregion:

Sabanejewia aurata (De Filippi, 1863) (*Osteichthyes*, *Cobitidae*)

In Slovakia *Sabanejewia aurata* occurs mainly in the sub-montane zones of streams and rivers, mostly in shallow, slightly flowing sections with a sandy or fine gravel bottom. In the Danube River it inhabits river sections with very fine substrate too. A typical benthic species, it stays on the bottom. The monitored taxon has an ambiguous identity. According to some opinions, *S. aurata* does not occur in the territory of Slovakia and the populations belong to *S. balcanica* or *S. bulgarica*.

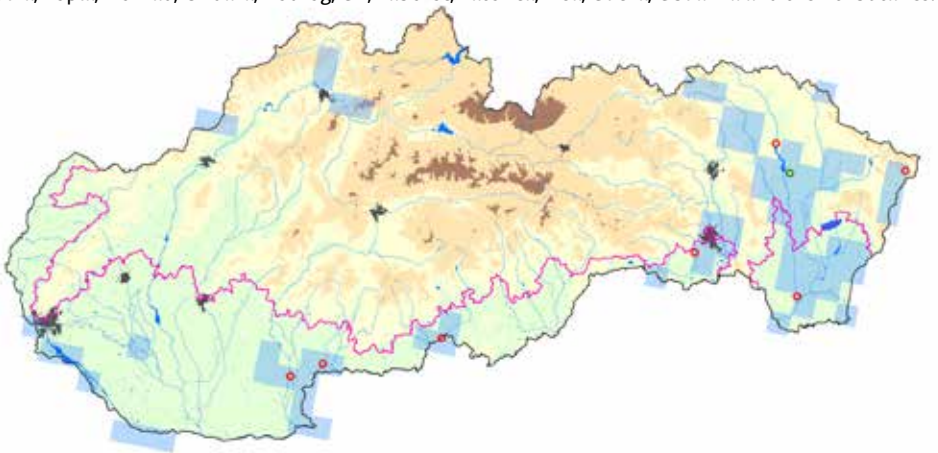
Number of PMLs: 8 **PML average area size:** 2,000 m²

Number of involved experts: 4 **Number of PML field visits:** 16

The most common accompanying species: *Alburnoides bipunctatus*, *Alburnus alburnus*, *Leuciscus cephalus*, *Chondrostoma nasus*, *Gobio albipinnatus*, *Barbatula barbatula*, *Barbus meridionalis*, *Barbus barbus*, *Gobio gobio*, *Rutilus rutilus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane and lowland sections of small water courses, but also shallower sections of mid-sized and large water courses, e.g. the Danube, Hron, Ipeľ, Tisovník, Slaná, Oľka, Topľa, Hornád, Ondava, Bodrog, Uh, Laborec, Latorica, Tisa, Ulička, Ublianka and their tributaries.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: – PAN: –

<u>Population quality in PMLs:</u>

Overall population quality: ALP: U2 PAN: U2

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: U1 PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

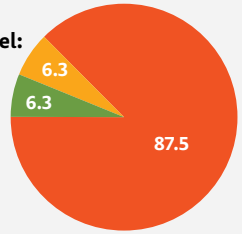
Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (PAN 69 %) and surface water pollution (PAN 16 %).

Assessment and notes on the monitoring results: In most of the localities the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of water courses. Based on the monitoring results, the average abundance of *Sabanejewia aurata* (in the localities where it occurred) is approximately 10-20 individuals per 100 m of the length of the watercourse. In some of the monitored localities the species could not occur because there is a lack of appropriate sandy substrate in these particular sections of the watercourse. Regarding the nature of these sections of water courses, the reliability of the data from literature, on which these PMLs were selected, is questionable. In the future it would be appropriate to include new PMLs into the monitoring that will be carefully selected on the basis of verified data on the nature of the habitat and on the basis of the past and current occurrence of the species. In any case, in the localities where *Sabanejewia aurata* occurred, the future prospects of the habitats are problematic because at the present they are threatened by hydromorphological changes resulting from the alteration of watercourses and mainly by the high number of small hydroelectric power plants. At the present, these are the major threats for fish communities in both bioregions. The small hydroelectric power plants change the characteristics of the watercourses and are associated with the loss of riffle habitats and in case of *Sabanejewia aurata* also with the loss of substrate that is very important for their reproduction and therefore for their survival too. In smaller watercourses the species may be threatened by climate change that may cause a significant reduction of the water flow as well as temporarily drying-up.

<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: U2



By bioregion:

Thymallus thymallus (Linnaeus, 1758)
(*Osteichthyes*, *Thymallidae*)

In the territory of Slovakia *Thymalus thymallus* occurs in the sub-montane zone of streams and rivers, in riffle sections with a gravel bottom and of a variable nature – alternating rapids and deeper and larger quiet pools.

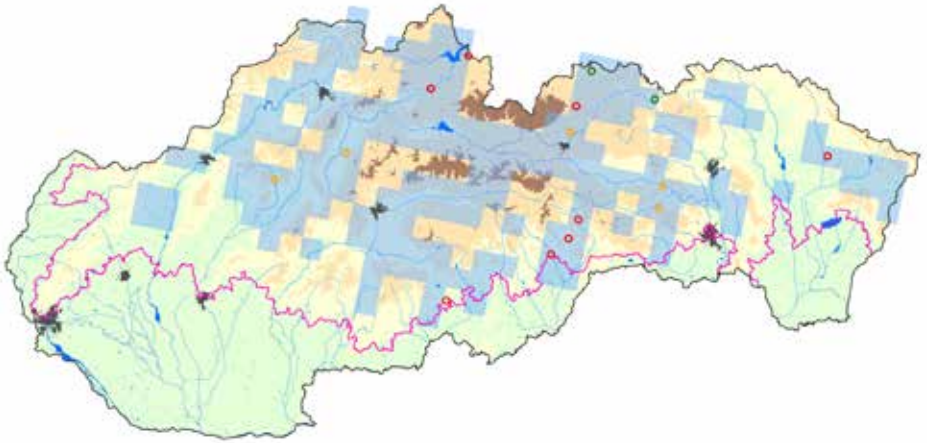
Number of PMLs: 15 **PML average area size:** 1,667 m^2

Number of involved experts: 6 **Number of PML field visits:** 30

The most common accompanying species: *Salmo trutta morpha fario*, *Phoxinus phoxinus*, *Leuciscus cephalus*, *Barbus meridionalis*, *Alburnoides bipunctatus*, *Barbatula barbatula*, *Gobio gobio*, *Chondrostoma nasus*, *Cottus poecilopus*, *Leuciscus leuciscus.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane sections of streams and rivers in the Alpine Bioregion, e.g. Váh, Drietomica, Hron, Nitra, Orava, Kysuca, Rajčanka, Revúca, Hornád, Hnilec, Poprad, Belá, Poprad, Ulička, Ublianka and their tributaries.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: – PAN:

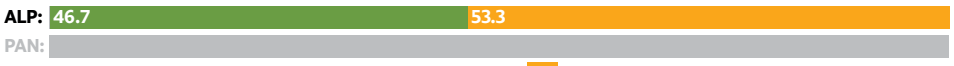
Population quality in PMLs:

Overall population quality: ALP: U2 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:



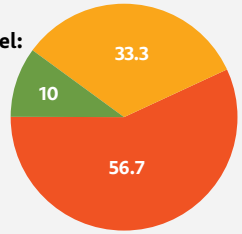
Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (35 %), predation (29 %) and management of recreational fishing (29 %).

Assessment and notes on the monitoring results: In most of the localities the habitat quality is unfavourable; this is caused mainly by inappropriate modifications of watercourses. Based on the monitoring results, the average abundance of the *Thymallus thymallus* population (in the localities where it was recorded) is approximately 11-22 individuals per 100 m of the length of the watercourse. However *Thymallus thymallus* is among the species with the least favourable trend – it has disappeared from many sections of watercourses. *Thymallus thymallus* is currently threatened mainly by the predation by cormorants. Also the future prospects of the habitats are problematic because they are threatened by hydromorphological changes resulting from the modification of watercourses and primarily by the construction of small hydroelectric power plants that, at the present, are the greatest threat for fish communities. According to several sources (mostly from Slovak Anglers' Union, but from the scientific community too) *Thymallus thymallus* has become completely or almost completely extinct in some watercourses due to the overwhelming increase in the population of *Phalacrocorax carbo* and the subsequent increase in predation. This phenomenon is most visible in the Orava and Turiec rivers and the problem is even more serious due to low water levels. In the future the species could be seriously threatened also by climate change that may result in the decrease or significant fluctuations in the water levels in the rivers of Slovakia.

Overall assessment of the conservation status of species

Conservation status on national level:

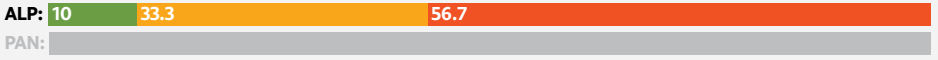


Con. status of species: ALP: U2 PAN:

Conservation status in SCIs: U2

Overall conservation status on national level: U2

By bioregion:



Umbra krameri Walbaum, 1792
(*Osteichthyes*, *Umbridae*)

Umbra krameri inhabits very slow flowing or standing waters of lowland streams, wetlands and canals. It requires the presence of dense submerged aquatic vegetation. In the 1970s the population size decreased dramatically and since then it has remained at very low levels.

Number of PMLs: 10 **PML average area size:** 2,000 m^2

Number of involved experts: 1 **Number of PML field visits:** 20

The most common accompanying species: *Esox lucius*, *Misgurnus fossilis*, *Rhodeus sericeus*, *Rutilus rutilus*, *Carassius gibelio*, *Ictalurus melas*, *Lepomis gibbosus*, *Proterorhinus marmoratus*, *Tinca tinca*, *Scardinius erythrophthalmus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Lowland streams and wetlands of the Pannonian Bioregion in Záhorie Region, Žitný ostrov and in the southern part of Východoslovenská nížina Lowland.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals

Estimate of the population development trend: ALP: PAN: –

Population quality in PMLs:

Overall population quality: ALP: PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include runoff from fertilisation and other agricultural activities (30 %), pollution (30 %) and biological invasions (8 %).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Assessment and notes on the monitoring results: Based on the monitoring results, the average abundance of the *Umbra krameri* population (in the localities where it has been recorded) is approximately 7-14 individuals per 100 m of the length of the watercourse. However, *Umbra krameri* is among the species with the least favourable trend, of all fish species in Slovakia, it has disappeared from many former localities and its occurrence is tightly clustered, in the territory of Slovakia the species lives only in few isolated populations. Also the future prospects of the habitats are problematic, because they are threatened by inappropriate modifications – elimination of bankside vegetation, insensitive cleaning of river bed etc. To support the species it is necessary not only to preserve the shallow wetland waters but also to restore their mutual connectivity. This can only be achieved through the restoration of the natural conditions of small watercourses in the Pannonian Bioregion as well as through well planned maintenance of artificial canals. Such restoration requires the removal of concrete lining from the bottoms of these water courses (existing sediments may be retained on the paved bottom in places where they had developed) and the restoration or preservation of the bankside vegetation. *Umbra krameri* is often an accompanying species of *Misgurnus fossilis* with which it shares the habitat. Other threats for the future existence of *Umbra krameri* include biological invasions and climate change, which may result in the complete extinction (dry-up) of its habitats. *Umbra krameri* is an endangered species not only in Slovakia, but globally. Considering the endemic area of distribution it is threatened by global extinction.


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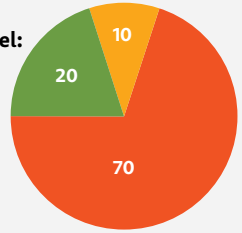
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: U2



By bioregion:

Zingel streber (Siebold, 1863)
(*Osteichthyes*, *Percidae*)

Zingel streber occurs in sub-montane and lowland sections of larger rivers where it likes deeper riffle sections with a gravel bottom. It is a benthic species, it lives exclusively at the riverbed.

Number of PMLs: 8 **PML average area size:** 1,875 m²

Number of involved experts: 5 **Number of PML field visits:** 16

The most common accompanying species: *Alburnoides bipunctatus*, *Chondrostoma nasus*, *Alburnus alburnus*, *Barbus barbus*, *Leuciscus cephalus*, *Gobio albipinnatus*, *Gobio gobio*, *Barbus meridionalis.*

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Lowland or sub-montane sections of larger or medium-sized water courses, e.g. Morava, the Danube, Váh, Turiec, Hron, Ipeľ, Ondava, Latorica, Uh, Bodrog.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: – PAN: 0

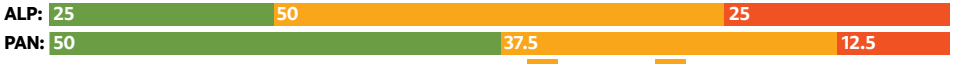
Population quality in PMLs:

Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

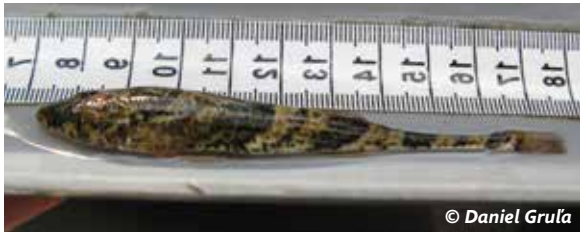
Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include human-induced changes in the hydrological conditions (PAN 100 %) and surface water pollution (ALP 43 %).


© Daniel Gruľa

Assessment and notes on the monitoring results: Based on the monitoring results, the average abundance of *Zingel streber* is approximately 4-8 individuals per 100 m of the length of the watercourse. The quantitative monitoring of the species is extremely challenging and influenced by high uncertainty because *Zingel streber* resides mainly in the current of the main water course in the river Danube during the day where the speed of the stream is often higher than 3.6 m.s^{-1} and the depth is up to 10 m. The occurrence of *Zingel streber* is bound to particular habitats that may be threatened by hydromorphological changes, resulting from the modification of watercourses and especially from the construction of small hydroelectric power plants. Many of the projected small hydroelectric power plants also cause backwater in several kilometres of the water course that is associated with the loss of riffle habitats. Consequently, significant negative changes in the fish communities will happen. So at the present time the construction of unregulated number of small hydroelectric power plants is a major threat for aquatic ecosystems in both biogeographic regions. Biological invasions pose a certain threat too. Another significant risk, that may threaten the favourable abundance in some localities, is pollution, even short-term pollution. *Zingel streber* is very sensitive to various forms of pollution and it is one of the first species in the community to start dying, even from only local poisoning. In localities, which were not part of the monitoring, *Zingel streber* occurs together with other rare species, e.g. *Gymnocephalus baloni, Gymnocephalus schraetser, Zingel zingel* and *Stizostedion volgensis*.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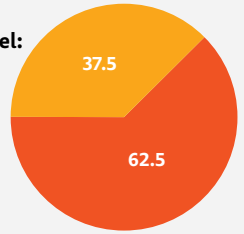
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U2 PAN: U2
Conservation status in SCIs: U2
Overall conservation status on national level: U2



By bioregion:

Zingel zingel (Linnaeus, 1766)
(*Osteichthyes*, *Percidae*)

In the territory of Slovakia *Zingel zingel* occurs in sub-montane and lowland sections of larger rivers where it likes deeper flowing sections with a gravel bottom. It is a benthic species that lives exclusively at the river bottom.

Number of PMLs: 4 **PML average area size:** 1,500 m²

Number of involved experts: 2 **Number of PML field visits:** 8

The most common accompanying species: *Alburnus alburnus*, *Barbus barbus*, *Aspius aspius*, *Gobio albipinnatus*, *Leuciscus cephalus*, *Perca fluviatilis*, *Carassius gibelio*, *Gymnocephalus schraetser*, *Sabanejewia aurata*, *Chondrostoma nasus*.

Monitoring method: Ichthyological survey with a standard protocol of sampling using an electro-fishing method in accordance with the approved methodology, from 1st April to 30th November.

PMLs distribution and localization: Sub-montane and lowland sections of larger and mid-sized watercourses of the Pannonian Bioregion, e.g. Morava, the Danube, Váh, Hron, Ondava, Bodrog, Tisa.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals

Estimate of the population development trend: ALP: PAN: 0

<u>Population quality in PMLs:</u>

Overall population quality: ALP: PAN: U2

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressure and threat, of high or moderate intensity recorded on the PMLs, is surface water pollution (100 %).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Assessment and notes on the monitoring results: Based on the monitoring results, the average abundance of *Zingel zingel* is approximately 6-12 individuals per 100 m of the length of the watercourse. In the river Danube the abundance is probably higher. The quantitative monitoring of the species is extremely challenging and influenced by high uncertainty because *Zingel zingel* resides primarily in the main current of the river during the day where the speed of the current is often higher than 3.6 $m.s^{-1}$ and the depth is up to 10 m. The occurrence of *Zingel zingel* is bound to particular habitats that may be threatened by hydromorphological changes, resulting from the modifications of watercourses and especially from the construction of small hydro-electric power plants. Many of the projected small hydroelectric power plants also cause backwater in several kilometres of the water course that is associated with the loss of riffle habitats. Consequently, this will cause significant negative changes in the fish communities. At the present time the construction of an uncontrolled number of small hydroelectric power plants is a major threat for aquatic ecosystems in both biogeographic regions. Another significant risk, that may threaten the favourable population size of the species in some localities, is pollution, even short-term pollution. *Zingel zingel* is very sensitive to various forms of pollution and it is first species in the community to start dying from local pollution. In localities, that were not part of the monitoring, *Zingel zingel* occurs together with other rare species, e.g. *Gymnocephalus baloni, Gymnocephalus schraetser, Zingel streber* and *Stizostedion volgensis*.


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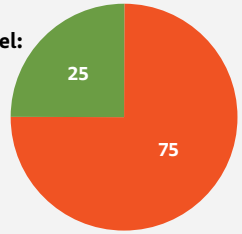
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Bombina bombina (Linnaeus, 1758)
(*Anura, Bombinatoridae*)

Species of shallow standing waters overgrown by vegetation. In many locations in the foothills it can hybridize with *Bombina variegata*, the hybrids are fertile.

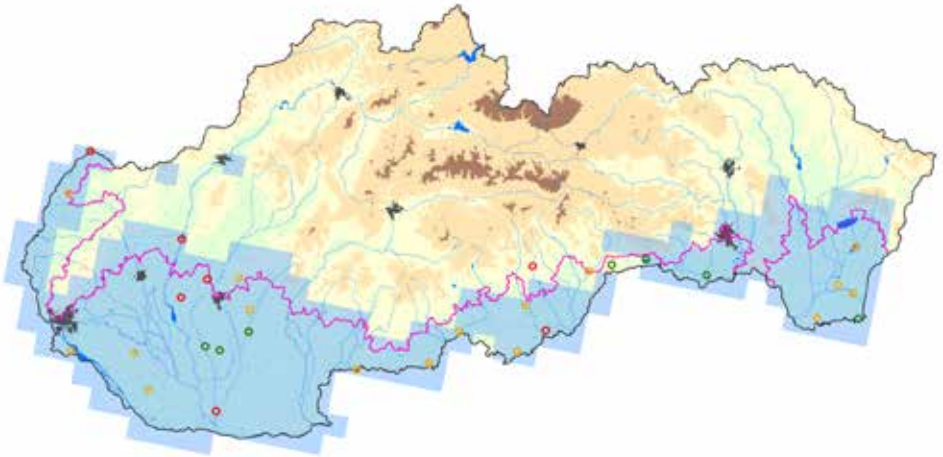
Number of PMLs: 31 **PML average area size:** 70.7 ha

Number of involved experts: 11 **Number of PML field visits:** 76

The most common accompanying species: *Rana esculenta*, *Rana arvalis*, *Natrix natrix*, *Pelobates fuscus*, *Rana dalmatina*, *Hyla arborea*, *Lutra lutra*, *Bufo viridis*, *Anax imperator*, *Rana lessonae.*

Monitoring method: Point monitoring (smaller water bodies) or monitoring on transects – belt transect with a width of 5 m, seen or heard individuals were recorded (Majláth & Vongrej, 2013).

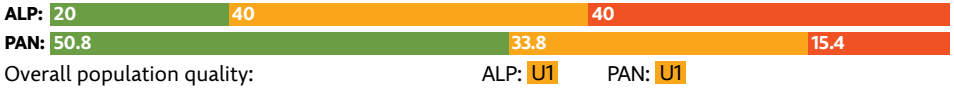
PMLs distribution and localization: Primarily a lowland species, bound mainly to the river alluvia. It inhabits wet meadows, floodplain forests and oxbow lakes, but also older artificial water bodies, ponds and drainage channels.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 50,000 – 100,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: U1

Pressures and threats: In the Pannonian Bioregion the main negative pressures are biological processes, such as succession or eutrophication. In the Alpine Bioregion the most significant negative pressures are transport networks, mainly roads and the related movement of vehicles.
In general, the populations are mainly threatened by the degradation of habitats preferred both in the reproduction and non-reproduction periods of life.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Assessment and notes on the monitoring results: The best quality populations can be found in the alluvium of the large lowland rivers where the spring floods and plenty of shallow temporary water areas occur. In the localities where only deeper permanent water areas are present, the quality of the populations is often insufficient or bad.

The species prefers mainly shallow water areas prone to drying out or successional overgrowing and humid terrestrial habitats that, without any flood dynamics in the area or appropriate human management, are susceptible to overgrowing and degradation by inappropriate plant communities. The species is negatively influenced by the loss of reproduction areas. Transport networks have a significant negative impact in the non-reproduction phases of life, particularly roads and the related killing of individuals by vehicles.


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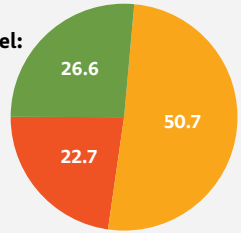
In the localities where the species is present the top priority is to maintain appropriate reproduction areas. It is necessary to maintain the possibility of the development of temporary water bodies in the spring. Alternative aid to the species could be the creation of artificial reproduction habitats – deeper depressions that are capable of maintaining their water-level during the spring and summer months.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Bombina variegata (Linnaeus, 1758)
(*Anura, Bombinatoridae*)

Species of shallow standing waters. In many locations in the foothills it can hybridize with *Bombina bombina*, the hybrids are fertile.

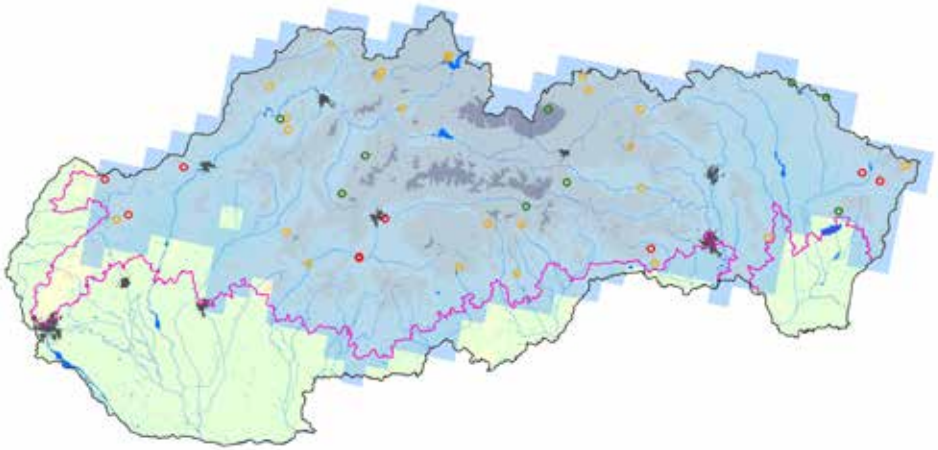
Number of PMLs: 42 **PML average area size:** 26.9 ha

Number of involved experts: 27 **Number of PML field visits:** 99

The most common accompanying species: *Rana temporaria, Bufo bufo, Triturus montandoni, Rana dalmatina, Triturus alpestris, Hyla arborea, Natrix natrix, Rana esculenta, Araschnia levana, Bufo viridis.*

Monitoring method: Point monitoring (smaller water body) or monitoring on transect – belt transect with a width of 5 m, seen or heard individuals were recorded (Majláth & Vongrej, 2013).

PMLs distribution and localization: It inhabits smaller permanent and periodic puddles and tracks in the forest and on field roads in central and higher altitudes. The species is not present in the Pannonian biogeographical region.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: 0 PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The negative pressures on the population include biological processes, such as eutrophication, succession and overgrowing, as well as anthropogenic activities – intensification of agriculture, soiling, land reclamation and draining, fertilization and surface water pollution caused by agriculture and forestry activities, soil pollution, reconstruction of unpaved roads – filling up of puddles and tracks on unpaved roads, landfilling with solid waste.

Assessment and notes on the monitoring results: Although the results of the monitoring in the northern regions of Slovakia indicate a stable population of the species, in the long term the total abundance in the country is decreasing. The main threats include activities leading to the deterioration of reproduction habitats, such as filling up of small wetlands, pollution of surface water, more frequent movement of vehicles in the localities of occurrence and inappropriate management of forest or meadow habitats. Reproductive success is also affected by the hydrological conditions of the season; populations in drier areas often suffer from the drying-up of habitats. The populations in northern Slovakia where rainfall is more frequent and geological substrate is suitable (flysch, granite, slate) are of relatively good quality.

In the localities where the species is present the top priority is to maintain appropriate reproduction areas. It is necessary to maintain the possibilities for the development of temporary water bodies in the spring. Alternative aid to the species could be the creation of artificial habitats for reproduction, these must be deeper depressions that are capable of maintaining their water-level during the spring and summer months.

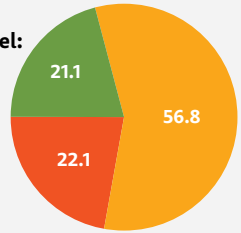
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Bufo viridis (Laurenti, 1768)
(*Anura, Bufonidae*)

Originally a steppe species, it is partially synanthropic, living mainly in cultivated country.

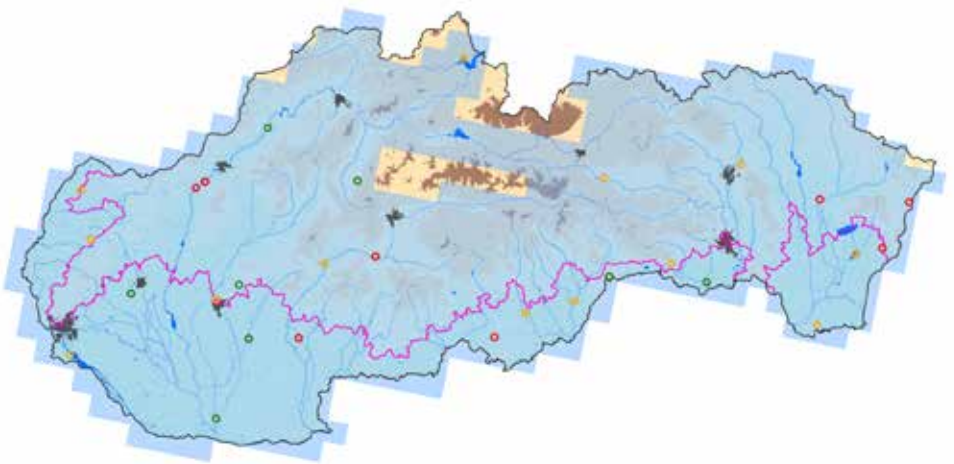
Number of PMLs: 28 **PML average area size:** 83.3 ha

Number of involved experts: 24 **Number of PML field visits:** 55

The most common accompanying species: *Rana esculenta, Bombina bombina, Rana temporaria, Rana lessonae, Hyla arborea, Bufo bufo, Rana arvalis, Bombina variegata, Natrix natrix, Pelobates fuscus.*

Monitoring method: The monitoring of this species was carried out in the form of visual observation, or by capturing; in the mating season identification was also based on vocalisations (Majláth & Vongrej, 2013).

PMLs distribution and localization: It inhabits mainly drier non-forest habitats in lower to medium altitudes, such as meadows, pastures, fields and often urban areas. It prefers periodic shallow waters, e.g. puddles in the fields or meadows, for reproduction.



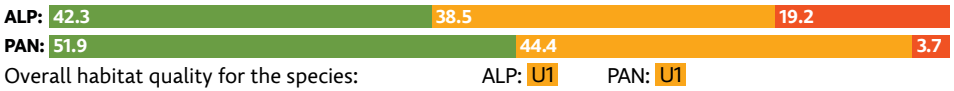
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

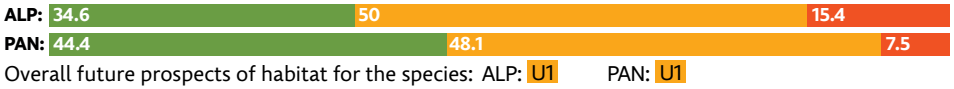
Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The population of the species is influenced by intensive fish farming, intensification of agriculture, silting-up, land-reclamation and drying out of its habitat. It is also threatened by pollution, deterioration of suitable hatching places – by drainage, land reclamation, construction works and increasing road transportation as well as drying-up of hatching places due to the long-term lack of rainfall.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Assessment and notes on the monitoring results: The population of the species in Slovakia is currently, according to the monitoring results, on the decline, with a prospect of its continuing decrease in the future due to the loss of habitats suitable for reproduction. The current trend of building on agricultural land due to development activities represents a significant threat to the species. Although the species can exist in residential agglomerations, as long as there are areas for reproduction, the mortality on roads is a major negative factor.

In the localities where the species is present the top priority is to maintain appropriate reproduction areas. It is necessary to maintain the possibilities for the development of temporary water bodies in the spring. Alternative aid to the species could be the creation of artificial habitats for reproduction, deeper depressions that are capable of maintaining their water-level during the spring and summer months.


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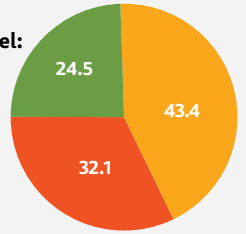
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Hyla arborea (Linnaeus, 1758)
(*Anura, Hylidae*)

Thermophilic species adapted to life in high vegetation.

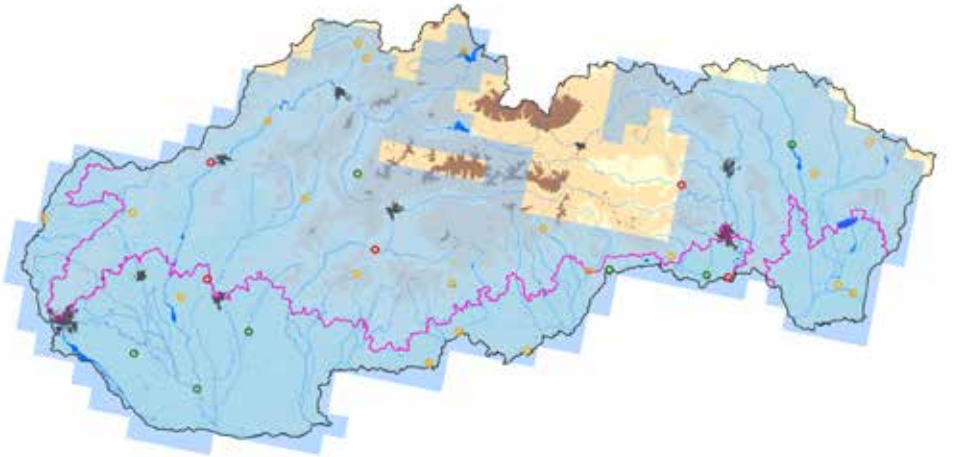
Number of PMLs: 32 **PML average area size:** 71.8 ha

Number of involved experts: 23 **Number of PML field visits:** 85

The most common accompanying species: *Bufo bufo, Natrix natrix, Rana esculenta, Rana temporaria, Bombina variegata, Rana arvalis, Rana dalmatina, Bombina bombina, Rana ridibunda, Pelobates fuscus.*

Monitoring method: Transects – belts with a width of 5 m (or according to the situation in the field) for visual monitoring, or up to 30 m for acoustic monitoring. The monitoring of this species was carried out in the form of visual observation or identification based on vocalisations (Majláth & Vongrej, 2013).

PMLs distribution and localization: It inhabits wet deciduous forests, especially in floodplains of lower to medium altitudes, as well as stands of reeds and bushes. The core distribution is in the alluvial areas of lowland rivers. Through river valleys it spreads into areas with colder climate.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: Negative pressures on the population of the species include: fish farming, intensification of agriculture, fertilization, soiling, cultivation and drainage of habitats and widespread pollution of surface waters caused by household waste and sewage.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Assessment and notes on the monitoring results: The population of the species in Slovakia is more or less stable, but in the future we expect significant declines due to the loss of suitable habitats and hatching places for reproduction. Already at the present we can see significant decrease of its abundance.

In the localities where the species is present the top priority is to maintain appropriate reproduction areas. It is necessary to maintain the possibility for the development of deeper temporary water bodies in the spring, or to maintain permanent water bodies with low-density of fish. It is also necessary to prevent pollution of surface waters from agricultural and industrial activities. Appropriate aid to the species in the localities with a deficiency of natural areas for reproduction is the creation of artificial reproduction habitats – these must be deeper depressions with the capability of maintaining their water-level during the spring and summer months. The species is capable, to some extent, of using artificial garden ponds on the outskirts of towns/villages for its reproduction.


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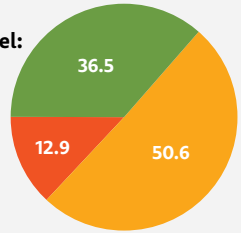
Overall assessment of the conservation status of species

Conservation status on national level:



Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**

By bioregion:

Pelobates fuscus (Laurenti, 1768)
(*Anura, Pelobatidae*)

Species that lives concealed; it is active mainly at night and spends the day mostly burrowed in the soil.

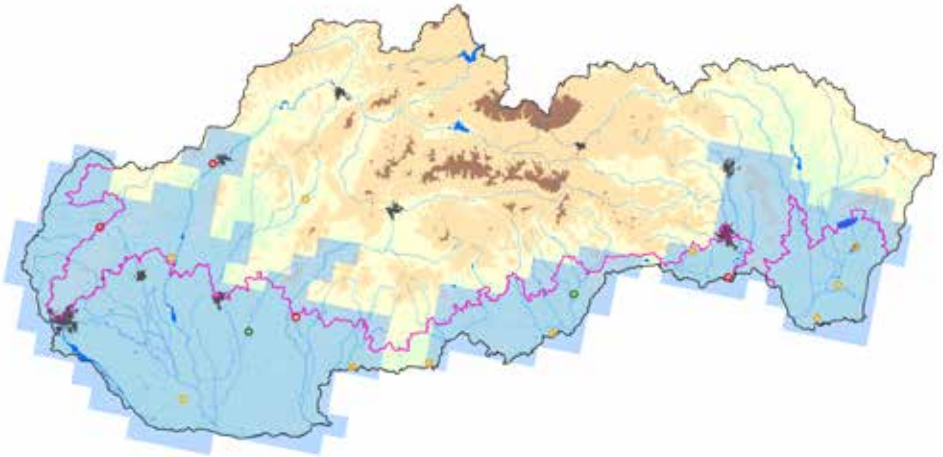
Number of PMLs: 16 **PML average area size:** 83.3 ha

Number of involved experts: 12 **Number of PML field visits:** 38

The most common accompanying species: *Rana esculenta, Bombina bombina, Rana arvalis, Hyla arborea, Rana ridibunda, Bufo viridis, Natrix natrix, Rana dalmatina, Rana lessonae, Locustella fluviatilis*.

Monitoring method: Point or transect method of monitoring – belt transect were a width of 5 m. The monitoring of this species was carried out in the form of optical observation, or by capturing, in the breeding period there was also identification based on vocalisations (Majláth & Vongrej, 2013).

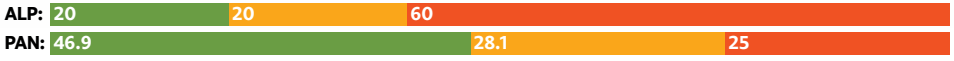
PMLs distribution and localization: It inhabits mainly alluvial areas near large rivers in lower and medium altitudes. It is most numerous in locations with light (sandy, loamy) soil.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

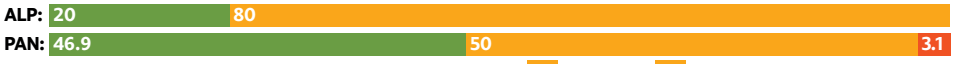


Overall population quality: ALP: U2 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: In the Panonnian biogeographical region the main negative pressures are biological processes, such as succession, vegetation overgrowing or eutrophication. Surface water pollution is also significant. In the Alpine Bioregion the most significant negative pressures include fertilisation, soil pollution and solid waste.

The populations are mainly threatened by degradation or direct elimination of reproductive habitats due to agricultural activities and natural succession processes. This applies to many areas with reproduction habitats that are limited in number or in area. A common threat is the early drying-out of the reproduction areas, where the larvae cannot complete their metamorphosis.

Assessment and notes on the monitoring results: In most of the monitored localities the species was recorded only sporadically or was not recorded at all. The best status populations are in the alluvial areas of large lowland rivers with light soils, e.g. in Záhorie Region. It is likely that the actual status of populations is better than in the results from the monitoring, as it is relatively difficult to observe this species and the prescribed methodology for monitoring may not be effective enough.

In the localities without special protection, the negative pressures on the species include mainly intensive agricultural land use, not only through the reduction of water bodies, but by polluting the existing surface waters and eutrophication due to application of fertilizers.


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In the localities where the species is present the top priority is to maintain appropriate reproduction areas. It is necessary to maintain the possibility for the development of temporary water bodies in the spring. Alternative aid to the species could be the creation of artificial reproduction habitats – deeper depressions that are capable of maintaining their water-level during the spring and summer months.

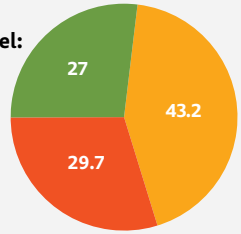
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Rana arvalis (Nilsson, 1842)
(*Anura, Ranidae*)

Mainly a riparian species, it is the rarest species in the grass frogs group.

Number of PMLs: 18 **PML average area size:** 96.6 ha

Number of involved experts: 4 **Number of PML field visits:** 33

The most common accompanying species: *Rana esculenta, Bombina bombina, Rana dalmatina, Pelobates fuscus, Natrix natrix, Hyla arborea, Bufo viridis, Lacerta viridis, Lacerta agilis, Rana lessonae.*

Monitoring method: Counting of egg yields and the transect method – monitoring belt with the width of 5 m; recording of seen individuals (Majláth & Vongrej, 2013).

PMLs distribution and localization: The species occurs mainly in wet habitats of lowlands, mainly in floodplain forests and nearby non-forest habitats (sedge meadows).

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

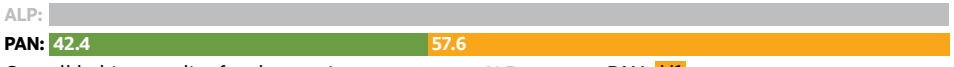
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals

Estimate of the population development trend: ALP: PAN: –

Population quality in PMLs:

Overall population quality: ALP: PAN: U1

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: In its reproduction areas the species is threatened by human activities related to fishing: management or removal of vegetation on the banks, management and use of banks for purposes of recreational fishing. In the terrestrial habitats the species is threatened by inappropriate management actions, particularly of forestry nature.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Assessment and notes on the monitoring results: The results of the monitoring in the PMLs are strongly dependent on the methodology used. Recording the species in the early spring period based on the detection of egg yields in the reproduction areas provided more reliable information on the quality of the population than the observation of individuals in the non-breeding period. It is therefore likely that the actual status of populations is often better than is reported based on the results of monitoring carried out in the non-reproduction period.

In the localities where the species is present the highest priority is to maintain appropriate areas for reproduction. It is necessary to prevent the drainage of these locations; in the terrestrial environments the species also prefers wetter habitats (wet meadows, flooded forests). As part of forest management it is necessary to limit clear-cutting.


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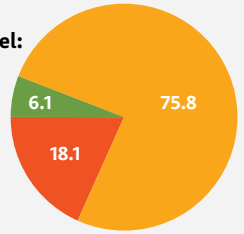
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Rana dalmatina (Fitzinger, 1838)
(*Anura, Ranidae*)

Thermophilic species, but among the grass frogs it has the longest seasonal activity.

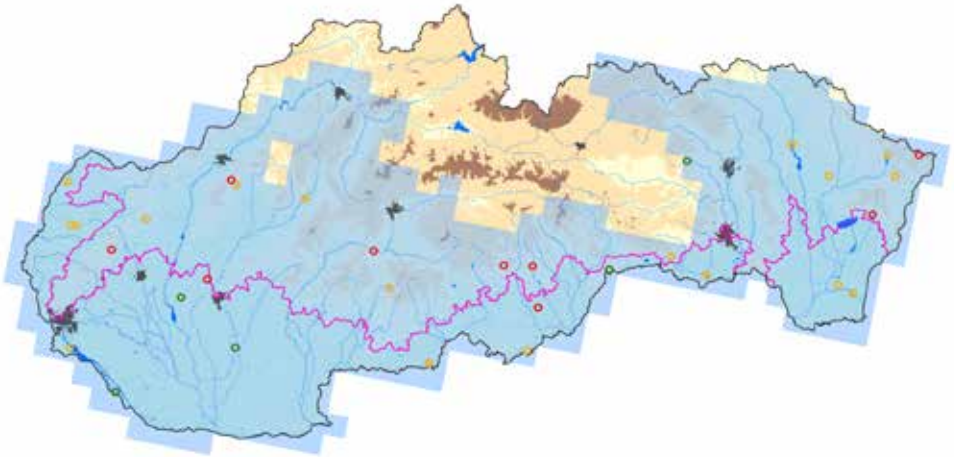
Number of PMLs: 33 **PML average area size:** 57.9 ha

Number of involved experts: 20 **Number of PML field visits:** 87

The most common accompanying species: *Rana temporaria, Rana esculenta, Natrix natrix, Rana arvalis, Hyla arborea, Bufo bufo, Rana ridibunda, Bombina bombina, Bombina variegata, Pelobates fuscus*.

Monitoring method: Counting of egg yields and the transect method – monitoring belt with a width of 5 m; recording of the observed individuals (Majláth & Vongrej, 2013).

PMLs distribution and localization: The core of the distribution is in lowlands, particularly forest and forest-steppe areas. It also occurs in warmer deciduous forests of mountains and valleys in medium altitudes, through river valleys it locally spreads to cooler areas as well.



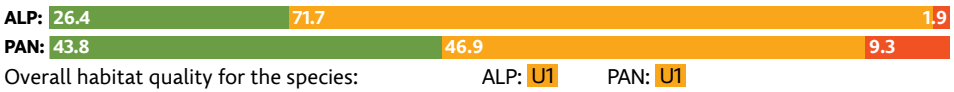
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: In both bioregions the main negative pressures include human-induced changes in its reproduction water bodies, e.g. filling-in or reclamation of wetlands. In the Pannonian Bioregion significant negative pressures are presented by biological processes, such as succession or eutrophication. In the Alpine Bioregion significant negative pressures come from roads and the related movement of vehicles.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Assessment and notes on the monitoring results: Recording the species in the early spring period based on the detection of egg yields in the reproduction areas provides more reliable information on the quality of the population than the survey of individuals in the non-reproduction period. It is likely, therefore, that the actual status of populations is better than the results of monitoring carried out outside the reproduction period suggest.

In the localities where the species is present the highest priority is to maintain appropriate reproduction areas. The species has a relatively wide tolerance for a variety of aquatic habitats, but it mainly prefers waters without fish and with the presence of submerged vegetation. An alternative way to support the species is the creation of artificial habitats for reproduction. These must be deeper depressions capable of maintaining the water at least during the spring months.


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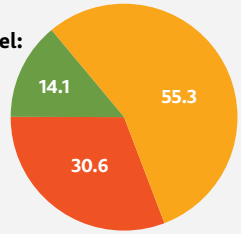
Overall assessment of the conservation status of species

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: U1

Conservation status on national level:



By bioregion:

Rana esculenta (Linnaeus, 1758)
(*Anura, Ranidae*)

Hybridogenetic hybrid with the genetic information inherited from *Rana ridibunda* and *Rana lessonae*.

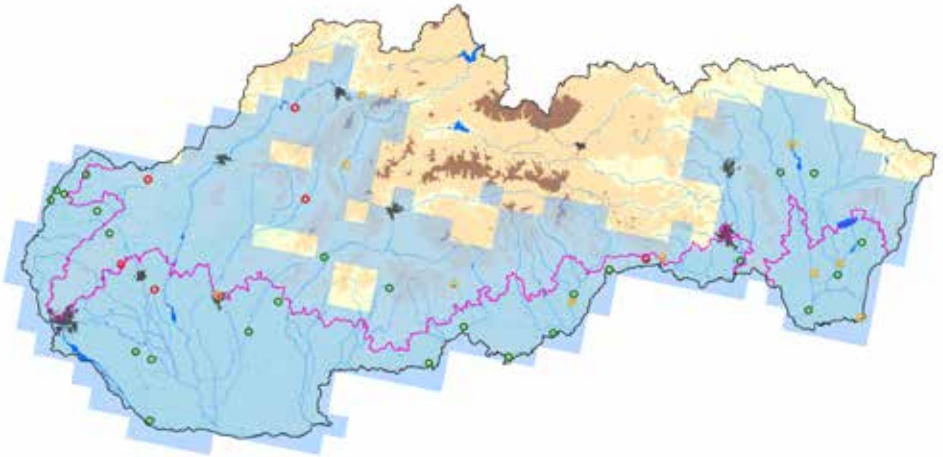
Number of PMLs: 41 **PML average area size:** 77.7 ha

Number of involved experts: 7 **Number of PML field visits:** 151

The most common accompanying species: *Rana ridibunda, Natrix natrix, Bombina bombina, Ardea cinerea, Bufo bufo, Natrix tessellata, Cygnus olor, Ischnura elegans, Rana temporaria, Circus aeruginosus*.

Monitoring method: Transect method – belt transect located along shore line; mainly visually observed individuals, as well the heard individuals (identification based on vocalisation) are registered (Majláth & Vongrej, 2013).

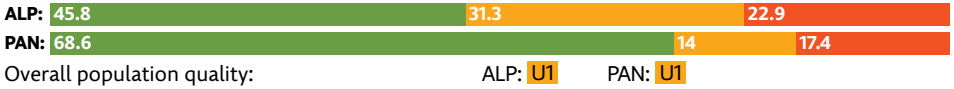
PMLs distribution and localization: It most commonly inhabits standing or slowly flowing waters in lower and medium altitudes. Its ecological valence to natural conditions is relatively wide and it can also temporarily inhabit degraded water bodies.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: – PAN: 0

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: Fishing activities, particularly recreational fishing and the related occupation of banks and disturbance represent the most significant negative pressures on the species in the Pannonian Region. Other significant negative pressures are crop production and activities related to shipping. In the Alpine Bioregion the most important negative pressure is agriculture.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Assessment and notes on the monitoring results: In general we can summarize that at present the populations can achieve a favourable status in appropriate conditions. This species occupies a relatively wide range of aquatic habitats (artificial water reservoirs, oxbow lakes, slow-flowing rivers and channels and periodic water bodies). In many localities the species is connected to *Rana lessonae* in terms of reproduction.

In endangered localities with high levels of negative pressure it is necessary to change the site's management (fisheries facilities and fishing grounds), providing conditions for at least the successful reproduction and wintering of the species. As long as the conditions allow it, it is also suitable to create new habitats as compensation.


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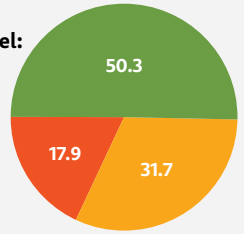
Overall assessment of the conservation status of species

Conservation status on national level:

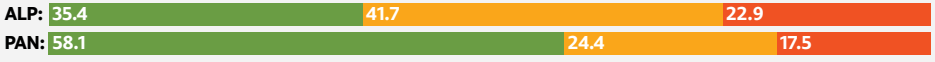


Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**

By bioregion:



Rana lessonae (Camerano, 1882)
(*Anura, Ranidae*)

The rarest species in the group of *Rana esculenta/R.lessonae/R.ridibunda*.

Number of PMLs: 24 **PML average area size:** 48.9 ha

Number of involved experts: 6 **Number of PML field visits:** 85

The most common accompanying species: *Rana esculenta, Rana ridibunda, Bombina bombina, Ardea cinerea, Rana dalmatina, Casmerodius albus, Natrix natrix, Oriolus oriolus, Pelobates fuscus, Natrix tessellata, Rana ridibunda.*

Monitoring method: Transect method – belt transect along shoreline; mainly visually observed but also acoustically registered individuals (identification based on vocalisation) (Majláth & Vongrej, 2013).

PMLs distribution and localization: The core area of the species' distribution in the territory of Slovakia is in the lowlands near large water courses. In the Alpine Bioregion the presence of the species is very limited (an isolated occurrence in Orava Region).

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 0 – 50 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: FV

Pressures and threats: The most significant negative pressures in the Pannonian Region include activities related to shipping, crop production and activities related to fishing. In reproduction areas the species is threatened mainly by recreational boating and related activities such as the modification of banks, etc., recreational fishing – management or removal of bankside vegetation. In terrestrial habitats the species is threatened by agricultural crop production in those localities where changes in the planted crops occur.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Assessment and notes on the monitoring results: The best quality populations live in the alluvia of the large lowland rivers, where spring floods and sufficient temporary water bodies occur. In the Alpine Bioregion of Slovakia the distribution of the species is limited (the only significant occurrence is in the Orava Region) and the population quality was evaluated mainly as insufficient there. Emigration of individuals from smaller localities may misrepresent the monitoring results.

The populations need large areas with a variety of suitable habitats for long-term survival. In these localities it is necessary to maintain the possibility of the creation of wetlands with submerged vegetation.


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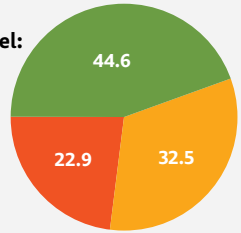
Overall assessment of the conservation status of species

Conservation status on national level:

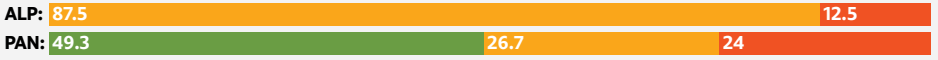
Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:



Rana ridibunda (Pallas, 1771)
(*Anura, Ranidae*)

Thermophilic species, the most aquatic amphibian species present in the country.

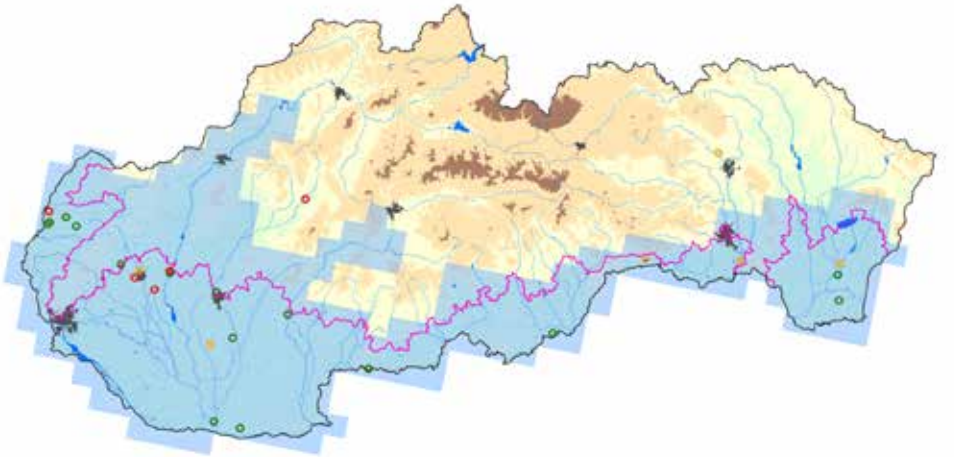
Number of PMLs: 27 **PML average area size:** 74.3 ha

Number of involved experts: 9 **Number of PML field visits:** 92

The most common accompanying species: *Natrix natrix*, *Bombina bombina*, *Rana esculenta*, *Ixobrychus minutus*, *Pelobates fuscus*, *Luscinia megarhynchos*, *Locustella naevia*, *Lacerta vivipara*, *Acrocephalus palustris*, *Emberiza citrinella.*

Monitoring method: Transect method – belt transect along shoreline; mainly visually observed but also acoustically registered individuals (identification based on vocalisations) (Majláth & Vongrej, 2013).

PMLs distribution and localization: It most commonly inhabits standing or slow-flowing waters in lower and medium altitudes. It inhabits various types of habitats – ponds, flooded gravel pits, oxbow lakes, rivers, channels and swamps.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: U1

Pressures and threats: Fishing activities, particularly recreational fishing and the related occupation of banks and disturbance represent the most significant negative pressures on the species in the Pannonian Region. In the Alpine Bioregion a significant negative impact on the species is agricultural crop production.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Assessment and notes on the monitoring results: In general we can summarize that at present the populations can achieve a favourable status in appropriate conditions. The species inhabits a relatively wide range of aquatic habitats (artificial water reservoirs, oxbow lakes, slow-flowing rivers and channels, in some places also temporary water bodies).

The most significant negative pressures on the species include activities related to fish farming and hunting, mainly recreational fishing and the related occupation of banks and disturbance, but locally also intensive use of fish ponds with an inappropriate timing of emptying threatens the species.

In endangered localities with high levels of negative pressure it is necessary to change the site's management (fisheries facilities, fishing grounds), at least providing conditions for reproduction and wintering of the species. As long as the conditions allow it, it is also suitable to create new habitats as compensation.


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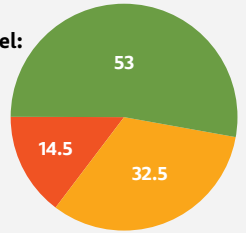
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Rana temporaria (Linnaeus, 1758)
(*Anura, Ranidae*)

Species adapted to cold and humid climates, typical for forest habitats.

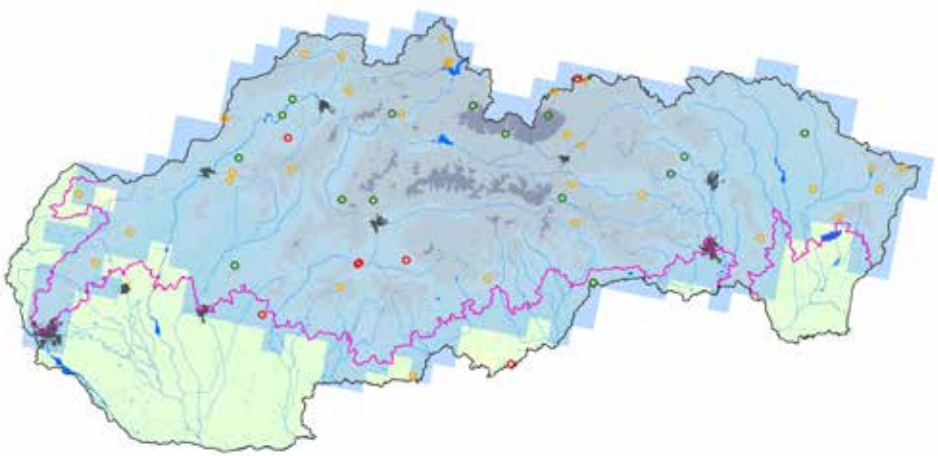
Number of PMLs: 56 **PML average area size:** 34.1 ha

Number of involved experts: 32 **Number of PML field visits:** 141

The most common accompanying species: *Bufo bufo*, *Bombina variegata*, *Rana dalmatina*, *Hyla arborea*, *Natrix natrix*, *Triturus montandoni*, *Rana ridibunda*, *Triturus vulgaris*, *Lacerta agilis*, *Anas platyrhynchos*.

Monitoring method: Alternative A) egg yields were counted. Alternative B) transect method – monitoring belt with the width of 5 m; all observed individuals were recorded (Majláth & Vongrej, 2013).

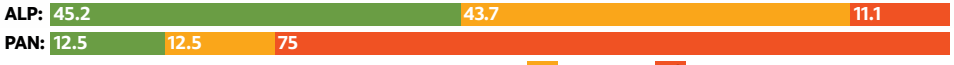
PMLs distribution and localization: It occurs mainly in the mountains, in medium and higher altitudes as well as in basins. It rarely penetrates into the lowlands, where it inhabits wetland habitats in the alluvia of sub-montane streams (e.g. in Záhorská nížina Lowland).



Monitoring results:

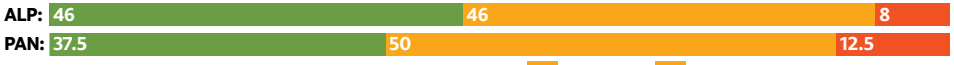
Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The negative pressures on the population include natural biological processes, such as eutrophication, succession and overgrowing, as well as intensive fish farming, soiling, land reclamation, drainage of habitats and surface water pollution caused by agriculture and forestry activities.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Assessment and notes on the monitoring results: Recording the species in the spring period based on the inventory of egg yields in the reproduction areas provided more reliable information on the quality of the population than monitoring executed in other periods. The status of the populations in the Alpine Bioregion appears to be stable, but in the future deterioration of the quality of many populations is expected mainly due to the loss of suitable reproduction habitats. The status of the populations in the Pannonian Bioregion is insufficient, but these populations are on the margins of the species' range already.

In the localities were the species is present the highest priority is to maintain appropriate reproduction areas. The species has a relatively wide ecological valence to different types of aquatic habitats, but it likes mainly waters without fish and with some submerged vegetation. An alternative aid to the species is the creation of artificial reproduction habitats as compensation, i.e. depressions with the capability of maintaining the water during entire life of the larvae, until their metamorphosis.


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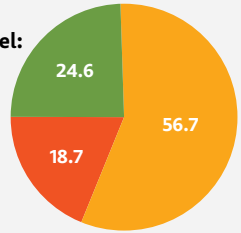
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Triturus cristatus (Laurenti, 1768)
(*Urodela, Salamandridae*)

Species of middle altitudes, adult individuals live in aquatic environment from spring to summer.

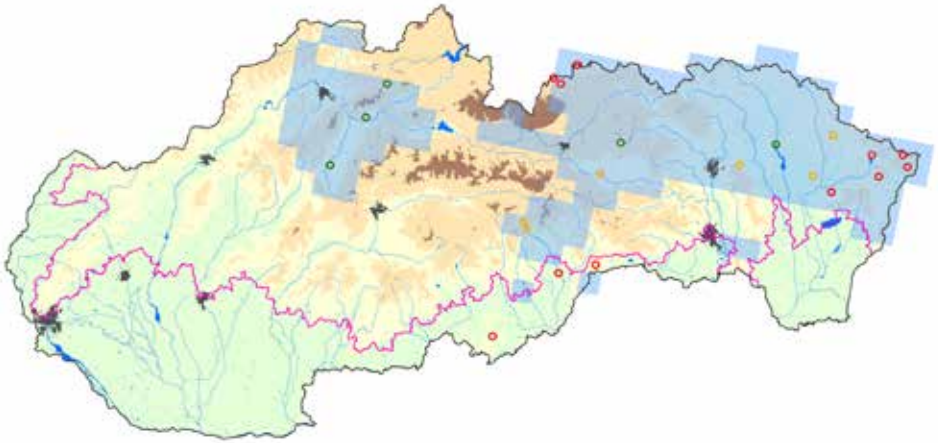
Number of PMLs: 21 **PML average area size:** 12.4 ha

Number of involved experts: 13 **Number of PML field visits:** 44

The most common accompanying species: *Rana temporaria*, *Bufo bufo*, *Bombina variegata*, *Natrix natrix*, *Triturus montandoni*, *Triturus vulgaris*, *Triturus alpestris*, *Sitta europaea*.

Monitoring method: Capturing of living individuals, or observations on transects or points. Monitoring carried out during the mating season, in aquatic environment, was done by capturing and optical observation of adult individuals (Majláth & Vongrej, 2013).

PMLs distribution and localization: It occurs in basins, foothills and lower mountains of northern, central and eastern Slovakia. During reproduction, it prefers deeper water bodies – artificial reservoirs, ponds, gravel pits and oxbow lakes.



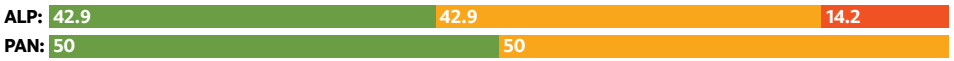
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U2

Pressures and threats: Negative pressures on the population of the species include: fish farming, intensification of agriculture, fertilisation, silting-up, land reclamation, drying-out and diffuse pollution of surface waters caused by household waste and sewage.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Assessment and notes on the monitoring results: The monitoring results point to the fact that in Slovakia the species' population is in decline. The negative result of monitoring is surprising in the case of the Grófske chyžky site (National Park Poloniny), which, in the past, appeared to be very promising. The species occurred here in large numbers and mating had also happened in the puddles in the wider area.

In general we can summarize that the populations are mainly threatened by the degradation or direct destruction of reproduction areas, as a result of agricultural activities, regulation of water courses and construction as well as pollution to which especially the larval stages are sensitive. In deeper waters, or in permanent water bodies, the high density of fish impacts negatively on the species (whether directly by the predation of adults or larvae, or indirectly by alteration of food supply, elimination of aquatic vegetation etc.).

In the localities where the species is present the highest priority is to maintain appropriate reproduction areas. Elimination of fish, especially of predatory species seems to be appropriate. An alternative way of preserving the species and improving status of populations is the creation of artificial reproduction habitats with deeper water.


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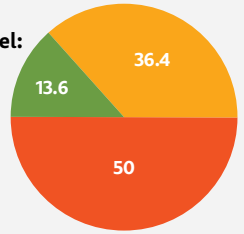
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Triturus dobrogicus (Kiritzescu, 1903)
(*Urodela, Salamandridae*)

Species typical for the Danube River basin, adults live in the water from spring to summer.

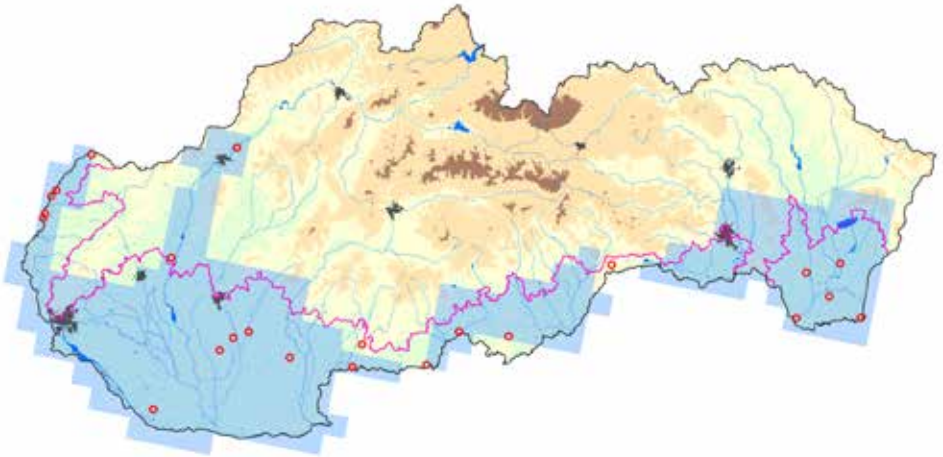
Number of PMLs: 23 **PML average area size:** 139.4 ha

Number of involved experts: 5 **Number of PML field visits:** 80

The most common accompanying species: *Rana esculenta, Bombina bombina, Rana ridibunda, Egretta alba, Triturus vulgaris, Natrix natrix, Rana temporaria, Anser anser, Hyla arborea, Bombina variegata.*

Monitoring method: Capturing of living individuals, observations on transects or points. Monitoring carried out during the mating season in aquatic environments was done by capturing and optical observation of adult individuals (Majláth & Vongrej, 2013).

PMLs distribution and localization: It inhabits mainly the alluvial areas of large rivers in lowlands, often floodplain forests with adjacent periodically flooded meadows, also the surroundings of oxbow lakes, or even overgrown drainage channels.



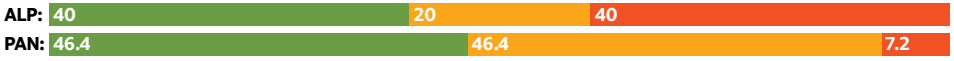
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

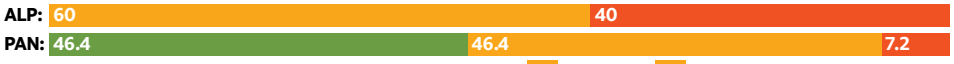
Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: In the Panonnian Bioregion the most significant negative pressures are agricultural activities. In the Alpine Bioregion these are abiotic changes of the environment, mainly silting-up or drying-up of the reproduction habitats.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Assessment and notes on the monitoring results: In most of the monitored localities the species was recorded only sporadically or was not recorded at all. The bad result of the species' status evaluation based on the results obtained in the field may be influenced by the monitoring method used. This proved to be ineffective and should be re-evaluated. It is likely that in fact the species is more numerous in many localities and thus the status of the population is better too. For example, successful hunting of newts by egrets was observed in the localities where the monitoring complying with the methodology brought a negative result. The species is most threatened by changes in the reproduction areas. In localities without higher levels of protection, the negative pressures on the species include mainly intensive agricultural land use. The alluvial areas of large rivers, that represent the core areas of the species distribution, are mainly used as arable land. This is causing the deterioration of temporary wetlands, which are the main habitats for reproduction of the species. In deeper waters, or in permanent water bodies, the species is negatively influenced by fish (whether directly by the predation of adults or larvae, or by indirect alteration of food supply, elimination of aquatic vegetation etc.). The species is negatively influenced also by natural abiotic changes to the environment, especially silting-up or drying-up of the reproduction habitats. This applies mainly to areas with a limited number or area of reproduction habitats.


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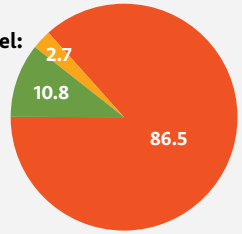
In the localities where the species occurs the highest priority is to maintain appropriate reproduction areas. It is necessary to maintain the possibility of the development of periodical water bodies in the spring. In locations where only permanent water bodies are present, the elimination of fish is important, especially of predatory species, but also of crucian, carp, grass carp and other species, which significantly influence and change the biotic conditions of the water. Alternative support for the species is creation of artificial reproduction habitats.

Overall assessment of the conservation status of species

Conservation status on national level:



Con. status of species: ALP: U2 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2

By bioregion:

Triturus montandoni (Boulenger, 1880)
(*Urodela, Salamandridae*)

Endemic species of the Carpathians, typical for middle and higher altitudes.

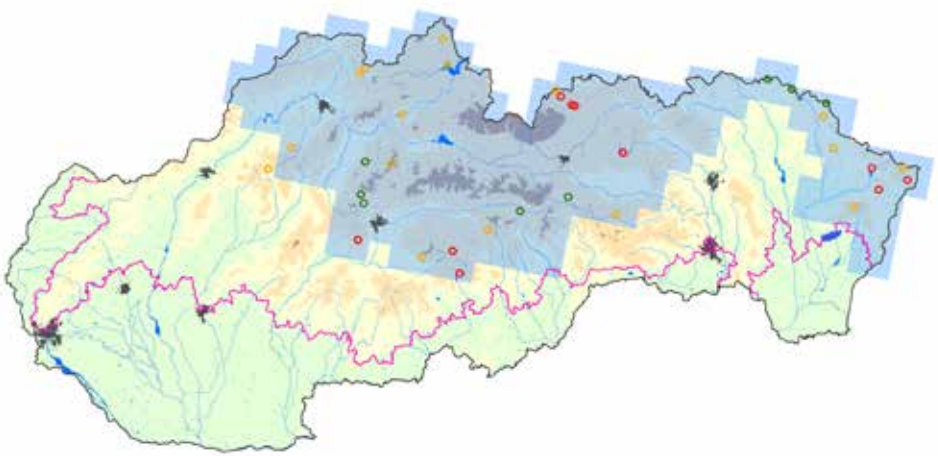
Number of PMLs: 34 **PML average area size:** 61.9 ha

Number of involved experts: 16 **Number of PML field visits:** 89

The most common accompanying species: *Triturus alpestris, Rana temporaria, Bombina variegata, Bufo bufo, Salamandra salamandra, Natrix natrix, Triturus vulgaris, Triturus cristatus, Hyla arborea.*

Monitoring method: Capturing of living individuals, or observations on transects or points. Monitoring of this species was carried out during the mating season, in aquatic environment, by capturing and optical observation of adult individuals (Majláth & Vongrej, 2013).

PMLs distribution and localization: The most significant negative pressures include abiotic changes to the environment, mainly eutrophication, succession and overgrowing as well as drying-up of hatching places due to the long-term deficit of rainfall.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: 0 PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most significant negative pressures include abiotic changes to the environment, mainly eutrophication, succession and overgrowing as well as drying-up of hatching places due to the long-term deficit of rainfall.

Assessment and notes on the monitoring results: According to the monitoring results the status of the population is unfavourable – inadequate. The bad result of the population status evaluation is based on the results obtained in the field and may be influenced by the monitoring method used. This could be more effective and should be reviewed. It is likely that in fact the species is more numerous in many localities and thus the status of the population is better too. It is threatened by deterioration of conditions necessary for reproduction and development of larvae, e.g. by filling up of puddles and tracks in unpaved roads as well as eutrophication, soiling and succession. Higher reproductive success is recorded in areas with frequent rainfall and in localities with the occurrence of water reservoirs with no fish stock. In the localities where the species is present the top priority is to maintain appropriate reproduction areas. It is necessary to maintain the possibility for the development of periodical water bodies in the spring. In the localities where only permanent water bodies are present, the elimination of fish is important, especially of predatory species. Alternatively, creation of artificial reproduction habitats is possible.

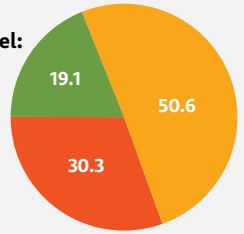
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Ablepharus kitaibelii (Mertens, 1952)
(*Squamata, Scincidae*)

Ablepharus kitaibelii is the only skink species living in our territory. When moving it pushes its legs against its body and then moves similarly to a snake.

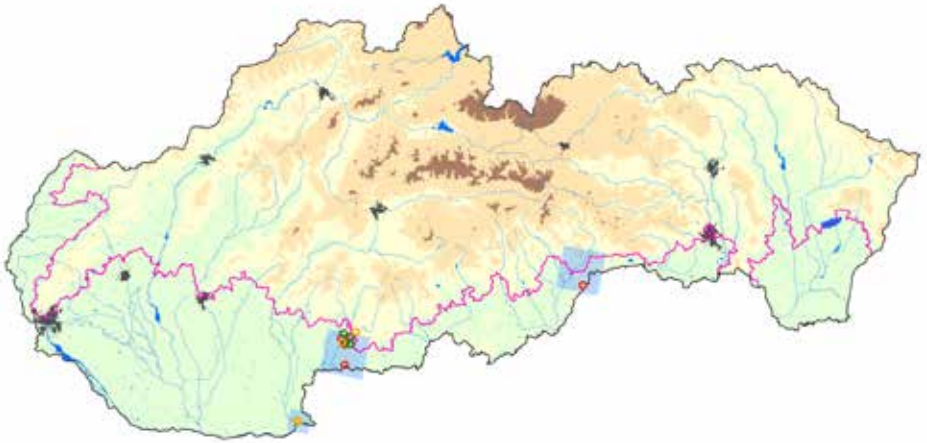
Number of PMLs: 12 **PML average area size:** 9.5 ha

Number of involved experts: 3 **Number of PML field visits:** 99

The most common accompanying species: *Lacerta viridis, Buteo buteo, Upupa epops, Sus scrofa, Oriolus oriolus, Lanius collurio, Hyla arborea, Cetonia aurata, Bufo viridis.*

Monitoring method: Transect method – 500 m long belt with a width of 5 m, sometimes the length of the transect was determined by the nature of the habitat; visually observed individuals were recorded and there maturity determined (adults – juveniles) (Majláth & Kánya, 2013).

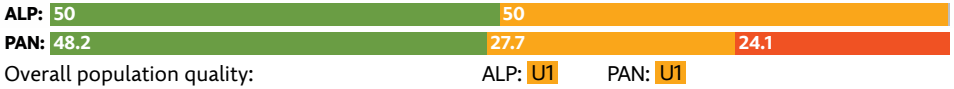
PMLs distribution and localization: NThe northern boundary of the species range crosses our territory. It lives in well-lit parts of oak forests on xerothermic hillsides oriented to the south-east, south and south-west. *Ablepharus kitaibelii* often hides on the ground in dead oak leaves.



Monitoring results:

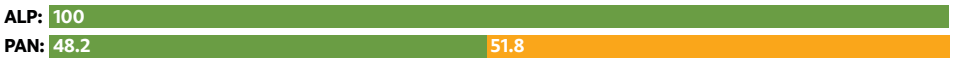
Estimate of the population size in the Alpine Bioregion: 0 – 50 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:



Overall habitat quality for the species: ALP: FV PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: U1

Pressures and threats: The most frequent pressures and threats include vegetation overgrowing (succession) the habitats (29 %) and damage caused by game (25 %).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Assessment and notes on the monitoring results: Due to its low reproductive capability, its numbers are constantly decreasing and in many locations it is disappearing. Since it has a lot of enemies (other reptiles, birds and collectors) its future is endangered in our territory. Because of the fact that it is a species of xerothermic hillsides, it rarely shares this habitat with humans and therefore the quality and future prospects of the habitats are relatively satisfactory. This species has a relatively low reproductive capability. It also spends most of the time hidden under dead leaves or stones and therefore is easy prey for predators. Because of these factors the stability of the species' population is threatened in the territory of Slovakia. It is necessary to pay attention to this species and to monitor it permanently. It is essential to restore and extend its habitats in the areas where it occurs, using appropriate management measures.


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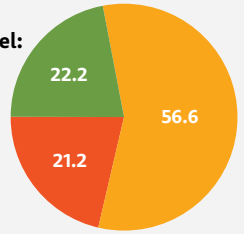
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Coronella austriaca (Laurenti, 1768)
(*Squamata, Colubridae*)

It is a small snake, of grey to brown colour, inhabiting forest steppes, feeding on other reptiles and small rodents.

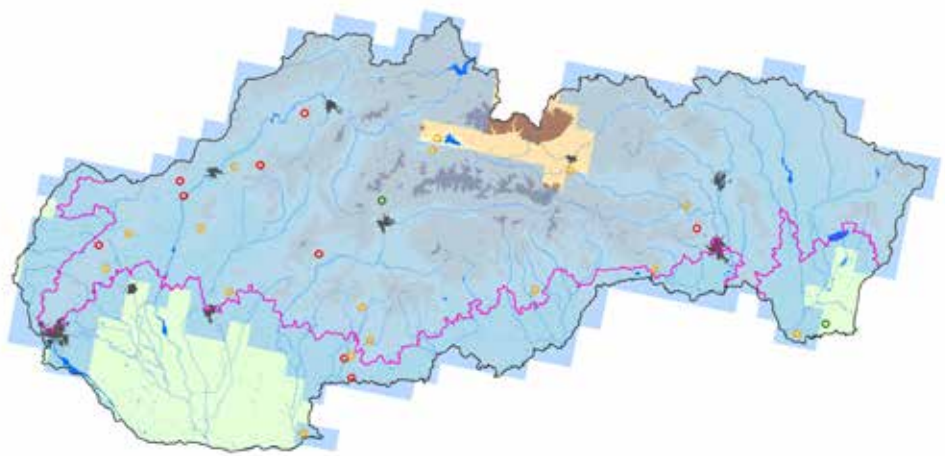
Number of PMLs: 28 **PML average area size:** 17 ha

Number of involved experts: 6 **Number of PML field visits:** 225

The most common accompanying species: *Lacerta viridis*, *Anguis fragilis*, *Natrix natrix*, *Lacerta agilis*, *Vipera berus*, *Lacerta vivipara*, *Vulpes vulpes*, *Lacerta* (*Podarcis*) *muralis*, *Gryllus campestris*.

Monitoring method: Transect method – 1,000 m long belt with a width of 5 m; all observed individuals and their sex and maturity (adults – juveniles) were recorded (Majláth & Kánya, 2013).

PMLs distribution and localization: Habitats with plenty of food (reptiles and rodents). It occurs mainly on forest steppes, sunny landscapes rich in hiding places.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats in the Alpine Bioregion include overgrowing (succession) of the habitats (25 %) and outdoor, sport and recreational activities (24 %). In the Pannonian Bioregion these include the changes in the management practices (23 %) and succession (19 %).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Assessment and notes on the monitoring results: In general, there were only a few localities evaluated as being in favourable status. Despite this, visits were recorded when many adult individuals were found in a relatively small places, e.g. under a piece cardboard, on a piece of wood.

Limiting the size and number of suitable habitats leads not only to the deterioration of the food supply and increased competition with other species of snakes, but also to extreme vulnerability of the whole population.

Very intensive mowing is not beneficial for the species; the same is true for the destruction of dry hiding places, but the abandonment of the traditional management and subsequent succession of the localities is also inappropriate.

The occurrence of the species was often recorded near human settlements (mainly recreational ones) – these provide plenty of hiding places and food. Due to the frequent confusion with the Common Adder (*Vipera berus*) it is necessary to significantly raise public awareness on the importance of snakes and the need for their protection.


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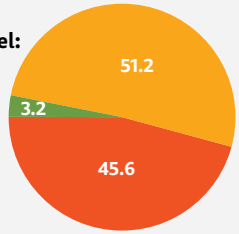
For continued monitoring of snakes, in general, it would be useful to create artificial hiding places in the PMLs by placing larger items suitable for hiding under (cardboards, linoleum, carpets) – thus increasing the possibility of positive registration of the species.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U2
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Elaphe longissima (Laurenti, 1768)
(*Squamata, Colubridae*)

It is a muscular snake with a small narrow head, slim body and long tail. The young resemble *Natrix natrix*. Its abdomen is a straw-yellow colour and this is its main determining feature.

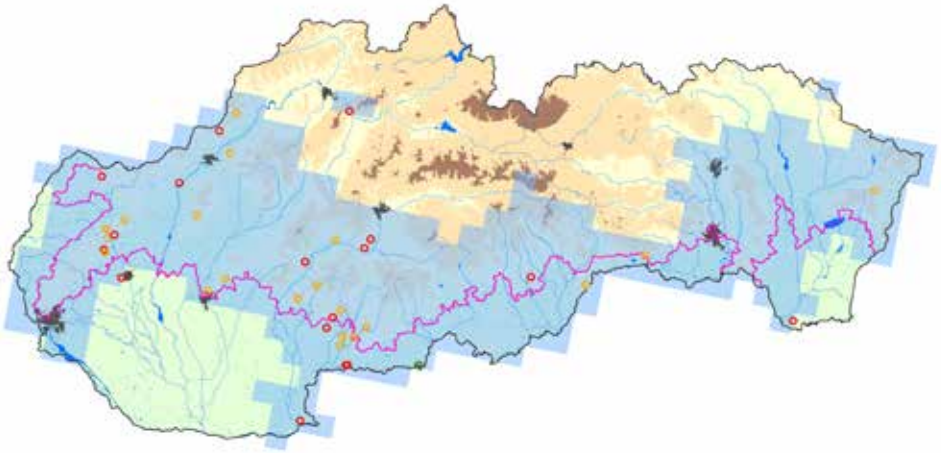
Number of PMLs: 38 **PML average area size:** 23.8 ha

Number of involved experts: 7 **Number of PML field visits:** 296

The most common accompanying species: *Natrix natrix*, *Anguis fragilis*, *Lacerta viridis*, *Lacerta agilis*, *Rana temporaria*, *Lacerta* (*Podarcis*) *muralis*, *Felis silvestris catus*, *Ardea cinerea*, *Dama dama*, *Coronella austriaca*.

Monitoring method: Transect method – 1,000 m long belt transect with a width of 5 m; all observed individuals along with their sex and maturity (adults – juveniles) were recorded (Majláth & Kánya, 2013).

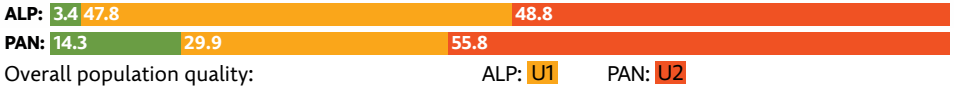
PMLs distribution and localization: *Elaphe longissima* inhabits mainly lowlands or middle altitudes. It prefers warm, sun-lit areas of forest steppes, bright groves and deciduous forests where it resides mainly in the lower parts of the bush layer.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats in the Alpine Bioregion include overgrowing (succession) of the habitats (22 %), urbanisation and human settlements (19 %). In the Pannonian Bioregion similarly it is succession of the habitats and changes in the management practices (both 20 %).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Assessment and notes on the monitoring results: Very intensive mowing as well as destruction of dry hiding places is not beneficial for the species; the abandonment of the traditional management and subsequent succession of vegetation in the localities is also inappropriate. The occurrence of the species was often recorded near human settlements (mainly recreational ones). These provide plenty of hiding places and food. Due to the deep-rooted fear of snakes among people it is necessary to significantly raise public awareness on the importance of snakes and the need for their protection. The populations located near roads are threatened by transport. In several locations, killing of *Elaphe longissima* specimen was recorded.

Most of the localities are in bad status but this just reflects the low success of monitoring of the snakes. For continued monitoring of snakes, in general, it would be useful to create artificial hiding places in the PMLs by placing larger items suitable for hiding under (cardboards, linoleum, carpets) – thus increasing the possibility of positive registration of the species.


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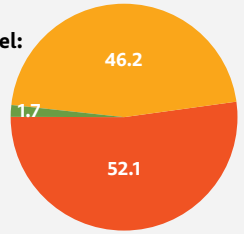
Overall assessment of the conservation status of species

Conservation status on national level:

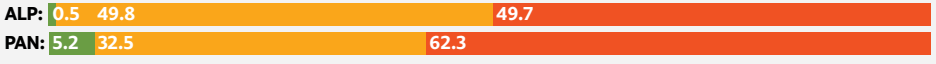
Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:



Emys orbicularis (Linaeus, 1768)
(*Chelonii*, *Emydidae*)

It is the only native species of turtle that occurs in our territory.

Number of PMLs: 7 **PML average area size:** 45 ha

Number of involved experts: 3 **Number of PML field visits:** 54

The most common accompanying species: *Natrix natrix*, *Lacerta agilis*, *Ardea cinerea*, *Alcedo atthis*, *Anodonta cygnaea*, *Pseudemys scripta*, *Rana ridibunda*, *Martes* sp., *Lacerta viridis*, *Cygnus olor.*

Monitoring method: Transects – of 1,000-4,000 m (depending on the density of population and the nature of PML) located on the banks of water bodies/rivers or marshes, transects in the localities of potential oviposition were visited during period of egg-laying; all observed individuals were recorded and categorized by maturity (adults – juveniles) (Majláth & Kánya, 2013).

PMLs distribution and localization: It occurs near standing and slow-flowing waters. It can also be found in overgrown dead-end stream branches, in ponds and lakes.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 150 – 250 individuals

Estimate of the population development trend: ALP: PAN: –

<u>Population quality in PMLs:</u>

Overall population quality: ALP: PAN: U2

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: PAN: U1

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats include changes in the management practices (28 %), intensive agriculture interfering with oviposition areas and the banks of water bodies where the species is present (16 %).

Assessment and notes on the monitoring results: At the present time the only known population in Slovakia that is regularly reproducing is located in the National Nature Reserve Tajba near Streda nad Bodrogom. The other localities represent only remnant populations. Without appropriate management and stricter conditions of use in close proximity of these localities the local population have no chance to survive.

Today, the oviposition sites are threatened mainly by wild carnivores and game (foxes, badgers, wild boars). The area of the oviposition sites, limited due to shrub encroachment and intensive agriculture means that the turtles are often forced to lay eggs on field roads where they are destroyed by the passing cars and machinery. When the egg yields are lost, the population is not supplied with juveniles, which causes its ageing and automatically causes deterioration of its reproductive capability and durability. There is a risk that if the Tajba locality should cease to exist (extreme drought, release of chemicals into water etc.) the species would become practically extinct in the territory of Slovakia.

To achieve a favourable status of the species and its habitats it is necessary to implement the following actions: restore habitats in NNR Tajba and its surroundings, map the distribution of *Emys orbicularis* in the territory of Slovakia and restore populations of *Emys orbicularis* in selected sites. It is also necessary to prevent spreading of invasive alien species of turtles.

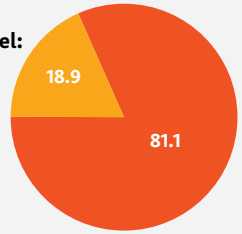
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: PAN: U2

Conservation status in SCIs: U2

Overall conservation status on national level: U2



By bioregion:

Lacerta agilis (Linné, 1758)
(*Squamata, Lacertidae*)

In Slovakia the species is present in few colour aberrations. Except the generally common green-grey-brown variation a melanistic form and also very pale specimen can be found.

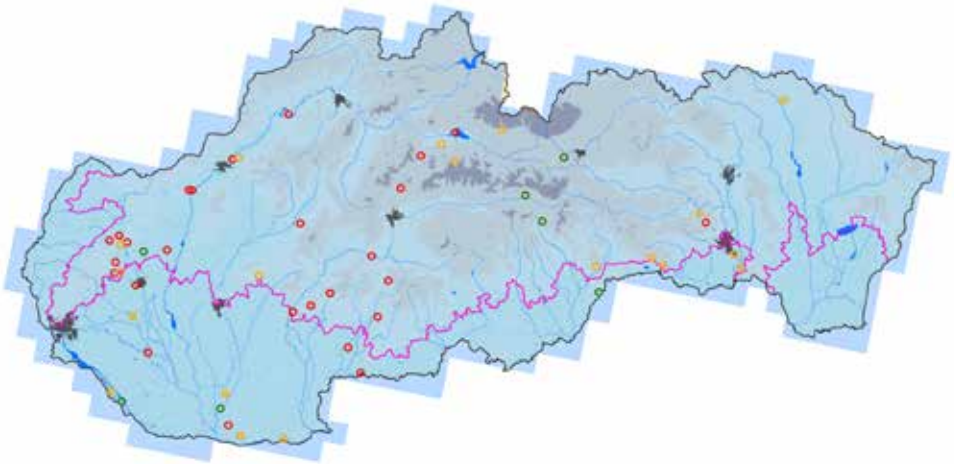
Number of PMLs: 52 **PML average area size:** 21.2 ha

Number of involved experts: 5 **Number of PML field visits:** 252

The most common accompanying species: *Natrix natrix*, *Vipera berus*, *Anguis fragilis*, *Lacerta viridis*, *Upupa epops*, *Dendrocopos* sp., *Falco tinnunculus*, *Merops apiaster*, *Picus viridis.*

Monitoring method: Transects – 1,000 m long strips with a width of 5 m, the length of transect can be determined according to the status of the habitat; all observed individuals are recorded and their age (adults – juveniles) and sex (for adult individuals) determined (Majláth & Kánya, 2013).

PMLs distribution and localization: It usually inhabits sunny grassland hillsides, pastures, bushy areas, clearings, gravel pits, railway embankments, forest edges etc. Due to the destruction of its natural habitats, it often occurs near human settlements as well.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats in both bioregions include the habitats being overgrown (succession) and predation by other animal species (mainly domestic cats).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Assessment and notes on the monitoring results: This species is considered to be relatively abundant, but the experience during the monitoring of reptiles indicates that it is quite endangered and its population is significantly decreasing. The decrease is evident mainly in localities near permanent settlements where people keep cats and other domestic animals. These represent important predators and they can quickly decimate the entire local populations of lizards. Several, former localities with numerous populations were excluded from the monitoring after the first year due to expanded urbanisation. After repeated visits to these localities no individuals of this species were recorded there. On these sites the presence of domestic animals was visible. In recreational locations (cottages and garden settlements), rarely visited by people, the significant decrease of the populations was not observed.

In the PMLs it is appropriate to implement active management in the form of grassland mowing and removal of woody vegetation to avoid shading of the locations that have suitable hiding places. At the same time it is necessary to raise public awareness on the consequences of proliferation and free movement of domestic animals (cats and dogs) to the native fauna.


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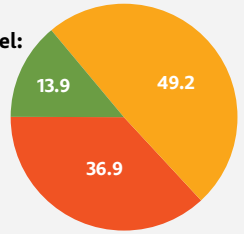
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Lacerta viridis (Laurenti, 1768)
(*Squamata, Lacertidae*)

This is our largest lizard. In the areas where it occurs, it represents an important predator due to its size and voraciousness.

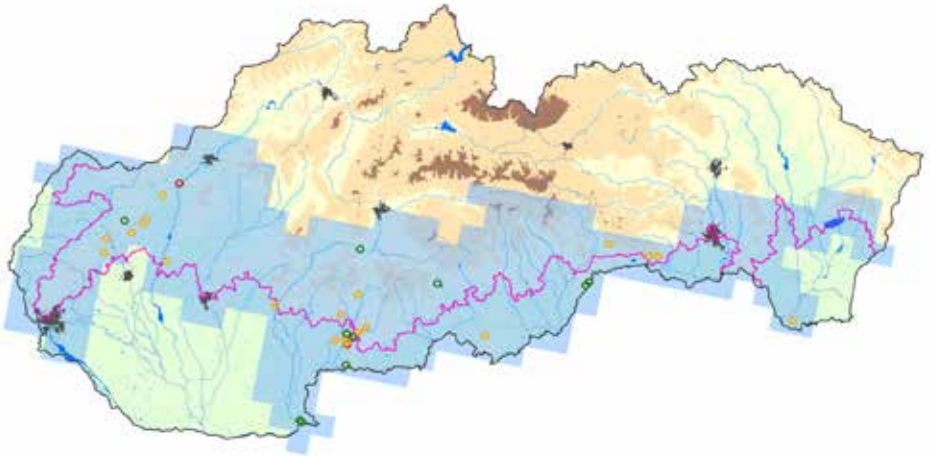
Number of PMLs: 32 **PML average area size:** 16.1 ha

Number of involved experts: 6 **Number of PML field visits:** 194

The most common accompanying species: *Podarcis* (*Lacerta*) *muralis*, *Anguis fragilis*, *Felis silvestris catus*, *Lucanus cervus*, *Natrix natrix*, *Lacerta agilis*, *Elaphe longissima*, *Dendrocopos* sp.

Monitoring method: Transects – 1,000 m long strips with a width of 5 m, sometimes the length of transect was determined by the actual status of the habitat; visually observed individuals were recorded and their maturity (adults – juveniles) and sex (for adult individuals) was determined (Majláth & Kánya, 2013).

PMLs distribution and localization: This is a thermophilous lizard, which prefers dry, warm and sunny habitats of steppe and forest steppe character, such as rocky and bushy slopes on limestone and sandstone substrates as well as forest edges, pastures and vineyards.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1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Pressures and threats: The most frequent pressures and threats include vegetation overgrowing (succession) the habitats (34 %) and predation pressure mainly from domestic animals, but also natural predators (wild boars, foxes) (19 %) in both bioregions of Slovakia.

Assessment and notes on the monitoring results: The species was recorded in the PMLs during most visits. Up to 68 % of the PLM visits showed unfavourable-inadequate species status, but 25 % of them resulted in favourable status. The best localities include Sites of Community Importance: Boky, Burdov and Domické škrapy. Other localities such as Brezovská stráň, Turecký vrch have showed negative results. The species finds better conditions in the Pannonian Biogeographic Region.

Lacerta viridis is mainly threatened by succession and its habitats being overgrown. Secondary negative factors include domestic cats that can extirpate entire populations near human settlements.

In the PMLs it is appropriate to implement active management in the form of grassland mowing and removal of woody vegetation to avoid shading of the locations with suitable hiding places. In some places it is appropriate to leave some bushes that can be used as hiding places.


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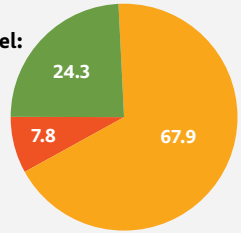
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Lacerta (*Zootoca*) *vivipara pannonica* (Von Jacquin, 1787)
(*Squamata, Lacertidae*)

With a length of 15-18 cm it is one of the smallest lizards present in Slovakia.

Number of PMLs: 7 **PML average area size:** 104 ha

Number of involved experts: 3 **Number of PML field visits:** 44

The most common accompanying species: *Lacerta agilis*, *Ciconia nigra*.

Monitoring method: Transects – 1,000 m long strip with the width of 5 m, in some cases the length of the transect was determined by the nature of the habitat, reflecting the environment and the way of life of the given species (depending on the population density and the nature of the PML); the observed individuals were recorded and their maturity (adults – juveniles) and sex (for adult individuals) was determined (Majláth & Kánya, 2013).

PMLs distribution and localization: *Lacerta vivipara pannonica* inhabits several habitats with various climatic conditions. We can find it mainly near water sources, in places where it can bask in the sun, e.g. on elevated stony or rocky areas with hiding places, in dense vegetation, or in rock crevices.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals

Estimate of the population development trend: ALP: PAN: –

Population quality in PMLs:

Overall population quality: ALP: PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most frequent pressures and threats include vegetation overgrowing (succession) the habitats (51 %) and excessive mowing (39 %).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Assessment and notes on the monitoring results: The monitoring was carried out in locations known for the species' presence from the past. Occurrence and concentration of individuals recorded on the monitored site was significantly dependent on the weather conditions at the time of observation. During seasons with high air temperature, which occurred mainly during the last year (2015), the number of recorded individuals was considerably lower than in other period of year.

Apart from the extreme temperatures, the lower abundance of the species is also caused by significant progress of succession on some localities.

It is therefore appropriate to implement active management by mowing grasslands and clearing wood and shrub encroachment to prevent shading of parts with suitable hiding places. At the same time it is necessary to raise public awareness on the consequences of proliferation and free movement of domestic animals (cats and dogs) to the native fauna.


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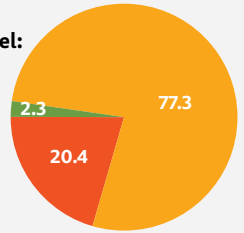
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Natrix tessellata (Laurenti, 1768)
(*Squamata, Colubridae*)

This snake is markedly bound to aquatic habitats. It is a thermophilic, very shy snake that is hardly noticed.

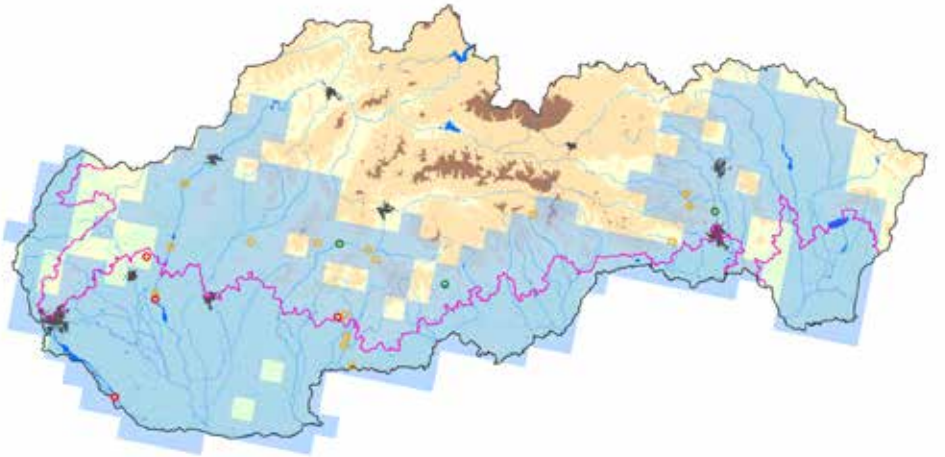
Number of PMLs: 22 **PML average area size:** 43.7 ha

Number of involved experts: 5 **Number of PML field visits:** 159

The most common accompanying species: *Natrix natrix, Alcedo atthis, Ardea cinerea, Anas platyrhynchos, Calopteryx virgo, Motacilla alba, Rana esculenta, Rana temporaria, Leuciscus cephalus, Lacerta viridis.*

Monitoring method: Transect method – 1,000 m long belt transect located in close proximity to the water body or course; all observed individuals were recorded and their sex and maturity (adults – juveniles) were determined (Majláth & Kánya, 2013).

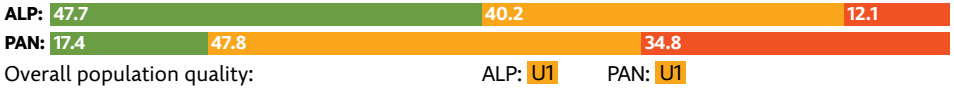
PMLs distribution and localization: *Natrix tessellata* lives mainly near slow-flowing rivers, with dense vegetation on the banks. It also occurs on the shore of the densely overgrown lakes with plenty of fish. When disturbed it quickly escapes into its hiding place.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:



Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats in the Alpine Bioregion include transport networks (16 %), fishing (16 %) and surface water pollution (16 %). In the Pannonian Bioregion the most important pressure is overgrowing of habitats (succession) (17 %).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Assessment and notes on the monitoring results: Because this species is bound to streams and lakes, the success of its inventory was the best among the snakes. The populations living near roads, even unfrequented ones, are threatened by transport. The pollution of water courses seems to a problem for *Natrix tessellata*. It is therefore necessary to strictly adhere to high standards of water quality in both smaller water courses and tributaries of larger rivers, where there is enough food for the species.

The occurrence of the species was often recorded near human settlements (mainly recreational ones), on the river banks. Fishermen, especially, often consider this species to be harmful.

Due to the frequent confusion with Common Adder *Vipera berus* it is necessary to significantly raise public awareness on the importance of snakes and the need for their protection.

For the continued monitoring of snakes; in general, it is suitable to create artificial hiding places in the localities by placing larger items suitable for hiding (cardboards, linoleum, carpets), thus increasing the chance of positive registration of the species.


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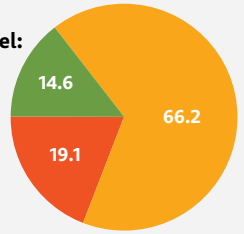
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: U1



By bioregion:

Podarcis (*Lacerta*) *muralis* (Linaeus, 1768)
(*Squamata*, *Lacertidae*)

Podarcis (*Lacerta*) *muralis* is a slim and extremely agile lizard species.

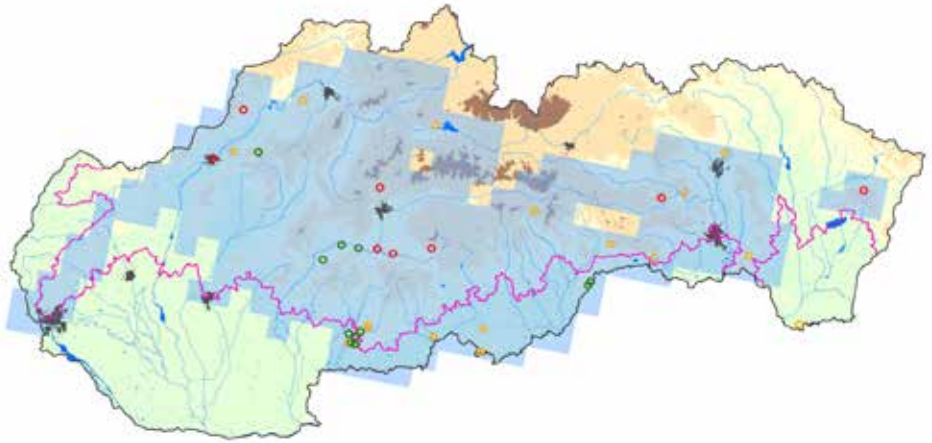
Number of PMLs: 35 **PML average area size:** 14.4 ha

Number of involved experts: 6 **Number of PML field visits:** 251

The most common accompanying species: *Lacerta viridis*, *Lacerta vivipara*, *Anguis fragilis*, *Cetonia aurata*, *Bombus terrestris*, *Coronella austriaca*, *Lacerta agilis*, *Liparus glabrirostris*, *Vipera berus*.

Monitoring method: Transects – 1,000 m long strip with a width of 5 m, in some cases the length of transect was determined by the nature of the habitat; observed individuals were recorded along with their maturity (adults – juveniles) and sex (for adult individuals) being determined.

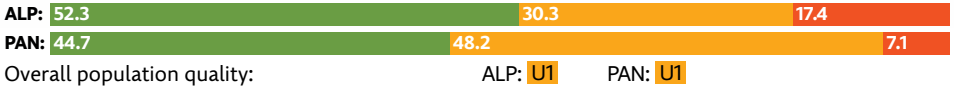
PMLs distribution and localization: *Podarcis* (*Lacerta*) *muralis* prefers sun-exposed hillsides in andesite and limestone areas. It inhabits mainly well-lit forests in which it gathers on rocky habitats. We can find it in ruins, stone buildings, abandoned quarries, old walls, dams and river embankments and ramparts of roads and railways.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

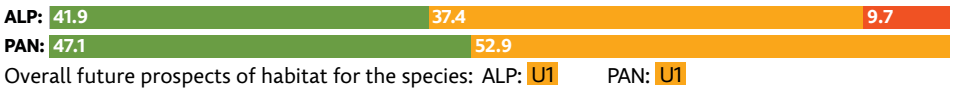


Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats include habitats being overgrown (succession, 32 %), recreational activities (23 %) and urbanisation and predation pressure by game species (14 %).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Assessment and notes on the monitoring results: A typical feature of this species is that its populations are isolated and concentrated in a small area (castles, ruins and rocky cliffs). Thanks to it these populations are threatened even by small interventions into the habitat. Some historical localities were excluded from the monitoring after the first year because repeat visits did not prove the presence of the species. The best sites for the species seem to be some Sites of Community Importance – the ruins of the castle Čabraď, Boky, Suť, Brezovská stráň, Litava etc.

As with most reptiles, this species is mostly threatened by succession and by the localities being overgrown by shrubs and trees. The species frequently occurs in visited places (e.g. castles, ruins). Their reconstruction may cause destruction of the suitable habitats and increasing of the number of visitors may result in permanent disturbance and disappearance of the species. Removal of the vegetation from these ruins or its thinning may help this species considerably.

The management of the localities where the species occurs should include thinning of the vegetation on suitable dry rocks and screes. The lizards may become an attraction for visitors of castles and ruins but such locations should be saved from too much pressure.


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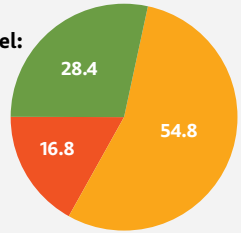
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Castor fiber Linnaeus, 1758
(*Rodentia, Castoridae*)

In the territory of Slovakia, *Castor fiber,* inhabits mainly lowland streams, but if there is enough food it enters into mountain streams too. Its distribution in Slovakia is influenced by an almost one-hundred-years long absence from the country that it is gradually repopulating.

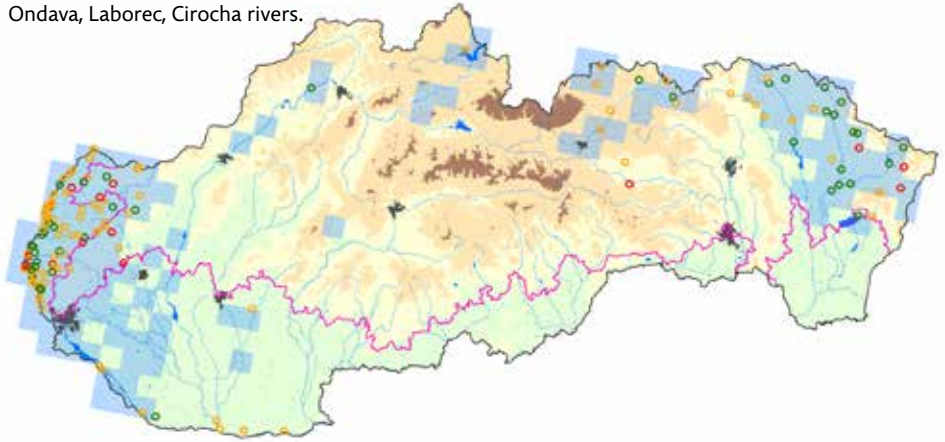
Number of PMLs: 136 **PML average area size:** 38.96 ha

Number of involved experts: 17 **Number of PML field visits:** 273

The most common accompanying species: *Sus scrofa, Lutra lutra, Ardea cinerea, Casmerodius albus, Capreolus capreolus, Anas platyrhynchos, Alcedo atthis, Unio tumidus, Unio pictorum, Cinclus cinclus.*

Monitoring method: Recording the habitual signs of the *C. fiber* on transects 20 × 5,000 m along the banks of water bodies in the winter season from 1st December to 30th March with the aim to determine the size of the home range as well as the size of beaver family.

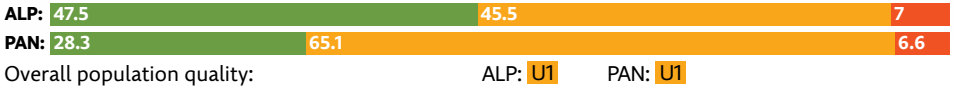
PMLs distribution and localization: Banks of nearly all standing and flowing waters. It avoids streams which are only rocky with a fast current, steep gradient and insufficient food supply of woody bankside vegetation and other accompanying vegetation. Localities include the Záhorie Region, the foothills of Malé Karpaty Mountains, Podunajsko, Považie and Orava regions, the river basins of Poprad, Topľa, Ondava, Laborec, Cirocha rivers.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 70 – 100 individuals
Estimate of the population size in the Pannonian Bioregion: 450 – 600 individuals
Estimate of the population development trend: ALP: + PAN: +

Population quality in PMLs:

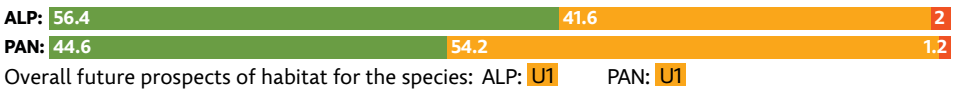


Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most common pressures and threats, of high or moderate intensity, include the lack of rainfall resulting in the loss of surface water (43 %) and the polluting of water bodies (13 %). Another factor of lower intensity is potential flooding during the first two months of the life of the young (8 %). During this time they are immobile.

Assessment and notes on the monitoring results: In relation to the fact that *C. fiber* is repopulating across the country, the PMLs were localized predominantly in Záhorie Region (68 %), which was the first area the species inhabited again. The aim was to capture the dynamics of the re-settlement process, including natural decrease in the abundance (population regression) after reaching the peak (culmination) of the pioneer (initial) population.

The habitat quality in most of the monitored locations is unfavourable. The most common reason was the lack of water during the first monitoring season, which partly lasted up to the second season. Some of the localities are also in an unfavourable condition due to the absence of key winter food sources (poplar and willow). This is related to the stage of the population development, where the initial population occupies suboptimal habitats too. Nevertheless, in several localities with optimal food supply, there are minimal habitual signs of *C. fiber* presence, as the settled family has fallen apart due to over-ageing.

The abundance of *C. fiber* is increasing due to the colonization of other new localities and river basins. This trend can be expected to continue as long as the protected status of the beaver is maintained in the next decades too. In regions where the species is currently present in high density (which is the source of the re-colonisation), the population will gradually evolve to reach a balanced state.

Other significant species of animals were also recorded in the monitored localities, some of them depend on the water level created by the activity of beaver, e.g. *Alcedo atthis*, *Brachytron pratense*, *Gomphus flavipes*, *Sympetrum pedemontanum* and *Libellula fulva.*

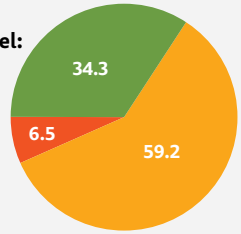
Overall assessment of the conservation status of species

Conservation status on national level:

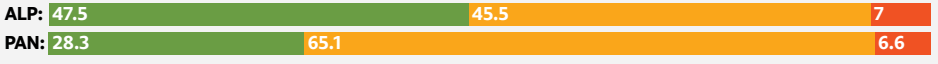
Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:



Cricetus cricetus (Linnaeus, 1758)
(*Rodentia, Cricetidae*)

Cricetus cricetus inhabits open cultivated landscape. In such areas it inhabits mainly hedges, meadows, edges of agricultural crop fields, gardens and orchards. It prefers habitats with softer substrate, where it burrows systems of tunnels, in which it lives and reproduces.

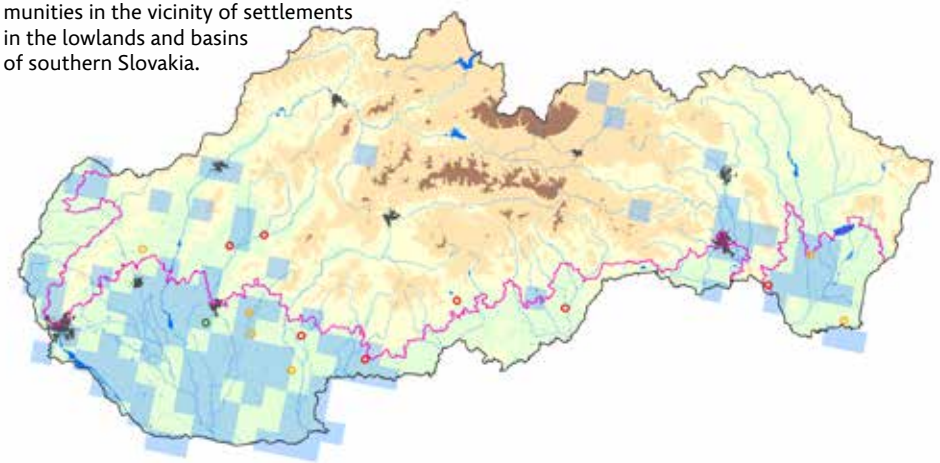
Number of PMLs: 14 **PML average area size:** 1,031.6 ha

Number of involved experts: 6 **Number of PML field visits:** 32

The most common accompanying species: *Microtus arvalis*, *Apodemus sylvaticus*, *Apodemus microps*, *Mustela nivalis*, *Mus musculus*, *Sorex araneus*, *Crocidura suaveolens*, *Clethrionomys glareolus*, *Apodemus flavicollis*.

Monitoring method: Counting of observed individuals in a given time unit in a selected area at the time of the highest or lowest daily activity. Counting of observed habitual signs of the individuals of the species in a given time unit (e.g. 2 hours) or its multiple in a selected area compared to the total area of the locality. Capture of individuals in live traps fixed in a line (line method).

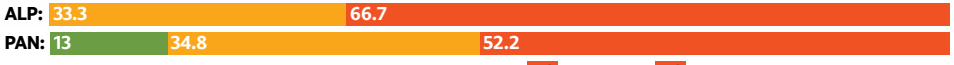
PMLs distribution and localization: Agricultural land – edges of agricultural crop-fields, ruderal communities in the vicinity of settlements in the lowlands and basins of southern Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100 – 500 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:



Overall population quality: ALP: U2 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, usually of moderate intensity, include a change in the function of landscape elements that create habitats suitable for life and reproduction of *Cricetus cricetus*. The most frequent changes include the conversion of grasslands to arable land and frequent changes of agricultural crops.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Assessment and notes on the monitoring results: The quality of the *Cricetus cricetus* population as well as the habitat quality in the monitored sites in the Alpine and Pannonian Bioregions were evaluated as inadequate and bad. This fact can be considered as extremely alarming because the species was once dominant and a constant component of the communities of small mammals of the agricultural landscape in the southern part of Slovakia with a relatively high abundance and population cycles (outbreaks), distributed continuously in most of its range in Slovakia. One of the causes of the current unfavourable status of the *Cricetus cricetus* population in Slovakia is the fact that the individuals are not able to have more than one litter per season, as the result of the timing of agricultural activities inappropriate for reproduction of the species (early ploughing, missing winter crops etc.). Also the replacement of trophically favourable crops, for *Cricetus cricetus*, by less suitable ones may have an impact on the decreasing number of the populations in the territory of Slovakia. Because traditional ways of conservation (protected areas, management etc.) can hardly be used for *Cricetus cricetus* we recommend: a) the retention of green belts in the cultural landscape, b) planning agricultural work so that the females of *Cricetus cricetus* are capable of multiple litters per season.


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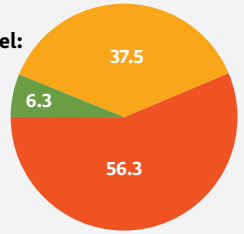
Overall assessment of the conservation status of species

Conservation status on national level:

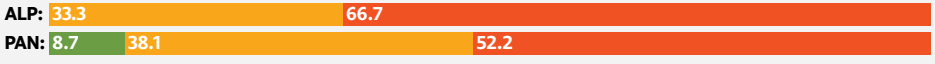


Con. status of species: ALP: U2 PAN: U2

Conservation status in SCIs: N/A

Overall conservation status on national level: U2

By bioregion:



Dryomys nitedula Pallas, 1778
(*Rodentia, Gliridae*)

Dryomys nitedula occurs mainly in young deciduous and mixed forests, and also on rare occasions inhabits forest steppe habitats (Krištofík, 2012).

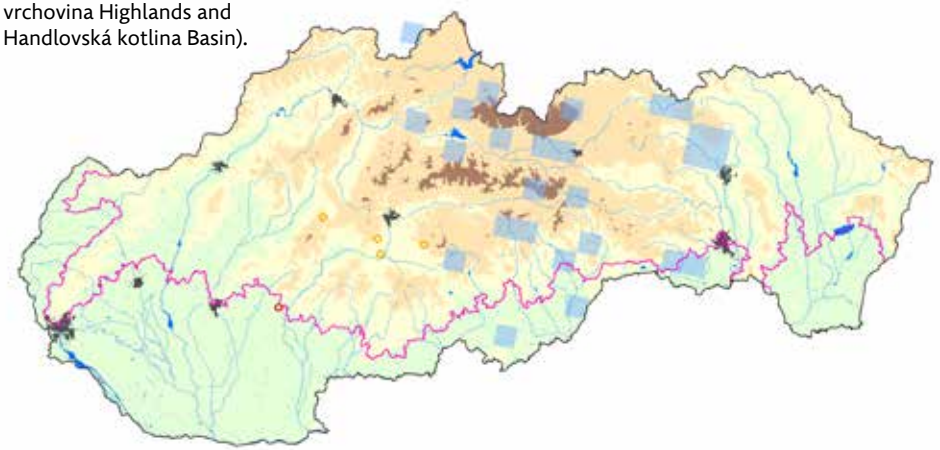
Number of PMLs: 5 **PML average area size:** 6,348.46 ha

Number of involved experts: 3 **Number of PML field visits:** 19

The most common accompanying species: *Apodemus flavicollis*, *Apodemus sylvaticus*, *Clethrionomys glareolus*, *Microtus subterraneus*, *Microtus arvalis*, *Muscardinus avellanarius*, *Glis glis*, *Sorex araneus*, *Sorex minutus.*

Monitoring method: The monitoring method consisted of the installation of artificial nest boxes to be checked during the vegetation season, the continuous visual or acoustic registration using digital scouting cameras, and the line or quadratic method of capturing individuals in live traps (e.g. Sherman type).

PMLs distribution and localization: *Dryomys nitedula* is distributed discontinuously in sub-montane and montane forests. Five PMLs monitored in 2013-2015 were very unevenly distributed over five orographic units (Hronská pahorkatina Upland, Turovské predhorie, Zvolenská pahorkatina Upland, Lomnianska vrchovina Highlands and Handlovská kotlina Basin).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 500 – 1,000 individuals
Estimate of the population size in the Pannonian Bioregion: 50 – 100 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U2

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: In Alpine Bioregion, negative pressures of the highest frequency include mowing – especially mechanized (60 %), and forest management and forestry activities (40 %). Within the Pannonian Bioregion, the pressures and threats include interspecific competition (67 %) and forestry activities (33 %).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Assessment and notes on the monitoring results: The overall quality of the habitat type in the monitored PMLs is inadequate (up to 75 % in PML in the Pannonian Bioregion) due to inappropriate forestry interventions, mechanized mowing and reduction of scrub and tree vegetation belts. A slightly more favourable situation has been ascertained in the PMLs of the Alpine Bioregion (60 % of the monitored areas have a good status), but also negative impacts of the intensive management of meadows and pastures can be seen here, associated with the cutting down of non-forest woody vegetation and the application of inappropriate forestry interventions. The future prospects of the habitats are, with the current intensity of anthropic disturbances, unfavourable-inadequate, in both the Alpine and the Pannonian Bioregions. The quality of the population in the Alpine Bioregion is predominately bad (53 %). The Pannonian populations are all currently in a bad state (100 %) – all visits for the target species, carried out on five PMLs during three-years monitoring period had a negative result.


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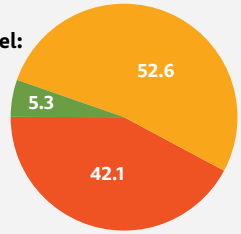
To increase the likelihood of positive registrations of the given species in PMLs, we propose to extend the monitoring to the collection and analysis of owl pellets (*Strix aluco, Bubo Bubo*), or of the raven (*Corvus corax*), that can confirm the presence of *Dryomys nitedula* even at low population densities.

In the monitored localities the other species of dormouse, such as *Muscardinus avellanarius* and *Glis glis* occurred most frequently.

Overall assessment of the conservation status of species

Conservation status on national level:



Con. status of species: ALP: U1 PAN: U2

Conservation status in SCIs:

Overall conservation status on national level: **U1**

By bioregion:

**Marmota marmota latirostris* Kratochvíl, 1961 (*Rodentia, Sciuridae*)

Marmota marmota latirostris (Kratochvíl 1961) occurs in Západné Tatry, Vysoké Tatry, Belianske Tatry Mountains and in the Ďumbier part of the Nízke Tatry Mountains. It occurs in sub-alpine, Alpine and subnival zones of grassy uplands and rocky screes.

Number of PMLs: 9 **PML average area size:** 95 ha

Number of involved experts: 4 **Number of PML field visits:** 30

The most common accompanying species: *Anthus spinoletta, Oenanthe oenanthe, Phoenicurus ochruros, Aquila chrysaetos, Corvus corax, Falco tinnunculus, Falco peregrinus, Buteo buteo, Rupicapra rupicapra tatrica, Vulpes vulpes.*

Monitoring method: Mapping of the winter burrows of marmots in the spring months and survey of families' abundance during the summer (incl. determination of the age – adult/juvenile).

PMLs distribution and localization: The location of PMLs was determined on the basis of the data on former occurrence of marmot families in each valley unit, scree fields, moraines and trenches with alpine grassland vegetation that the marmots colonise.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 800 – 1,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: + PAN:

Population quality in PMLs:

Overall population quality: ALP: FV PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN:

Pressures and threats: The most frequent pressures and threats, of moderate intensity, include: skiing and alpine skiing, sports and recreational activities e.g. hiking, mountaineering and rock climbing, picking berries and non-intensive grazing.

Assessment and notes on the monitoring results: The marmots are active in the Tatry Mountains for 5-6 months, the other 6-7 months of the year is a period of hibernation. The habitats in the areas where the species occurs are suitable; they meet the habitat requirements of the marmots. During the monitoring, it was found out that marmots that had the main burrow near the hiking trails were often disturbed by tourists and especially by photographers. These marmots gradually built other burrows at a greater distance from the tourist centres, or they completely emigrated from the territory. The negative pressures and threats include walking dogs off leash and non-compliance with the visitor rules of the protected areas. Predation by terrestrial carnivores (especially by fox *Vulpes vulpes*) and birds of prey (Golden Eagle *Aquila chrysaetos*) is a commonly seen threat for the populations, especially for young marmots.

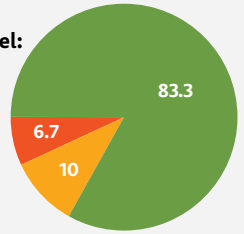
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

**Microtus oeconomus mehelyi* Ehik, 1928
(*Rodentia, Cricetidae*)

Microtus oeconomus is a relic of the Ice Age fauna. Its current population inhabits wetland habitats in southern Slovakia in Podunajská rovina Lowland and Hronská pahorkatina Upland.

Number of PMLs: 9 **PML average area size:** 152.6 ha

Number of involved experts: 1 **Number of PML field visits:** 44

The most common accompanying species: *Clethrionomys glareolus*, *Sorex araneus*, *Apodemus microps*, *Apodemus agrarius*, *Apodemus sylvaticus*, *Micromys minutus*, *Microtus arvalis*, *Microtus subterraneus*, *Sorex minutus.*

Monitoring method: Capture in live traps set up on in the line (or quadrant) with at least a two-day exposition.

PMLs distribution and localization: Bankside vegetation with the residues of dead branches, old meanders and side arms of the rivers Žitava, Nitra, Váh and the Danube, in different stages of succession.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:

Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals

Estimate of the population development trend: ALP: PAN: ×

Population quality in PMLs:

Overall population quality: ALP: PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: PAN: U1

Pressures and threats: The most common pressures and threats, generally of moderate intensity, include anthropogenic activities: intensification of agriculture, reclamation and drainage of wetlands (65 %), which occur in parallel with the ongoing natural succession processes, such as the accumulation of the organic material (30 %) etc.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Assessment and notes on the monitoring results: The habitat quality in most of the monitored localities is unfavourable. The reason is the on-going aridisation as a result of the intensification of economic activities and natural processes. Only some of the localities can be evaluated as suitable or good. With the current trend of activities' dynamics, the future prospects of most habitats of *Microtus oeconomus* are unfavourable. So the forecast for the population must therefore be evaluated in the light of the above. In the Slovak part of its range the species shows signs of forming meta-populations. This is typical for habitats with local sub-populations and the existence or creation (or extinction) of migration corridors between them. To promote the species we recommend the maintenance of the water regime in suitable habitats, reduction of human activities, the creation of transitional (buffer) zones between the habitats for the species and the surrounding agricultural land and preventing the destruction of existing, as well as potential, migration corridors. In the monitored localities it has been found that the habitats of *Microtus oeconomus* are inhabited also by *Apodemus agrarius,* which has been a new rodent species in the Podunajská nížina Lowland since 2010. The impact of this species on the population of *Microtus oeconomus* is currently being examined.


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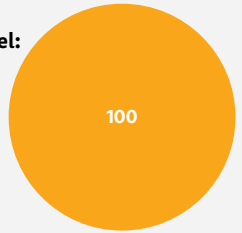
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Microtus tatricus (Kratochvíl, 1952)
(*Rodentia, Cricetidae*)

Microtus tatricus lives mainly in alpine and sub-alpine meadows in places with sufficient humidity and with dense grassland vegetation (Rosický & Kratochvíl 1955; Pelikán 1955). Optimal conditions also include the pre-climax and climax stages of forest (Kratochvíl & Gaisler 1967).

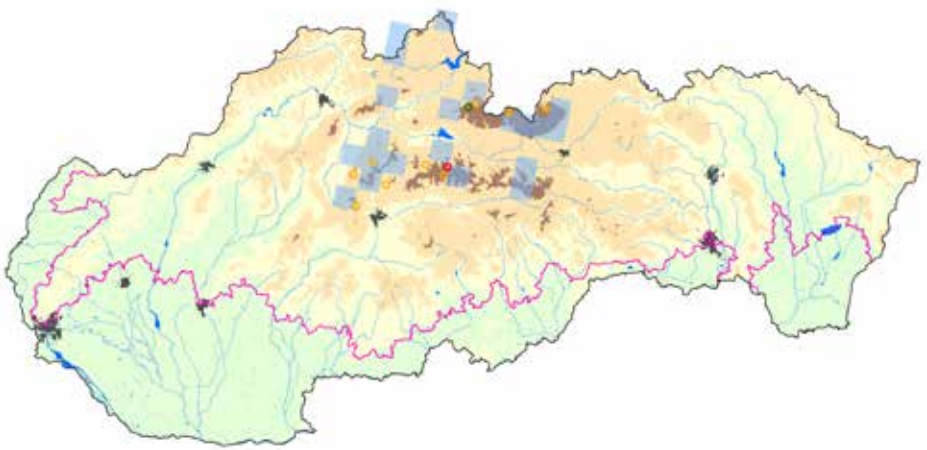
Number of PMLs: 11 **PML average area size:** 411.1 ha

Number of involved experts: 3 **Number of PML field visits:** 33

The most common accompanying species: *Apodemus flavicollis, Clethrionomys glareolus, Sorex araneus, Chionomys nivalis, Microtus subterraneus, Sorex minutus, Apodemus sylvaticus, Microtus agrestis, Sorex alpinus.*

Monitoring method: Capturing in live traps aligned in a line or quadrant, from May to October.

PMLs distribution and localization: Subalpine and alpine meadows with screes, moraines and dwarf pines, forest communities on a rocky substrate in the zone of mountain beech forests on limestone.



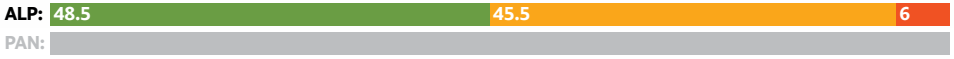
Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: – PAN:

Population quality in PMLs:

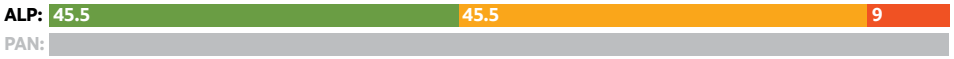


Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, include outdoor, sport and recreational activities (53 %) and inappropriate forest management (20 %).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Assessment and notes on the monitoring results: The habitat quality in most of the monitored localities is unfavourable-inadequate. The reason is mainly the negative impact of direct or indirect human activities. In particular the population of the species living in subalpine and Alpine zones is threatened by outdoor, sports and other recreational activities. In addition to these direct activities, the population is threatened by the development of tourist centres related to these activities, for example: accommodation facilities, ski resorts, cable cars etc. that occupy a significant part of the habitats suitable for this species. The inappropriate management of forests has a considerable negative impact too. This threatens the part of the population living in the montane zone, while the indirect impact related to these activities include the occurrence of landslides and rock avalanches. In the localities where the above-mentioned recreational activities and the related facilities were not recorded, the species has good future prospects. But in the summary assessment for the Alpine Region it is only 9 % of the area, since this area is significantly influenced by human activity (development of ski resorts etc.). The quality of the population is also evaluated unfavourable-inadequate.


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Also other significant species of small mammals were recorded in the monitored localities, such as *Chionomys nivalis mirhanreini, Microtus agrestis* and *Sorex alpinus.*

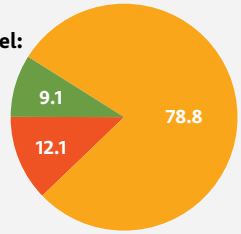
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Muscardinus avellanarius (Linnaeus, 1758)
(*Rodentia, Gliridae*)

Muscardinus avelanarius is an arboreal species preferring forest habitats and ecotones with well-developed herb and bush layers.

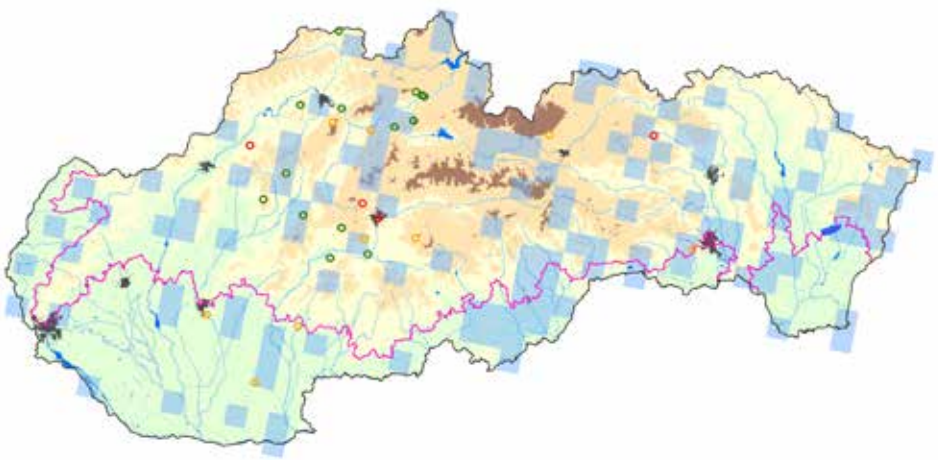
Number of PMLs: 27 **PML average area size:** 257.6 ha

Number of involved experts: 9 **Number of PML field visits:** 76

The most common accompanying species: *Glis glis*, *Apodemus flavicollis*, *Apodemus sylvaticus*, *Clethrionomys glareolus*, *Sorex araneus*, *Microtus arvalis*.

Monitoring method: Quadrant or line method of capturing individuals in live traps or the registration of individuals and habitual signs using nest boxes or tubes during the vegetation season.

PMLs distribution and localization: The species is continuously distributed in forest and ecotone habitats of sub-montane and montane vegetation zones, and sporadically in the planar, colline and subalpine zones. From the total of 27 PMLs, 24 were located in 15 orographic units in the Alpine Bioregion; in the Pannonian Bioregion there were 3 localities in 3 orographic units.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 500 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: U1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Pressures and threats: The most frequent pressures and threats, of high or moderate intensity, are related to inappropriate forest management and forestry activities (38 %), intensive grazing (29 %) and mowing (14 %), furthermore with high density of transport networks and the development of transport infrastructure (14 %) and finally with changes in the structure of agricultural land (5 %).

Assessment and notes on the monitoring results: The monitoring of *Muscardinus avellanarious* was carried out from 26th October 2013 to 29th August 2015 in 27 PMLs located in 16 types of habitats. During this monitoring period, across all the PMLs a total of 51 individuals were registered, 98 summer (or reproductive nests) and 51 other habitual signs (excrements, remains after feeding). On average 2 individuals, 4 nests and 3 habitual signs were registered per PML. The number of registered individuals in different types of habitats ranged from 1 (mixed beech and spruce forests, young beech forests and mountain spruce forests) to 10 (the habitat of blackthorn and hazelnut scrub). In the determined time period, the occurrence of the target species was recorded in all PMLs located in the Alpine Bioregion. The PMLs of the Pannonian Bioregion, except of the PML Ludinský háj Grove, had a negative result from the repeated visits. In the Pannonian Bioregion, decline in the quality of populations and potential habitats has been observed in the long term. This has been caused by intensive forest management, lack of meadows and pastures, reduction of bankside vegetation and non-forest woody vegetation and development of transport and industrial infrastructure.

To reveal long-term trends of abundance and changes of the habitat quality, we suggest completing the monitoring network of PMLs with new localities (especially in the Pannonian Bioregion), to ensure their continuous monitoring (at least for the next five years) and to supplement the monitoring methods with marking of the caught individuals (RFID microchips), or to monitor selected individuals with radio-telemetry in order to specify the size of the home range in different types of habitats.

In the monitoring localities there was the confirmed occurrence of *Muscardinus avellanarius*, it most often occurred together with edible dormouse *Glis glis*.


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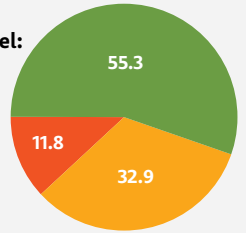
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Sicista betulina (Pallas, 1779)
(*Rodentia, Dipodidae*)

In Slovakia *Sicista betullina* inhabits more-less the territory defined by the natural occurrence of spruce. Vertically, it spreads up to the dwarf pine zone. Most of the observations of the species are associated with habitats characterised as wet meadows, wetlands, alluvia of streams and rivers.

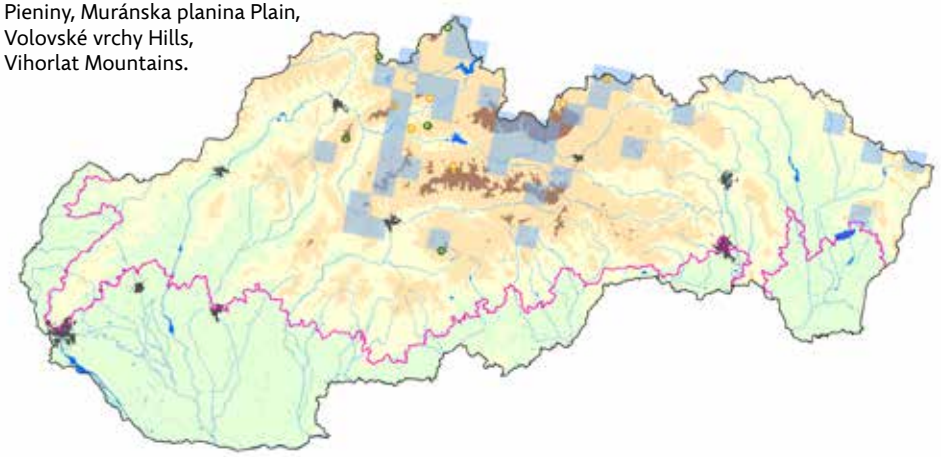
Number of PMLs: 10 **PML average area size:** 100.5 ha

Number of involved experts: 4 **Number of PML field visits:** 15

The most common accompanying species: *Apodemus flavicollis*, *Clethrionomys glareolus*, *Sorex araneus*, *Microtus arvalis*, *Microtus agrestis*, *Sorex minutus*, *Microtus subterraneus*, *Apodemus sylvaticus*, *Sorex alpinus*.

Monitoring method: Capture in live traps arranged in a line (or quadrant) with at least a two-day exposition.

PMLs distribution and localization: Mountain and alpine meadows, deforested hillsides and clearings in different successional stages with relation to waterlogged (wet) habitats and with continuous forest cover in the area. Kysucké Beskydy and Oravské Beskydy Mountains, Malá Fatra and Veľká Fatra Mountains, Chočské vrchy Hills, Poľana Mountains, Nízke Tatry, Belianske Tatry and Vysoké Tatry Mountains, Pieniny, Muránska planina Plain, Volovské vrchy Hills, Vihorlat Mountains.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: × PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most frequent pressures and threats, of low or moderate intensity, include interventions to the habitat of the species caused by human activity – the conversion or elimination of grassland vegetation (34 %), sports activities (20 %) etc. Since the knowledge on the ecology of the species in our country is not satisfactory, precise knowledge of threats and impacts on the population of *Sicista betullina* requires the collection of additional information.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Assessment and notes on the monitoring results: In most of the localities the quality of the habitats for the species is evaluated as good to inadequate. Considering the relatively wide range of habitats, in which, in the territory of Slovakia, *Sicista betullina* is capable of adapting, the further development of its topical and trophic habitats cannot (with the current number and distribution of PMLs) be predicted with sufficient accuracy. Neither can the trends in the species' population development in the Western Carpathians. Regarding the fact that the knowledge on the biology of *Sicista betulina* in Slovakia is considered to be insufficient, the planned activities designed to promote the species or to eliminate the negative impacts on its population may be, without appropriate professional information, ineffective or even harmful. More comprehensive information on local populations of *Sicista betullina* for the purposes of monitoring could be obtained by a more consistent application of a uniform monitoring methodology, based on sampling by using non-lethal pitfall traps.


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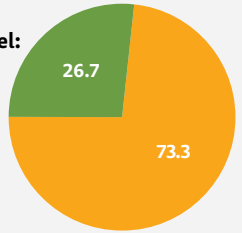
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: U1



By bioregion:

Sicista subtilis (Pallas, 1773)
(*Rodentia, Dipodidae*)

The presence of the current population of *Sicista subtilis* in Slovakia is only supported by finding of skeleton residues (three left and two right mandibles and one maxilla) in the pellets of barn owl *Tyto alba* from the agricultural land near Tekovské Lužany (Demeter & Obuch, 2004).

Number of PMLs: 1 **PML average area size:** 4,384.3 ha

Number of involved experts: 1 **Number of PML field visits:** 6

The most common accompanying species: *Apodemus sylvaticus*, *Microtus arvalis*, *Crocidura suaveolens*, *Sorex araneus*, *Apodemus microps*, *Micromys minutus.*

Monitoring method: Capture in live traps arranged in a line with at least a two-day exposition.

PMLs distribution and localization: Agricultural land and the surrounding area of the water reservoir near the village Tekovské Lužany. The species is considered to be extinct in our territory.

Monitoring results:

Estimate of the population size in the Alpine Bioregion:
Estimate of the population size in the Pannonian Bioregion: 0 – 50 individuals
Estimate of the population development trend: ALP: PAN: ×

Population quality in PMLs:

ALP:
PAN: XX

Overall population quality: ALP: PAN: XX

Habitat quality for the species in PMLs:

ALP:
PAN: XX

Overall habitat quality for the species: ALP: PAN: XX

Future prospects of habitat for the species in PMLs:

ALP:
PAN: XX

Overall future prospects of habitat for the species: ALP: PAN: XX

Pressures and threats: Regarding the fact that a living individual of *Sicista subtilis* has not been documented in the territory of Slovakia in this phase of Holocene, the tracking of possible positive/negative impacts and sources of threats to the population is pointless.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Assessment and notes on the monitoring results: All data on the occurrence of *Sicista subtilis* in the territory of Slovakia is considered to be questionable by most experts. For this reason, the species is registered in the literature as extinct in our territory. The suitable habitats for *Sicista subtilis* in southern Slovakia (Hronská pahorkatina Upland, Ipeľská pahorkatina Upland) disappeared in the late 19th century as they were destroyed at the time of intensification of agriculture in relation to the growing popularity of sugar beet production and processing. In theory, the species could occupy alternative habitats, but these probably exceeded its adaptive abilities. There is also a possibility that because the very low abundance of the population and specific bionomics of the species (e.g. hibernation), the current sampling methods are insufficient. As a consequence of the above-mentioned facts we consider the monitoring results and the subsequent forecasts of the habitat development as well as the populations of *Sicista subtilis* in the territory of Slovakia to be hypothetical and we recommend they are not evaluated.


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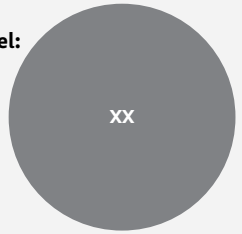
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: PAN: XX
Conservation status in SCIs: XX
Overall conservation status on national level: **XX**



By bioregion:

ALP:
PAN: XX

Spermophilus citellus (Linnaeus, 1766)
(*Rodentia, Sciuridae*)

The previously continuous range of *Spermophilus citellus* now has become fragmented in Slovakia at the present time. The abundance of the population in our country has been rapidly decreasing since the 1970s due to the lack of pastures that are optimal habitats for the life and reproduction of the species. At the present times, *Spermophilus citellus* is distributed mainly in the southern part of central Slovakia, in basins and adjacent areas in Horehronie, Spiš, Šariš Regions, in the Slovenský kras, Košická kotlina Basin and in Východoslovenská nížina Lowland.

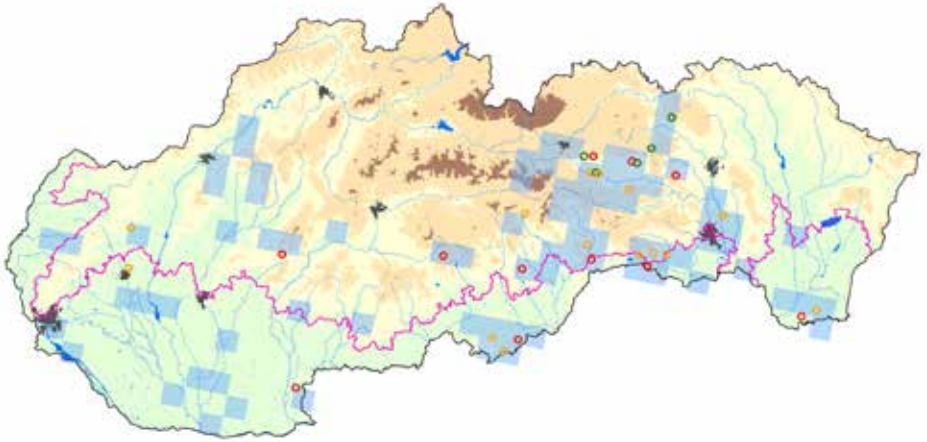
Number of PMLs: 30 **PML average area size:** 109.2 ha

Number of involved experts: 14 **Number of PML field visits:** 100

The most common accompanying species: *Microtus arvalis*, *Apodemus sylvaticus.*

Monitoring method: Capture of individuals in live traps using a line or quadratic method. Counting of observed individuals during a given time unit. Counting of observed habitual signs (active burrows) of the species in the selected plot (PMP) compared to the entire area of PML (colony).

PMLs distribution and localization: Active pastures, or mowed meadows used in long-term in the area of Cerová vrchovina Highlands, Slovenský kras (Slovak Karst) and Spiš Region.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: U1

Pressures and threats: The most frequent pressures and threats, usually of moderate intensity, include changes in the function of landscape elements that create habitats suitable for life and reproduction of *Spermophilus citellus*, i.e. pastures and mowed meadows. These changes can be fast and for the local population devastating (e.g. ploughing – 37 %), or they can proceed slowly (successional processes – 20 %), but with the same result – extinction of the population.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Assessment and notes on the monitoring results: In most of the localities in the Alpine and the Pannonian Bioregions the habitat quality of *Spermophilus citellus* and the quality of its population was evaluated as inadequate or bad. The reason is usually the disappearance of habitat through a change in the management of the localities. Forecasting the short to medium-term status and development of the habitats is not necessary for this type of monitoring because it does not have higher information value, as the ongoing changes are highly subjective in nature, based on the interests of the owners, or land users, and are unpredictable. In order to maintain a stable population of the species, the most important localities are Cerová vrchovina Highlands, Spiš and Slovenský kras (Slovak Karst) that have been managed in the long term in the form of pasture land. In other parts of Slovakia, due to the expansion of production of technical crops, the trend of the *Spermophillus citellus* population's development can be evaluated as unfavourable, except for the localities where long-term management is ensured by reason of their operation – airports, sports facilities etc.


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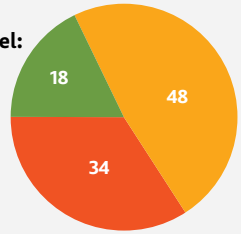
Overall assessment of the conservation status of species

Conservation status on national level:



Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**

By bioregion:

Barbastella barbastellus (Schreber, 1774)
(*Chiroptera, Vespertilionidae*)

Barbastella barbastellus occurs in the whole range of forest habitats, but typically in beech forests. The rich structure and the age of the stands are significant factors that determine the occurrence of the species.

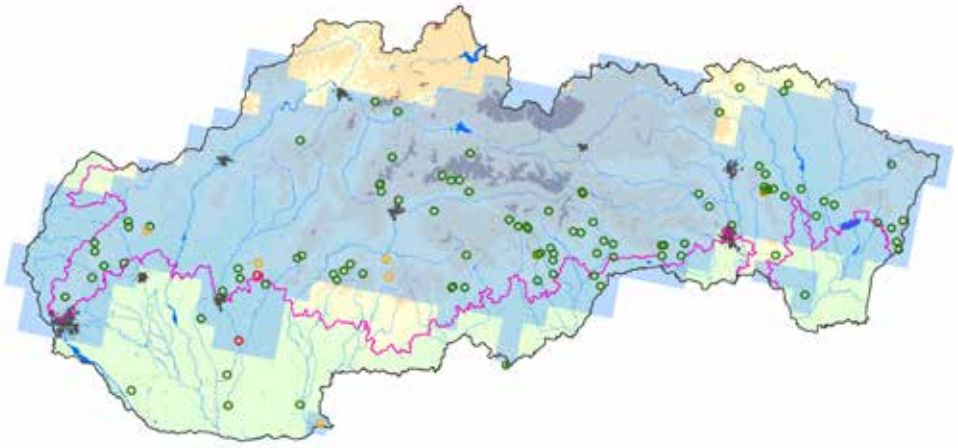
Number of PMLs: 190 **PML average area size:** 12 ha

Number of involved experts: 17 **Number of PML field visits:** 570

The most common accompanying species: *Myotis mystacinus*, *Myotis brandti*, *Myotis bechsteinii*, *Nyctalus leisleri*, *Plecotus auritus*.

Monitoring method: To determine the existence of reproduction mainly night catching in forest stands using mist nets was used during the summer. An additional method was the monitoring of wintering bat colonies in underground sites.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas and underground sites within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

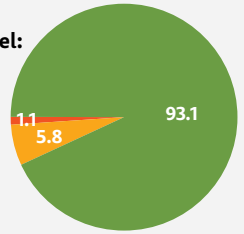
Pressures and threats: The most frequent pressures and threats to the habitats include clear cutting, growing monocultural forests and the removal of old trees from the forest stands.

Assessment and notes on the monitoring results: The quality of the population and of the habitat and its future prospects are favourable in most of the monitored localities in the Alpine as well as Pannonian Bioregions. Through using the transect mapping, which was not a method selected for monitoring of the given species, occurrence of the species was recorded in several areas of the Pannonian Bioregion, where the species was not expected in the summer. Most of the records in this bioregion, however, come from the period of hibernation. The highest abundance of the species is usually registered in the underground hibernation roosts in the Alpine Bioregion, where the species also forms numerous aggregations in some localities. To maintain the favourable status it is necessary to preserve enough old trees in the forest stands.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: FV



By bioregion:

Eptesicus nilssonii (Keyserling et Blasius, 1839) (*Chiroptera, Vespertilionidae*)

In the territory of Slovakia *Eptesicus nilssonii* occurs mainly in mountain spruce or fir and beech forests (over 700 m above the sea level) and is common in habitats above the upper limit of the forest.

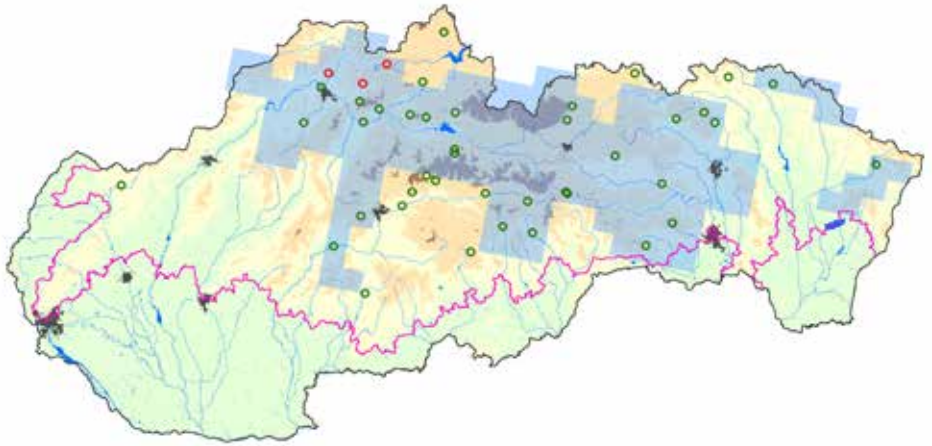
Number of PMLs: 190 **PML average area size:** 12 ha

Number of involved experts: 17 **Number of PML field visits:** 570

The most common accompanying species: *Vespertilio murinus*, *Myotis daubentonii*, *Nyctalus noctula.*

Monitoring method: To determine the existence of reproduction, mainly night catching in forest stands using mist nets was used during the summer. An additional method was the monitoring of wintering bats in underground sites.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas and underground sites within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: × PAN:

Population quality in PMLs:

ALP: 95.4 4.6

PAN:

Overall population quality: ALP: FV PAN:

Habitat quality for the species in PMLs:

ALP: 100

PAN:

Overall habitat quality for the species: ALP: FV PAN:

Future prospects of habitat for the species in PMLs:

ALP: 100

PAN:

Overall future prospects of habitat for the species: ALP: FV PAN:

Pressures and threats: The likely pressures and threats of the habitats include clear cutting and growing monocultural forest.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Assessment and notes on the monitoring results: The species was registered only in the Alpine Bioregion, where the quality of the population and of the habitat as well as the future prospects are evaluated as favourable. Even though that counts at hibernation sites were made only as an additional method in the case of this species, the majority of individuals were counted this way. But even there it occurred only in low numbers (mainly solitary individuals). The low number of records from mist netting may be due to the lower number of PMLs in mountain environment, where the species occurs during the reproduction period. Regarding the specific nature of the preferred habitats we may believe that large-scale disturbances of the mountain environment have the greatest impact on the overall status of the species. With the current global changes we expect stronger influence of this factor.


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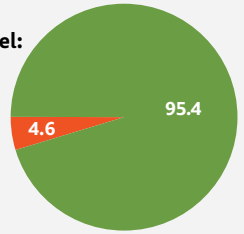
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN:

Conservation status in SCIs: FV

Overall conservation status on national level: FV



By bioregion:

ALP: 95.4 4.6

PAN:

Eptesicus serotinus (Schreber, 1774)
(*Chiroptera, Vespertilionidae*)

Eptesicus serotinus occurs in warm and colder locations, virtually in the whole territory of Slovakia. It prefers urbanized agricultural areas in the lowlands and highlands.

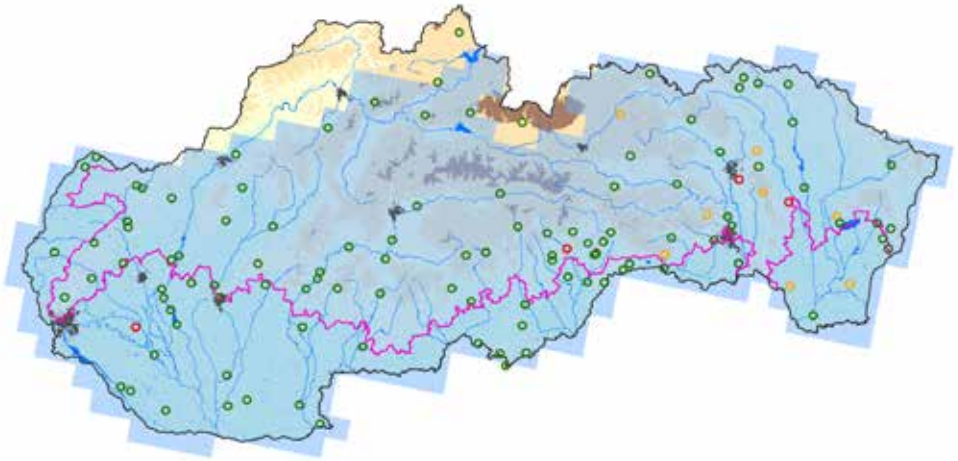
Number of PMLs: 98 **PML average area size:** 257 ha

Number of involved experts: 10 **Number of PML field visits:** 294

The most common accompanying species: *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Nyctalus noctula*.

Monitoring method: The species can be monitored only in the summer. To confirm reproduction the monitoring is carried out by counting the individuals flying out from the attic roosts. The transect mapping with the use of bat detector was used as an additional method.

PMLs distribution and localization: In the whole territory of Slovakia the attic roosts are situated mainly in sacral buildings. Transect mapping covers various habitats of the urban environment, agricultural landscape and forest areas in throughout Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

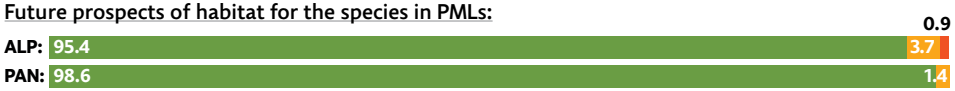
Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: Considering the preferred summer roosts, the most frequent threats and negative pressures include uncontrolled reconstructions of buildings, which are maybe, in some cases, motivated by the very presence of abundant colonies of the species in the building. In the country the species occurs sparsely in low-number colonies, therefore the evaluation of pressures and threats cannot be carried out objectively.

Assessment and notes on the monitoring results: Only a very small part of localities in both bioregions (10 %) is evaluated in terms of quality of the population, the habitat and the future prospects of the species as inadequate or bad. Regarding the typical echolocation signal as well as the high frequency of recordings, observation using bat detector in the car transects seems to be an appropriate monitoring methodology. The reconstruction of buildings (sacral objects) may have a significant negative impact on some colonies; during the monitoring some colonies known from the past were not confirmed. The reason of the disappearance from the building, in these cases, was its modernization.

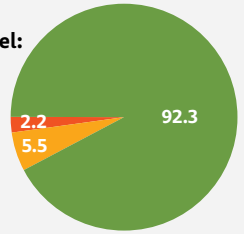
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV

Conservation status in SCIs: FV

Overall conservation status on national level: FV



By bioregion:

Hypsugo savii (Bonaparte, 1837) (*Chiroptera, Vespertilionidae*)

The occurrence of *Hypsugo savii* in the territory of Slovakia is not investigated sufficiently. It is a species that is likely to expand from its original range in the Mediterranean Region and in Slovakia it has been recorded only recently. Most records come from the urban environment of larger cities.

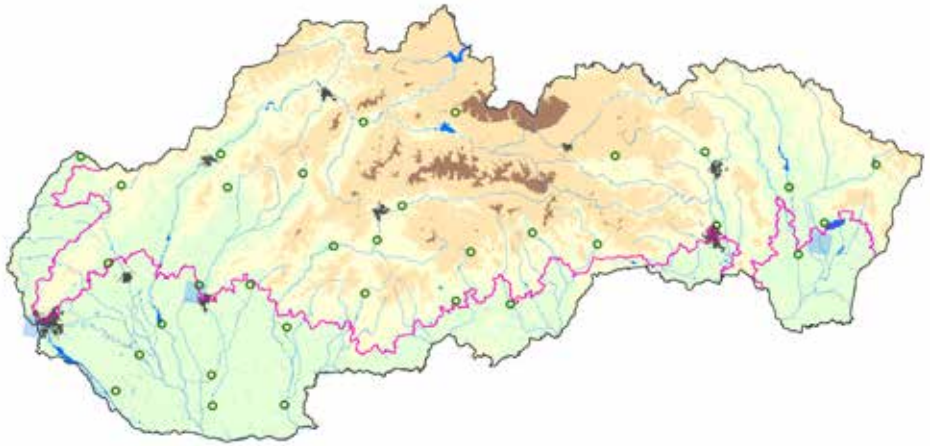
Number of PMLs: 50 **PML average area size:** 500 ha

Number of involved experts: 5 **Number of PML field visits:** 150

The most common accompanying species: *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Pipistrellus nathusii*, *Nyctalus noctula.*

Monitoring method: The species is monitored by mapping the occurrence on a transect using an ultrasound bat detector installed in a car.

PMLs distribution and localization: The transects cover various habitats of the urban environment, agricultural landscape and forest areas throughout Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 500 – 1,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: + PAN: +

Population quality in PMLs:

ALP: 100
PAN: 100

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

ALP: 100
PAN: 100

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

ALP: 100
PAN: 100

Overall future prospects of habitat for the species: ALP: FV PAN: FV

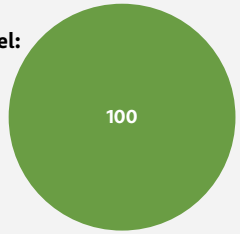
Pressures and threats: Particular threats and pressures are not fully understood. Based on available data, according to which the species forms reproductive colonies in crevices of panel houses in the territory of Slovakia, uncontrolled reconstruction of these objects can be assumed as a potential threat (such as façade repair and thermal insulation).

Assessment and notes on the monitoring results: In the Alpine and Pannonian Bioregions the population quality, habitat quality and the future prospects of the habitats are evaluated as favourable. But this evaluation may be underestimated by insufficient knowledge on the species from the territory of Slovakia. Most of the data come from the recordings made on transects using bat detector, where the connection of the record to a particular hiding place is not possible to be evaluated. The best explored reproducing population is in the town of Michalovce utilizes roosts in panel houses that are planned to be thermally insulated during reconstruction works.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

ALP: 100
PAN: 100

Miniopterus schreibersii (Kuhl, 1817)
(*Chiroptera, Miniopteridae*)

Miniopterus schreibersii occurs mainly in lower altitudes in several isolated areas of Slovakia (e.g. Slovenský kras, Revúcka vrchovina Highlands, Štiavnické vrchy Hills, Pieniny Mountains, Slanské vrchy Hills).

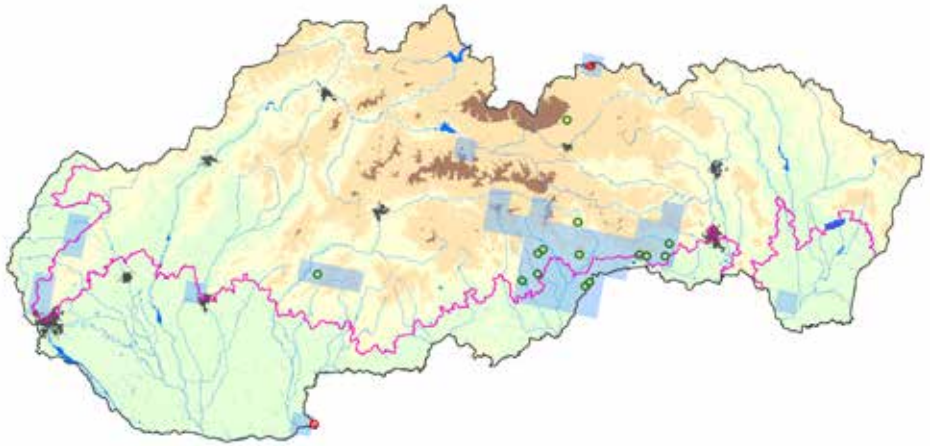
Number of PMLs: 212 **PML average area size:** 3 ha

Number of involved experts: 16 **Number of PML field visits:** 636

The most common accompanying species: *Rhinolophus euryale*, *Myotis emarginatus*, *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros.*

Monitoring method: Regular counting was conducted in known underground roosting sites in the summer as well as during hibernation.

PMLs distribution and localization: Known underground roosting sites within the known area of species' distribution in Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: FV PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: U1

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: U1

Pressures and threats: The threats and pressures in the roosts include speleology, recreational use of caves, closing entrances to underground sites or succession (in case of old mines it is burying of entrances, in case of caves it is overgrowing) and the reconstruction of historical buildings with attic roosts.

Assessment and notes on the monitoring results: A significant amount of the localities in the Panonnian Region (up to 30 %) and some localities in the Alpine Bioregion are evaluated as unfavourable in terms of the population quality and habitat quality of the species. Mainly in the Panonnian area there are localities where the future prospects are evaluated as unfavourable. *Miniopterus schreibersii* has disappeared from those localities probably due to excessive disturbance and succession of habitats near entrances. Overall positive evaluation is supported by the discovery of new winter and summer roosts of the species in the regions where it has not been recorded before (mainly Revúcka vrchovina Highlands).

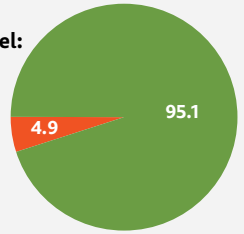
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: U1

Conservation status in SCIs: FV

Overall conservation status on national level: **FV**



By bioregion:

Myotis alcathoe Helversen et Heller, 2001
(*Chiroptera, Vespertilionidae*)

In the territory of Slovakia the knowledge on the distribution of *Myotis alcathoe* is very limited. It probably prefers warm oak and hornbeam forests in lower altitudes.

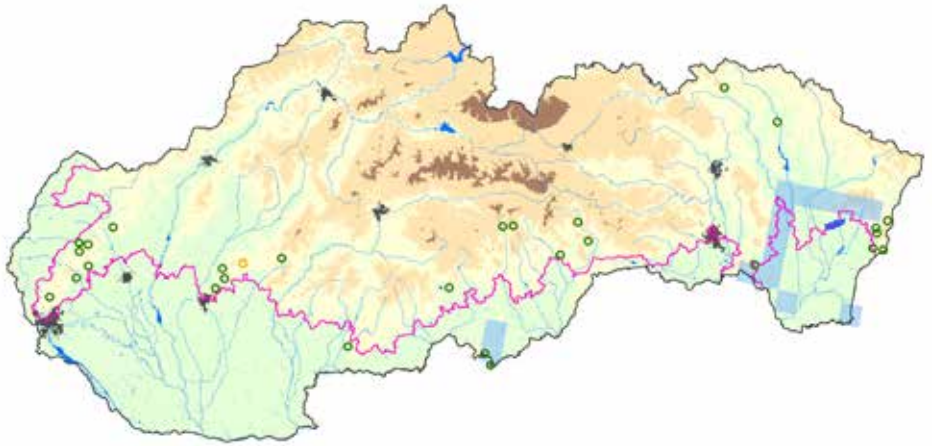
Number of PMLs: 127 **PML average area size:** 16 ha

Number of involved experts: 14 **Number of PML field visits:** 381

The most common accompanying species: *Myotis mystacinus.*

Monitoring method: To determine the existence of reproduction, mainly night catching in forest stands using mist nets during the summer was used. Another method, allowing precise identification of species, is survey at underground swarming sites in the autumn using mist nets.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas and underground sites within the known area of species' distribution in Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

ALP: 100
PAN: 100

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

ALP: 100
PAN: 100

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

ALP: 95.9 | 4.1
PAN: 100

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: Regarding the limited knowledge, the pressures and threats of the habitats for the species are not known.

Assessment and notes on the monitoring results: In both bioregions reproduction of the species was confirmed but the overall abundance was very low (altogether only a few tens of individuals were recorded). The determined distribution is concentrated on the border of the bioregions which corresponds to the species' estimated habitat preference. Virtually in all the monitored localities in the Alpine and Pannonian Bioregions the population quality, habitat quality and the future prospects of the habitats are evaluated as favourable. But this status should be understood with regard to the very low level of knowledge on the species.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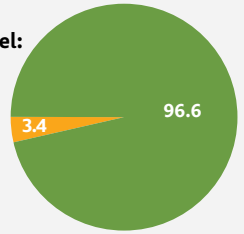
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

ALP: 95.9 | 4.1
PAN: 100

Myotis bechsteinii (Kuhl, 1817)
(*Chiroptera, Vespertilionidae*)

In the territory of Slovakia *Myotis bechsteinii* occurs mainly in oak-hornbeam forests and beech forests, rarely in climax spruce forests. It is a typical species of old natural forests with plenty of tree hollows.

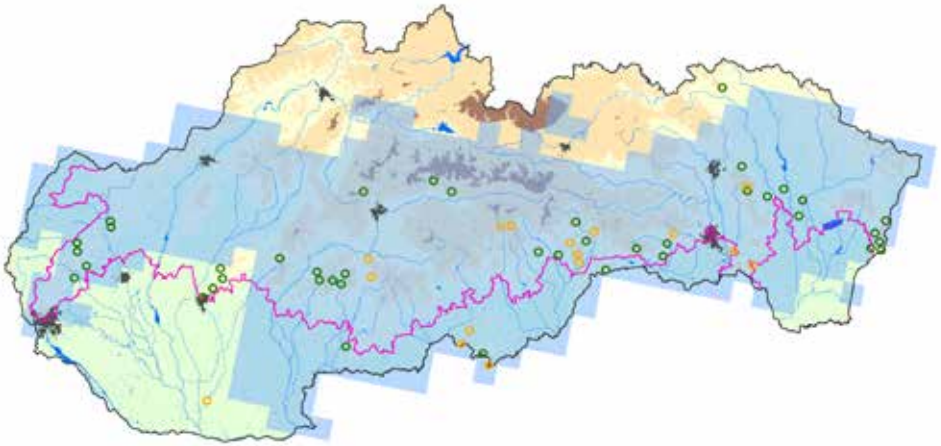
Number of PMLs: 190 **PML average area size:** 12 ha

Number of involved experts: 17 **Number of PML field visits:** 570

The most common accompanying species: *Myotis nattereri*, *Myotis mystacinus*, *Myotis emarginatus*, *Nyctalus leisleri*, *Plecotus auritus*, *Barbastella barbastellus.*

Monitoring method: To determine the existence of reproduction, mainly catching in forest stands with mist nets during summer nights was used. An additional method was the monitoring of wintering bats in underground hibernation sites.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas and underground sites within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: FV PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats of the habitats include clear-cutting, growing monocultural forests and the removal of old trees from the forest stands.

Assessment and notes on the monitoring results: The species was recorded mainly during summer catching with mist nets, rarely during hibernation. In most of the localities in the Alpine Bioregion and in half of the localities in the Pannonian Bioregion the population quality is evaluated as favourable. Although forestry activities significantly influence the quality of the habitat for the species in the monitored area, on the basis of records from mist netting, we can conclude that the species still has plenty of older forests, which provide food and tree roosts. In the monitored localities the future prospects of the species are estimated as favourable with the need to promote nature-friendly forest management.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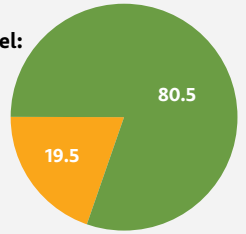
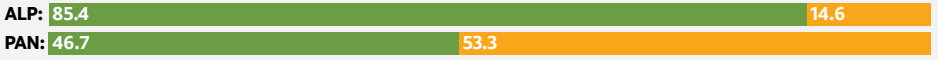
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: U1
Conservation status in SCIs: FV
Overall conservation status on national level: **U1**



By bioregion:



Myotis blythii (Tomes, 1857)
(*Chiroptera, Vespertilionidae*)

In the territory of Slovakia *Myotis blythii* occurs approximately in the southern half of the country, while the anticipated geographic limit of its reproduction are high mountains in the centre of Western Carpathians (e.g. the Nízke Tatry Mountains). It is a typical species of various types of underground sites and spacious attic habitats in human structures.

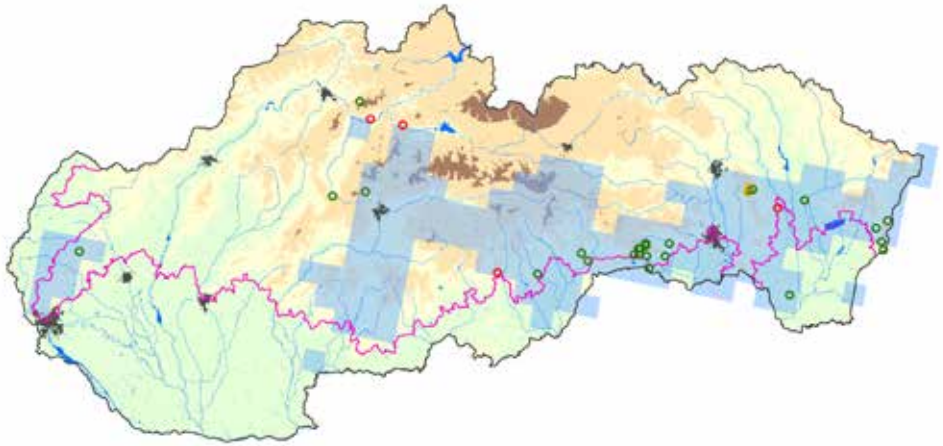
Number of PMLs: 212 **PML average area size:** 3 ha

Number of involved experts: 16 **Number of PML field visits:** 636

The most common accompanying species: *Myotis myotis*, *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, *Myotis emarginatus*.

Monitoring method: In the known hibernation sites periodic counting of hibernating individuals, in the summer period monitoring of reproductive colonies in summer roosts (attic habitats of human structures).

PMLs distribution and localization: Different types of underground sites (mines, caves, abysses) and spacious attic roosts.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

<u>Population quality in PMLs:</u>

Overall population quality: ALP: FV PAN: FV

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: FV PAN: FV

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: U1 PAN: FV

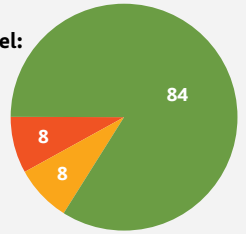
Pressures and threats: The threats and pressures in the roosts include speleology, recreational use of caves, closing entrances to underground sites or succession in case of old mines (gradual burying of the entrances) and the reconstruction of historical buildings in case of attic roosting places.

Assessment and notes on the monitoring results: The quality of the population and of the habitat in the Pannonian Bioregion is evaluated as favourable; some localities in the Alpine Bioregion are inadequate or bad in terms of both criteria. An analogous state results from the evaluation of future prospects of the habitat in the localities. Negatively evaluated localities include, in the summer, mainly attics, where reconstructions are planned, or where the presence of bat colonies causes social conflicts with the owners or users of buildings. But it should be emphasized that the evaluation as well as the estimated abundance of this species may be inaccurate as a result of the fact that the species is sometimes indistinguishable from the related and similar species *Myotis myotis*. This affects the results of monitoring in the hibernation roosts as well as in the (summer) roosts of the reproductive colonies.

<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: U1 PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **U1**



By bioregion:

Myotis brandtii (Eversmann, 1845)
(*Chiroptera, Vespertilionidae*)

Myotis brandtii inhabits mainly forest stands of varied tree species composition in higher altitudes of Slovakia, practically up to the upper forest limit.

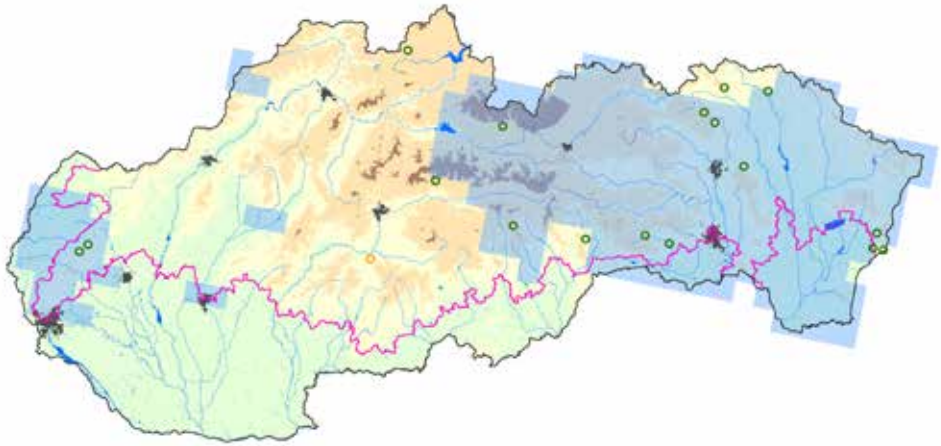
Number of PMLs: 127 **PML average area size:** 16 ha

Number of involved experts: 14 **Number of PML field visits:** 381

The most common accompanying species: *Myotis mystacinus*, *Myotis myotis*, *Myotis daubentonii*.

Monitoring method: To determine the existence of reproduction, mainly night catching in forest stands with mist nets during the summer was used. Another method, allowing precise identification of species, was survey at underground swarming sites using mist nets in the autumn.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas and underground sites within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats of the habitats include clear-cutting and growing monocultural forests.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Assessment and notes on the monitoring results: In the assemblage of recorded individuals, males are highly dominant but this is influenced by a determination characteristics (shape of the penis) to unambiguously distinguish small cryptic species of *Myotis* genus (the so-called group *mystacinus/brandtii*). The quality of the population and of the habitat and the future prospects are evaluated as favourable almost in all of the monitored localities in the Alpine as well as Pannonian Bioregions. Spruce stands of higher altitudes, where the species occurs frequently, are more susceptible to sudden changes in quality. The method of capturing in the forest stands in the summer appears to be more effective, since autumn capturing during swarming was successful only in locations where other small species of *Myotis* genus were also frequently recorded in hibernation sites.


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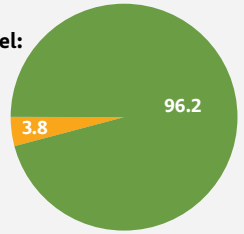
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Myotis dasycneme (Boie, 1825)
(*Chiroptera, Vespertilionidae*)

Myotis dasycneme is one of the rarest species of bats in Slovakia with fragmented knowledge on its distribution and roosts. Despite confirmed reproduction in our territory, thanks to the discovery of lactating females, the maternity roosts of the reproductive colonies are still unknown.

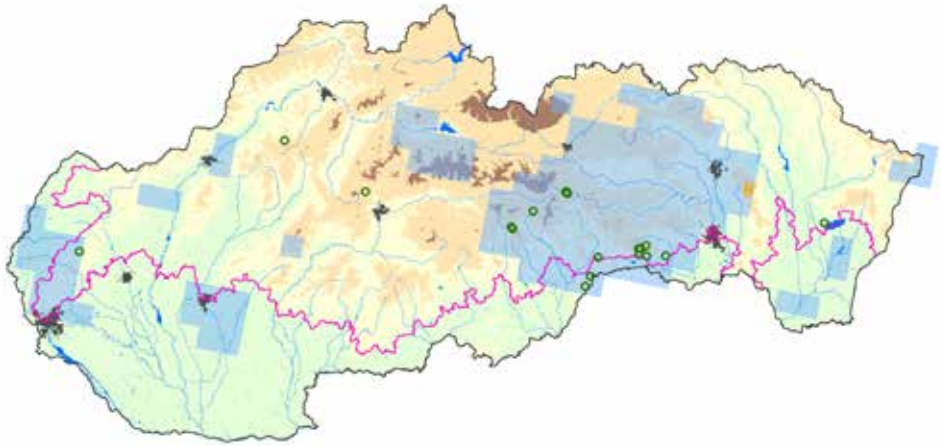
Number of PMLs: 140 **PML average area size:** 181 ha

Number of involved experts: 15 **Number of PML field visits:** 420

The most common accompanying species: *Myotis myotis*, *Myotis daubentonii*, *Rhinolophus hipposideros.*

Monitoring method: In the known hibernation roosts it was the regular counting of hibernating individuals. In the summer it was the mapping of occurrence using an ultrasound bat detector on the transects.

PMLs distribution and localization: The hibernation roosts are situated in karst areas and in some old mining. The transects cover various habitats of the urban environment, agricultural landscape and forest areas throughout Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 500 – 1,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The threats and pressures in the hibernation roosts include speleology, recreational use of caves and succession in case of old mines (gradual burying of the entrances). The pressures and threats in other roosts in the summer are not well understood due to absence of data.

Assessment and notes on the monitoring results: The quality of the population, of the habitat and the future prospects of the habitat, with the exception of a few localities in the Pannonian Bioregion (evaluated as unfavourable – inadequate) are evaluated as favourable. But the evaluation may be underestimated due to fragmentary data. High quality results can be obtained using transects and the recordings of ultrasound detectors, but stops near the appropriate water areas are important; records in hibernation sites are rare, but they point to some increase in the species' abundance in the territory of Slovakia in yearly comparisons.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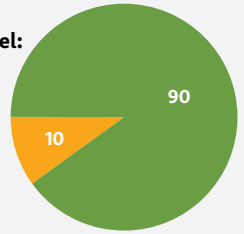
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Myotis daubentonii (Kuhl, 1817)
(*Chiroptera, Vespertilionidae*)

Myotis daubentonii is distributed throughout Slovakia. Its occurrence is concentrated near flowing or standing waters.

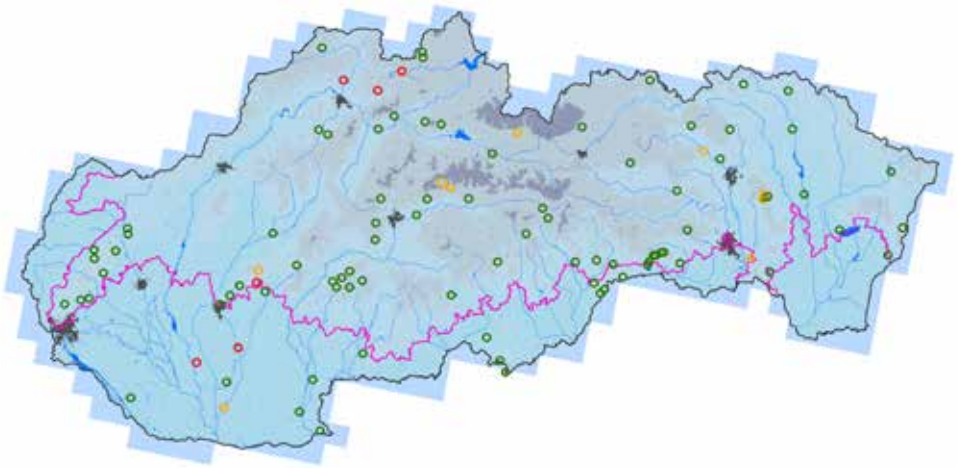
Number of PMLs: 150 **PML average area size:** 180 ha

Number of involved experts: 15 **Number of PML field visits:** 450

The most common accompanying species: *Myotis myotis, Eptesicus serotinus, Nyctalus noctula, Nyctalus leisleri.*

Monitoring method: To determine the existence of reproduction, mainly catching in forest stands with mist nets during summer nights was used and during this period also transect mapping using an ultrasound detector.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas. Transects cover various habitats of the urban environment, agricultural landscape and forest areas in the whole territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 200,000 – 300,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 200,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats of the habitats include the destruction of vegetation on the banks and the chemical pollution of water courses and reservoirs.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Assessment and notes on the monitoring results: Although it was not a key methodology for the species, numerous records were also obtained in the underground hibernation roosts, especially in the Alpine Bioregion. The Alpine Bioregion is heavily dominated by males in the reproductive period, which corresponds to the knowledge of the altitudinal gender segregation of the species. The quality of the population and of the habitat and the future prospects are evaluated as favourable in most of the monitored localities in the Alpine as well as Pannonian Bioregions. Since this is a widely distributed and abundant species, local deterioration of the habitat quality will probably have no major impact on the overall status of the species in our territory.


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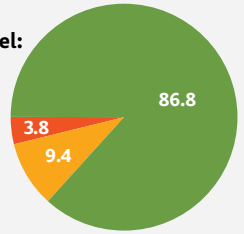
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Myotis emarginatus (Geoffroy, 1806)
(*Chiroptera, Vespertilionidae*)

Myotis emarginatus occurs discontinuously in the warmer areas throughout Slovakia, except for lowland areas of southern Slovakia and the highest mountain altitudes. It shows a certain affinity to karst areas.

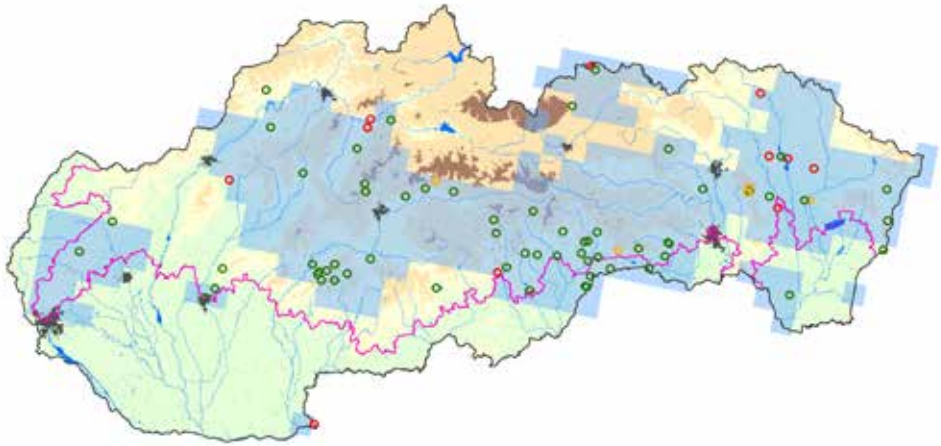
Number of PMLs: 212 **PML average area size:** 3 ha

Number of involved experts: 16 **Number of PML field visits:** 636

The most common accompanying species: *Rhinolophus hipposideros*, *Rhinolophus ferrumequinum*, *Rhinolophus euryale*, *Myotis myotis.*

Monitoring method: In the known hibernation roosts periodic counting of hibernating individuals, in the summer monitoring of reproductive colonies in summer roosts (attics of buildings).

PMLs distribution and localization: Different types of underground sites (mines, caves, abysses) and spacious attic roosts, mostly in sacral buildings that are located throughout the known area of the species' distribution in Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

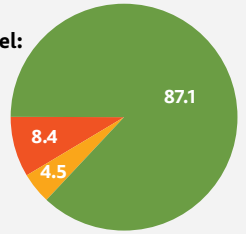
Pressures and threats: The threats and pressures in winter roosts include speleology, recreational use of caves and succession in case of old mines. The pressures and threats in the summer period are related to the unregulated reconstruction of buildings that act as roosts for the reproductive colonies.

Assessment and notes on the monitoring results: In both bioregions, in the Alpine as well as the Pannonian, the population quality, habitat quality as well as the future prospects of the habitats are evaluated as favourable, some of the localities in both bioregions (10 %) are evaluated as unfavourable-bad or inadequate. The summer localities evaluated negatively represent mainly attics of buildings, where the negative impact is the result of the eventual reconstructions of buildings. Counting in winter roosts appears to be a useful additional method of monitoring, particularly in traditional hibernation roosts of the species (e.g. Zlá diera).

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Myotis myotis (Borkhausen, 1797)
(*Chiroptera, Vespertilionidae*)

Myotis myotis occurs in the whole territory of Slovakia, rarely only in the lowland areas of eastern as well as western Slovakia. It is a typical species of various attic habitats of human structures, where it forms numerous reproductive colonies.

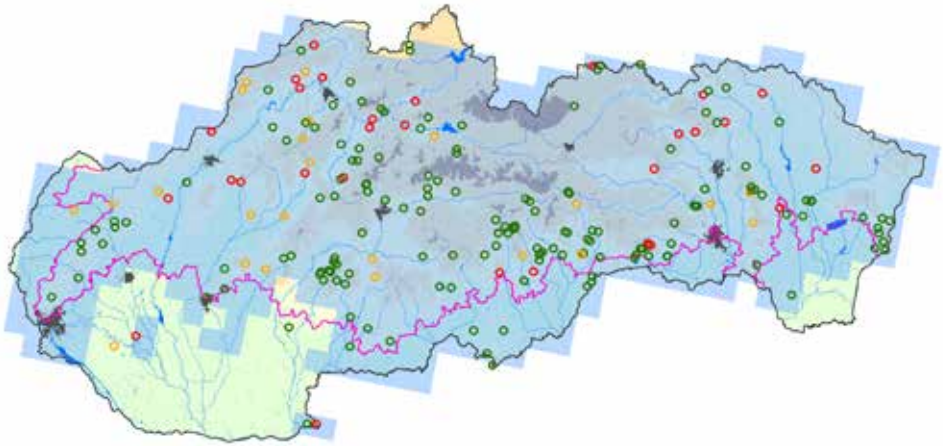
Number of PMLs: 212 **PML average area size:** 3 ha

Number of involved experts: 16 **Number of PML field visits:** 636

The most common accompanying species: *Rhinolophus hipposideros*, *Myotis emarginatus*, *Myotis blythii.*

Monitoring method: In the known hibernation roosts periodic counting of hibernating individuals, in the summer monitoring of reproductive colonies in summer roosts (attics of buildings).

PMLs distribution and localization: Wide spectrum of underground roosting sites (mines, caves,) and spacious attics in the known distribution of the species in Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 150,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: U1

Pressures and threats: Considering the preferred roosts, the most common threats and pressures in winter include speleology, recreational use of caves or succession in the case of old mining facilities (burying of the entrances etc.), in the summer the pressures relate to uncontrolled reconstructions of buildings, which may be, in some cases, motivated by the very presence of numerous colonies of the species in the building.

Assessment and notes on the monitoring results: In both bioregions the population quality, habitat quality as well as the future prospects of the habitats are evaluated as favourable, part of the localities in both regions (20 %) are evaluated as unfavourable-bad or inadequate. Negatively evaluated localities include, in the summer, mainly attic habitats, where the reconstructions are planned, or the presence of the bat colony causes social conflicts with the owners or users of buildings.

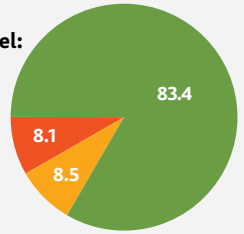
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Myotis mystacinus (Kuhl, 1817)
(*Chiroptera, Vespertilionidae*)

Myotis mystacinus inhabits almost all types of forest habitats in Slovakia. Based on the current knowledge, the species seems to be the generalist of the forest environment.

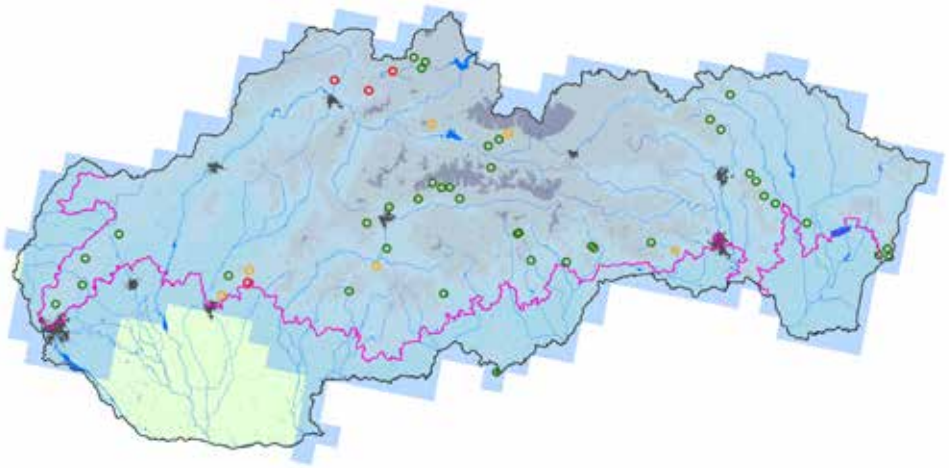
Number of PMLs: 127 **PML average area size:** 16 ha

Number of involved experts: 14 **Number of PML field visits:** 381

The most common accompanying species: *Myotis myotis*, *Myotis brandtii*, *Myotis alcathoe.*

Monitoring method: To determine the existence of reproduction, mainly catching in forest stands with mist nets during summer nights was used. Another method, allowing precise identification of species, was survey at underground swarming sites using mist nets in the autumn.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas and underground sites within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 100,000 – 500,000 individuals
Estimate of the population size in the Pannonian Bioregion: 50,000 – 100,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats of the habitats include clear-cutting and growing monoculture forests.

Assessment and notes on the monitoring results: With a few exceptions, almost all records come from the Alpine Bioregion. The quality of the population and of the habitat and the future prospects are evaluated as favourable in most of the monitored localities in the Alpine as well as Pannonian Bioregions. But it should be emphasized that the species is unlikely to have specific preferences on forest habitats. The method of catching with mist nets in the forest stands in the summer appears to be more effective, since autumn capturing during swarming is successful only in places where other small species of *Myotis* genus (the so-called group *mystacinus/brandtii*) are also frequently recorded at wintering roosts.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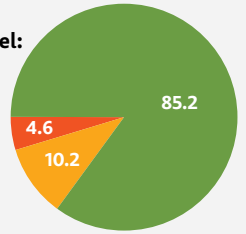
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: FV



By bioregion:

Myotis nattereri (Kuhl, 1817)
(*Chiroptera, Vespertilionidae*)

Myotis nattereri is a typical forest species that in the territory of Slovakia is found in nearly all types of forests from the lowlands to the upper forest limit. It often occurs in forest stands near water bodies.

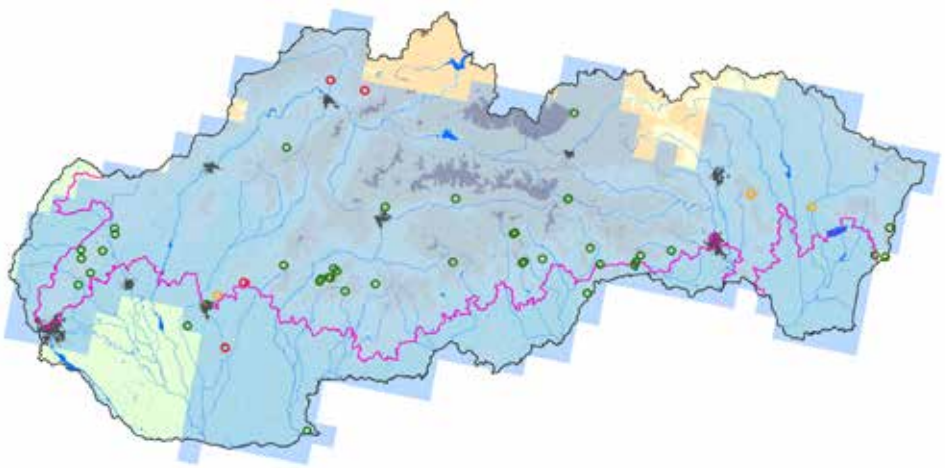
Number of PMLs: 190 **PML average area size:** 12 ha

Number of involved experts: 17 **Number of PML field visits:** 570

The most common accompanying species: *Myotis bechsteinii*, *Myotis mystacinus*, *Myotis emarginatus*, *Nyctalus leisleri*, *Plecotus auritus*, *Barbastella barbastellus.*

Monitoring method: To determine the existence of reproduction, mainly night catching in forest stands using mist nets during summer nights was used. An additional method was the monitoring of wintering bat colonies in underground roosts.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas and underground sites within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

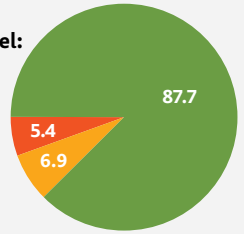
Pressures and threats: The most frequent pressures and threats of the habitats include clear-cutting, growing monocultural forests and the removal of old trees from the forest stands.

Assessment and notes on the monitoring results: The identified categories of the species' presence correspond to the expected image that it is found across the whole country, where they breed and hibernate. The species' occurrence is limited only by the presence of forest. In most of the localities in the Alpine Bioregion as well as in the Pannonian Bioregion the population quality of the species is evaluated as favourable. Although forestry activities significantly influence the quality of the habitat for the species, based on the results of mist netting, we can conclude that the species still has plenty of older forests in the monitored area, which provide food and tree roosts. In the monitored localities the future prospects of the species are estimated as favourable with the need to promote nature-friendly forest management.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Nyctalus lasiopterus (Schreber, 1870) (*Chiroptera, Vespertilionidae*)

In the territory of Slovakia *Nyctalus lasiopterus* is of rare occurrence, probably in one or two isolated populations. There is no knowledge on the typical nature of the habitats.

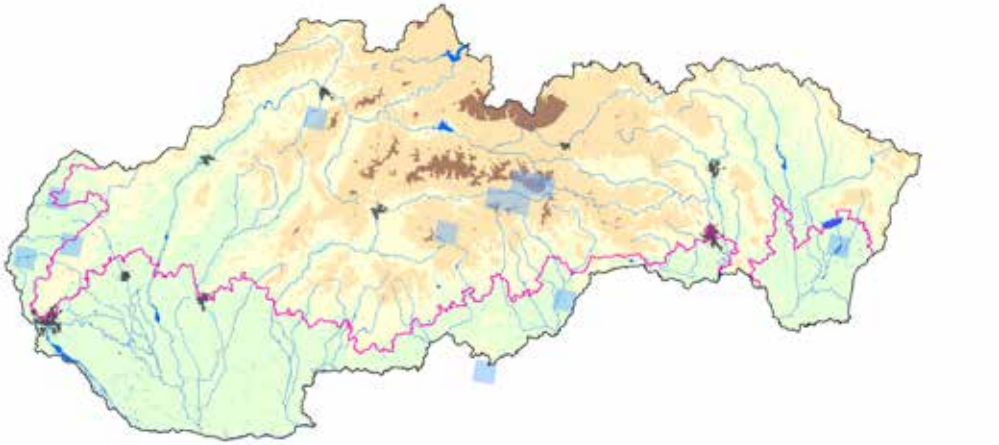
Number of PMLs: 100 **PML average area size:** 20 ha

Number of involved experts: 14 **Number of PML field visits:** 300

The most common accompanying species: *Nyctalus noctula, Nyctalus leisleri, Eptesicus nilssonii, Myotis myotis.*

Monitoring method: To determine its presence mainly catching using mist nets in forest stands on summer nights was used.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 0 – 50 individuals
Estimate of the population size in the Pannonian Bioregion: 0 – 50 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

ALP: XX
PAN: XX

Overall population quality: ALP: XX PAN: XX

Habitat quality for the species in PMLs:

ALP: XX
PAN: XX

Overall habitat quality for the species: ALP: XX PAN: XX

Future prospects of habitat for the species in PMLs:

ALP: XX
PAN: XX

Overall future prospects of habitat for the species: ALP: XX PAN: XX

Pressures and threats: Regarding the very rare occurrence of the species and nearly zero level of knowledge it is not possible to determine the pressures and threats to its habitats.

Assessment and notes on the monitoring results: The species was not recorded during the monitoring or by using other methods of survey. Its occurrence is still expected, especially in the north of Slovenské rudohorie Mountains, or on the southern border in contact with the Hungarian population. Evaluation of the status of population and the habitats for species is therefore not possible.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Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: N/A PAN: XX
Conservation status in SCIs: XX
Overall conservation status on national level: XX

XX

By bioregion:

ALP: XX
PAN: XX

Nyctalus leisleri (Kuhl, 1817)
(*Chiroptera, Vespertilionidae*)

In the territory of Slovakia *Nyctalus leisleri* occurs mainly in forested areas of middle to montane altitudes, but also in Záhorie Region. Typical species of old natural forests with plenty of tree hollows.

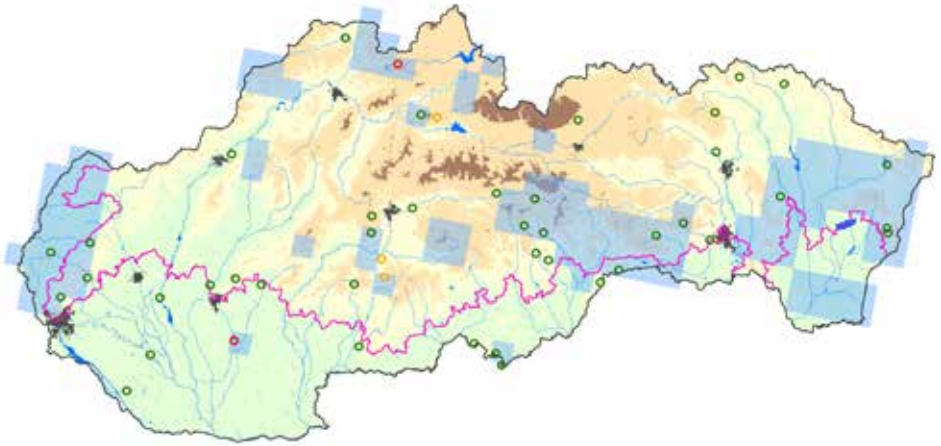
Number of PMLs: 150 **PML average area size:** 180 ha

Number of involved experts: 15 **Number of PML field visits:** 450

The most common accompanying species: *Nyctalus noctula*, *Pipistrellus pipistrellus*, *Myotis bechsteinii*, *Barbastella barbastellus*, *Myotis mystacinus*, *Plecotus auritus.*

Monitoring method: To determine the presence, mainly catching using mist nets in forest stands on summer nights was used and during this period also mapping of the occurrence using an ultrasound detector on transects.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas. Transects cover various habitats of the urban environment, agricultural landscape and forest areas in the entire territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

<u>Population quality in PMLs:</u>

Overall population quality: ALP: FV PAN: FV

<u>Habitat quality for the species in PMLs:</u>

Overall habitat quality for the species: ALP: FV PAN: FV

<u>Future prospects of habitat for the species in PMLs:</u>

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats of the habitats include clear-cutting, growing monocultural forests and the removal of old trees from forest stands.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Assessment and notes on the monitoring results: The reproduction of the species was frequently recorded in both bioregions, but more frequently in the Alpine Bioregion. In the Alpine Bioregion adult males were more numerous too. In most of the localities in the Alpine Bioregion as well as in the Pannonian Bioregion the population quality of the species is evaluated as favourable. Although forestry activities significantly influence the quality of the habitat for the species, based on the results of mist netting and transect counting, we can conclude that the species still has plenty of older forests in the monitored areas, which provide it food and tree roosts. In the monitored localities the future prospects of the species are estimated as good, but nature-friendly forest management needs to be promoted.


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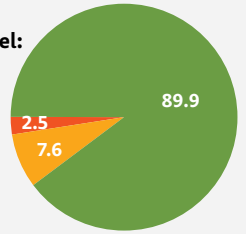
<u>Overall assessment of the conservation status of species</u>

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Nyctalus noctula (Schreber, 1774)
(*Chiroptera, Vespertilionidae*)

Nyctalus noctula is distributed in the whole territory of Slovakia. In summer its occurrence is concentrated in forested areas of middle altitudes in autumn and winter it is found in human settlements.

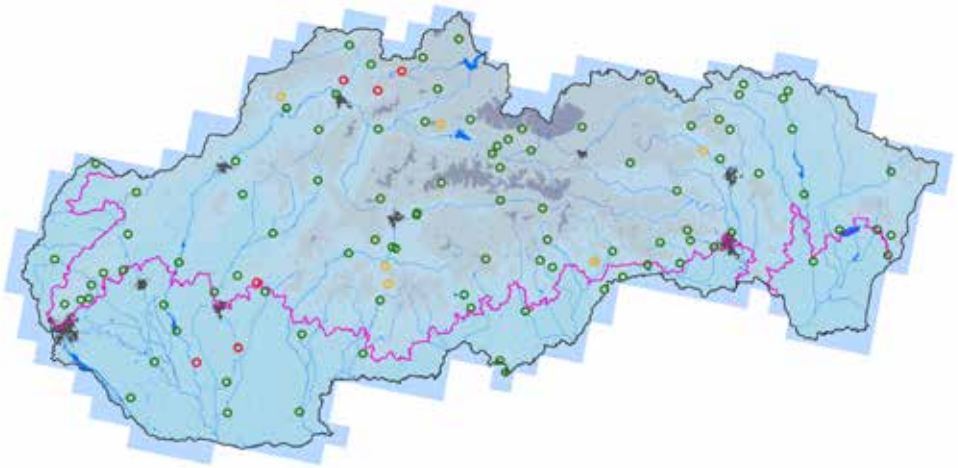
Number of PMLs: 150 **PML average area size:** 180 ha

Number of involved experts: 15 **Number of PML field visits:** 450

The most common accompanying species: *Nyctalus leisleri*, *Eptesicus serotinus*, *Pipistrellus pipistrellus.*

Monitoring method: To determine its presence, mainly catching using mist nets in forest stands was used on summer nights and also during this period mapping of the occurrence using an ultrasound detector on the transects.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas. Transects cover various habitats of the urban environment, agricultural landscape and forest areas in the whole territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 200,000 – 300,000 individuals
Estimate of the population size in the Pannonian Bioregion: 100,000 – 200,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats to the habitats include clear-cutting, growing monoculture forests and the removal of old trees from the stands. The hibernating individuals in urban areas may be negatively affected by the insulation of buildings.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Assessment and notes on the monitoring results: The dominant part of the records comes from the recordings on transects. The reproduction of the species in the territory of Slovakia was not confirmed from the records made during mist netting. The quality of the population and of the habitat and the future prospects are evaluated as favourable in most of the monitored localities in the Alpine as well as Pannonian Bioregions. Due to the high efficiency of the methodologies used to monitor the species this evaluation result can be overestimated compared to other species which are harder to monitor by mist netting or by using bat detectors on transects. The used methodologies do not directly capture the changes in the quality of the population and of the habitats during hibernation in urban areas, it is therefore necessary to take this fact into account.


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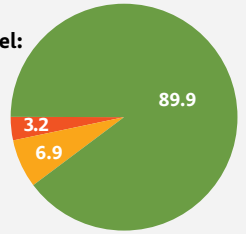
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Pipistrellus kuhlii (Kuhl, 1817)
(*Chiroptera, Vespertilionidae*)

The occurrence of *Pipistrellus kuhlii* is insufficiently known. It is a species that at the present time is expanding from its original range in the Mediterranean to the north of Europe. In the territory of Slovakia it has been recorded only recently and most records come from the urban environment of larger cities.

Number of PMLs: 50 **PML average area size:** 500 ha

Number of involved experts: 5 **Number of PML field visits:** 150

The most common accompanying species: *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Pipistrellus nathusii*, *Nyctalus noctula*, *Hypsugo savii.*

Monitoring method: The species was monitored by mapping the occurrence on the transect using an ultrasound detector installed in a car (auto-transects).

PMLs distribution and localization: Transects cover various habitats of the urban environment, agricultural landscape and forest areas throughout Slovakia.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 500 – 1,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: + PAN: +

Population quality in PMLs:

ALP: 100
PAN: 100

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

ALP: 100
PAN: 100

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

ALP: 100
PAN: 100

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: Particular threats and pressures are not known enough. Based on available data, according to which in the territory of Slovakia the species forms reproductive colonies in crevices in panel houses, uncontrolled reconstruction of these buildings can be assumed as a potential threat (such as façade repairs and thermal insulation work).

Assessment and notes on the monitoring results: All monitoring records come from the records of the occurrence based on the detection of the ultrasonic sounds on auto-transects. This methodology is limited by the overlap of echolocation characteristics of this species with related species *Pipistrellus nathusii*, especially in the autumn. With the exception of several localities in the Alpine Bioregion, the population quality, habitat quality and the future prospects of the habitats are evaluated as favourable. This evaluation may be influenced (underestimated) by insufficient knowledge on the species in the territory of Slovakia because its range is not sufficiently known at present.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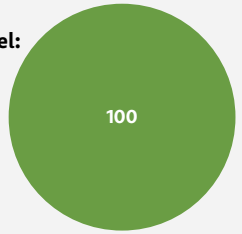
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

ALP: 100
PAN: 100

Pipistrellus nathusii (Keyserling et Blasius, 1839) (*Chiroptera, Vespertilionidae*)

Pipistrellus nathusii is a migratory species that, in the territory of Slovakia, occurs in lowland and highland locations predominantly in the western and eastern parts of Slovakia, mainly during migration.

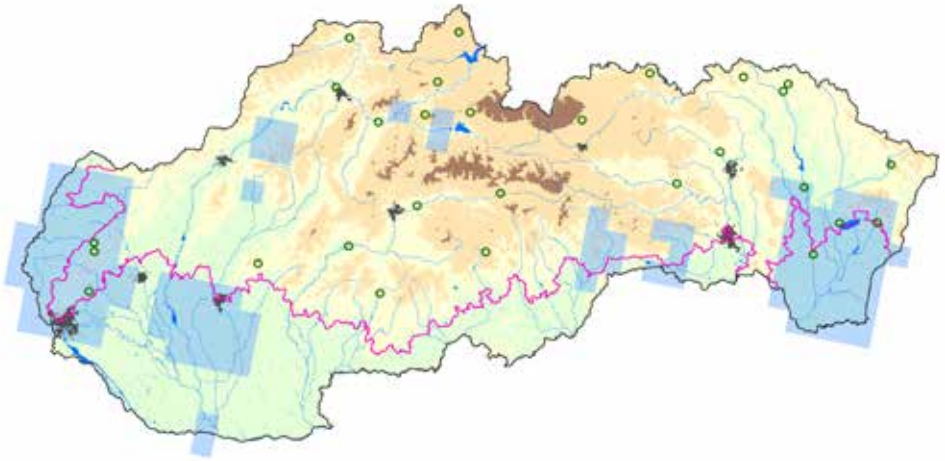
Number of PMLs: 50 **PML average area size:** 500 ha

Number of involved experts: 5 **Number of PML field visits:** 150

The most common accompanying species: *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*, *Nyctalus noctula*, *Hypsugo savii.*

Monitoring method: The species is monitored by mapping of the occurrence on the transect using an ultrasound (bat) detector installed in a car (so called auto-transects).

PMLs distribution and localization: Transects cover various habitats of the urban environment, agricultural landscape and forest areas throughout Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

ALP: 100
PAN: 100

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

ALP: 100
PAN: 100

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

ALP: 100
PAN: 100

Overall future prospects of habitat for the species: ALP: FV PAN: FV

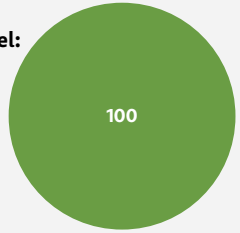
Pressures and threats: Particular threats and pressures are not known enough.

Assessment and notes on the monitoring results: In the Alpine and Pannonian Bioregions the population quality, habitat quality and the future prospects of the habitats are evaluated as favourable. But this evaluation may be underestimated because of insufficient knowledge on the species in the territory of Slovakia. Virtually, the only monitoring method available was recording using bat detectors on transects, but the analysis of recordings requires expert experience.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

ALP: 100
PAN: 100

Pipistrellus pipistrellus (Schreber, 1774)
(*Chiroptera, Vespertilionidae*)

Pipistrelus pipistrellus is probably a common species with discontinuous distribution across the entire territory of Slovakia, except of the coldest locations (such as the Vysoké Tatry Mountains).

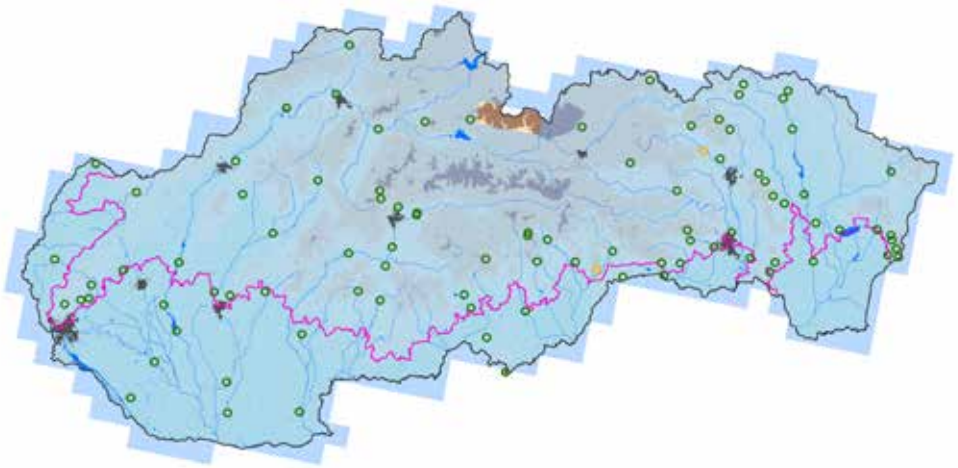
Number of PMLs: 140 **PML average area size:** 181 ha

Number of involved experts: 15 **Number of PML field visits:** 420

The most common accompanying species: *Rhinolophus ferrumequinum, Pipistrellus nathusii, P. pygmaeus, Nyctalus noctula, Hypsugo savii.*

Monitoring method: The species was monitored by mapping the occurrence on the transect using an ultrasound (bat) detector installed in a car (so called auto-transects). In the known winter roosts, counting and estimation of the number of hibernating individuals was used as additional methods.

PMLs distribution and localization: Transects cover various habitats of the urban environment, agricultural landscape and forest areas throughout Slovakia. Known winter roosts are located mainly in karst areas in the southern part of Slovakia (Slovenský kras).



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 150,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

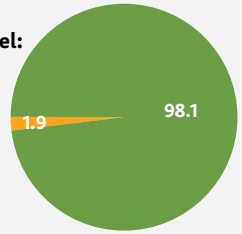
Pressures and threats: Specific threats and pressures in the summer are not known. But the species has a tendency to form summer and autumn aggregations in various types of human constructions; therefore we can assume threats related to the reconstruction of buildings, sometimes driven by the very presence of bats in the vicinity of the humans. Threats and pressures in the wintering places include speleology and recreational visits to caves.

Assessment and notes on the monitoring results: In the Alpine and Pannonian Bioregions the population quality and the habitat quality are evaluated as favourable. Several localities in the Alpine region are evaluated as inadequate in terms of future prospects of the habitat. This evaluation may be influenced by insufficient knowledge on the species in Slovakia, especially in the Alpine Bioregion, although in the records of bat detectors this is a common species. In this area, the knowledge on the roosts is limited. In the long-term monitored mass winter roost in Slovenský kras (Slovak Karst) the number of individuals of the species is stable on a year to year basis (68-80,000 bats).

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Pipistrellus pygmaeus (Leach, 1825)
(*Chiroptera, Vespertilionidae*)

In the territory of Slovakia the knowledge on the occurrence of *Pipistrellus pygmaeus* is very fragmented. Based on the recent knowledge it turns out that this is probably a common and widely distributed species throughout the entire territory.

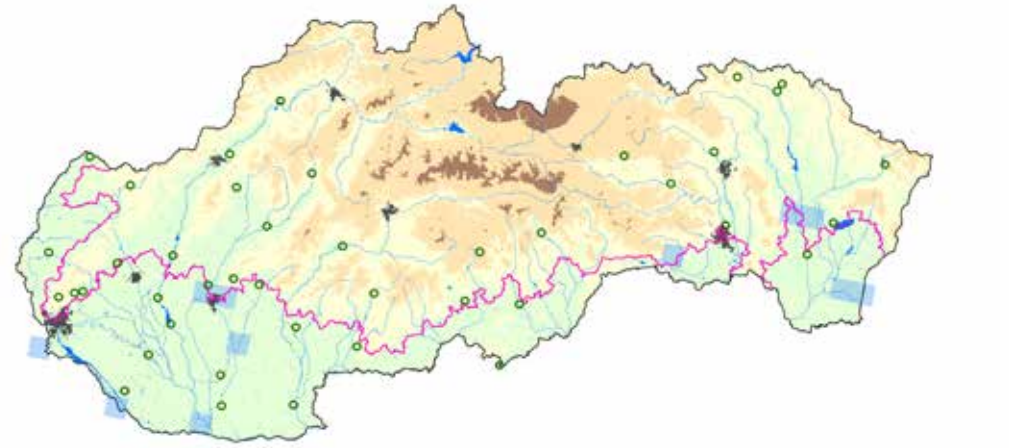
Number of PMLs: 50 **PML average area size:** 500 ha

Number of involved experts: 5 **Number of PML field visits:** 150

The most common accompanying species: *Pipistrellus nathusii*, *Pipistrellus pipistrellus*, *Nyctalus noctula*, *Hypsugo savii.*

Monitoring method: The species is monitored by mapping the occurrence on the transect using an ultrasound detector installed in a car.

PMLs distribution and localization: Transects cover various habitats of the urban environment, agricultural landscape and forest areas in the entire territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10,000 – 50,000 individuals
Estimate of the population size in the Pannonian Bioregion: 50,000 – 100,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

ALP: 100
PAN: 100

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

ALP: 100
PAN: 100

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

ALP: 100
PAN: 100

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The particular threats and pressures in the summer are not known enough; probably they include a wide range of threats depending on the type of summer roost used.

Assessment and notes on the monitoring results: In the Alpine and Pannonian Bioregions the population quality, habitat quality and the future prospects of the habitats are evaluated as favourable. This evaluation may be influenced (underestimated) by insufficient knowledge on the species in the territory of Slovakia. In the monitoring records from the detector transects it is a less frequently occurring species.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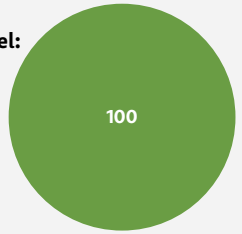
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

ALP: 100
PAN: 100

Plecotus auritus (Linnaeus, 1758)
(*Chiroptera, Vespertilionidae*)

In the territory of Slovakia *Plecotus auritus* is a typical forest species that is found in nearly all types of natural forests from the lowlands to the upper forest limit. It is a typical species of old natural forests with plenty of tree hollows, but it also uses human settlements as roosts.

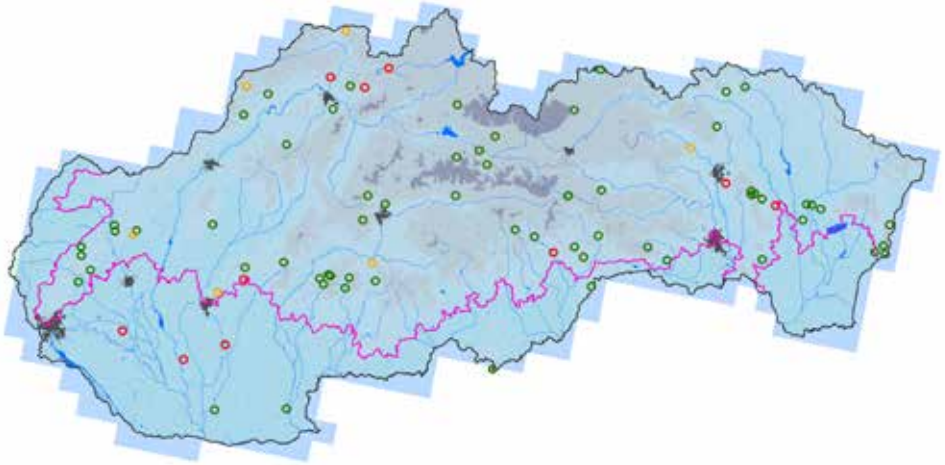
Number of PMLs: 148 **PML average area size:** 14 ha

Number of involved experts: 16 **Number of PML field visits:** 444

The most common accompanying species: *Myotis nattereri*, *Myotis bechsteinii*, *Myotis mystacinus*, *Myotis emarginatus*, *Nyctalus leisleri*, *Barbastella barbastellus.*

Monitoring method: To determine the presence of reproduction, mainly catching with mist nets in forest stands during summer nights was used. The species can also be monitored by counting of individuals flying out from attic roosts.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas. Across the entire territory of Slovakia the attic roosts are situated mainly in sacral buildings.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

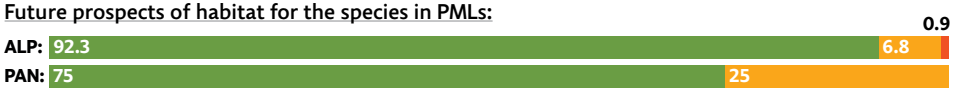
Population quality in PMLs:

Overall population quality: ALP: FV PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: U1

Future prospects of habitat for the species in PMLs:



Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats of the habitats include clear-cutting, growing monocultural forests and the removal of old trees from forest stands. In the case of the attic roosts of maternity colonies uncontrolled reconstruction of buildings may have a negative impact.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Assessment and notes on the monitoring results: In the Alpine Bioregion the quality of the population is evaluated as favourable in most of the monitored localities, but in the Pannonian Bioregion more than one third of the locations are evaluated as unfavourable-bad. This is probably influenced by the method used, counting of individuals flying-out from the attic roosts, as the species was not recorded in several localities. The species is typically distributed in the Alpine Bioregion, so this result should not have a significant impact on the overall evaluation of the species status. The habitat quality and the future prospects can be evaluated as favourable.


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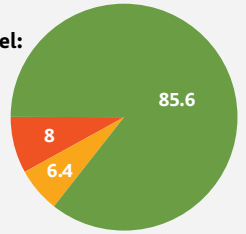
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: U1

Conservation status in SCIs: FV

Overall conservation status on national level: FV



By bioregion:

Plecotus austriacus (Fischer, 1829)
(*Chiroptera, Vespertilionidae*)

In the territory of Slovakia *Plecotus austriacus* is distributed throughout almost the entire country, except for mountain locations. As well as the presence of forests or other tree vegetation, it is also bound to human settlements where it has its reproduction roost sites.

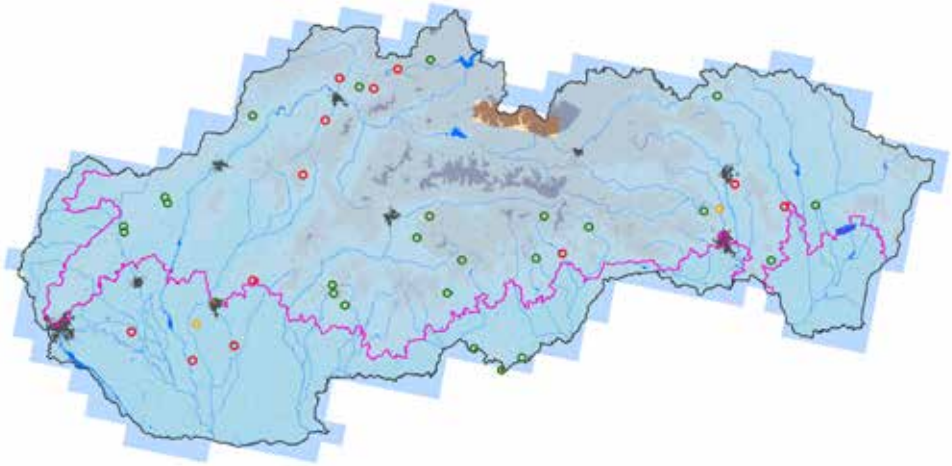
Number of PMLs: 148 **PML average area size:** 14 ha

Number of involved experts: 16 **Number of PML field visits:** 444

The most common accompanying species: *Myotis myotis*, *Myotis mystacinus*, *Myotis emarginatus*, *Pipistrellus pipistrellus.*

Monitoring method: To determine the presence of reproduction, mainly catching with mist nets in forest stands during summer nights was used. The species can be monitored also by counting of individuals emerging from attic roosts.

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas. In the territory of Slovakia the attic roosts are situated mainly in sacral buildings.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most frequent pressures and threats of the habitats include clear-cutting and growing monocultural forests. In the case of the anthropogenic roosts of maternity colonies uncontrolled reconstruction of buildings can have a negative impact.

Assessment and notes on the monitoring results: In some localities in the Alpine and Pannonian Bioregions, the quality of the population, of the habitat and its future prospects are evaluated as unfavourable-bad or inadequate. This is influenced mainly by the method used, counting individuals emerging from the attic roosts, as the species was not recorded in some localities. The species forms small reproductive colonies that may be undetected during the monitoring. But in most of the localities the quality of the population and of the habitat as well as the future prospects of the species are evaluated as favourable.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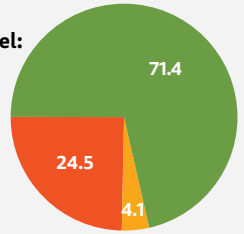
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: U1
Conservation status in SCIs: U1
Overall conservation status on national level: **U1**



By bioregion:

Rhinolophus euryale Blasius, 1853
(*Chiroptera, Rhinolophidae*)

In the territory of Slovakia *Rhinolophus euryale* occurs in an isolated area in the southern part of the territory, mainly in karst locations. In addition to the typical roosts in caves it also occurs in mining tunnels and sporadically in the attics of human structures.

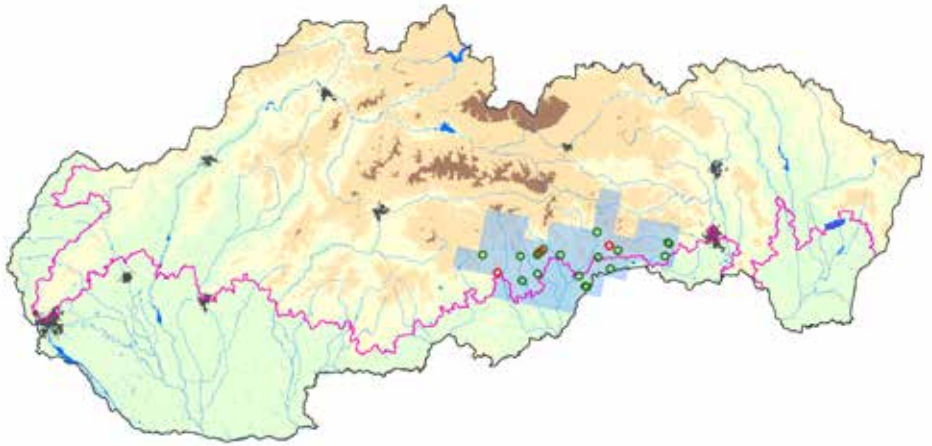
Number of PMLs: 212 **PML average area size:** 3 ha

Number of involved experts: 16 **Number of PML field visits:** 636

The most common accompanying species: *Rhinolophus hipposideros*, *Rhinolophus ferrumequinum*, *Myotis emarginatus*, *Miniopterus schreibersii.*

Monitoring method: To determine the size of the reproductive colony, counting during reproduction period in the summer roosts was used. In the winter hibernating individuals were counted.

PMLs distribution and localization: Known roosts of reproductive colonies in underground sites and in attics and selected winter roosts within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 20,000 individuals
Estimate of the population size in the Pannonian Bioregion: 1,000 – 5,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

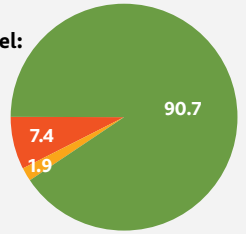
Pressures and threats: The most significant threats and negative pressures in the roosts include speleology, recreational use of caves, succession in case of old mines (burying of entrances) and the reconstruction of historical buildings in case of attic roosts.

Assessment and notes on the monitoring results: The quality of the population in the Pannonian Bioregion is evaluated as favourable. Some localities in the Alpine Bioregion are evaluated as unfavourable-bad or inadequate. The quality of the species' habitat is identically evaluated in both regions. The roosts created by anthropogenic activities (mining facilities, attics) are more threatened. In most of the monitored localities the future prospects of the species are evaluated as favourable. The prospects in some roosts (e.g. attic of the monastery in Jasov) are evaluated as unfavourable-bad or inadequate. The species is highly sensitive to anthropogenic disturbance.

Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Rhinolophus ferrumequinum (Schreber, 1774)
(*Chiroptera, Rhinolophidae*)

In the territory of Slovakia *Rhinolophus ferrumequinum* occurs, with the exception of the highest mountain altitudes, in most karst areas. Records are concentrated in the southern part of central and eastern Slovakia. It is a typical species of karst areas and related areas with plenty of underground sites.

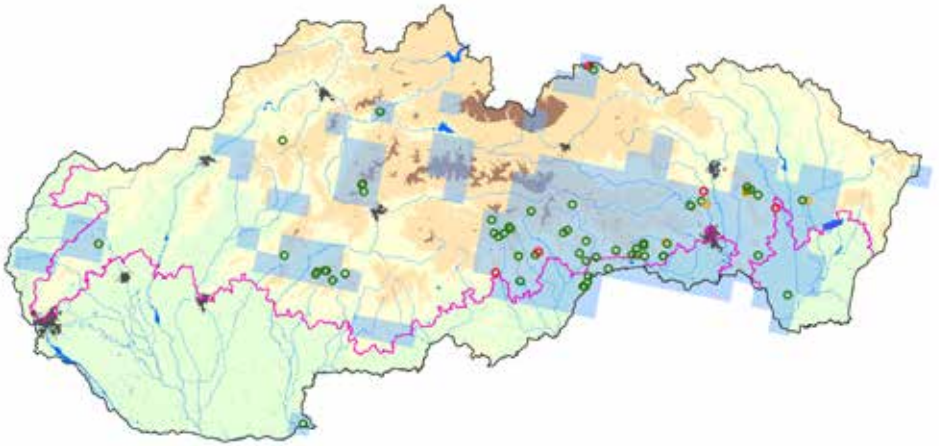
Number of PMLs: 212 **PML average area size:** 3 ha

Number of involved experts: 16 **Number of PML field visits:** 636

The most common accompanying species: *Rhinolophus hipposideros*, *Rhinolophus euryale*, *Myotis emarginatus*, *Myotis myotis*.

Monitoring method: To determine the existence of reproducing colonies, counting during the reproduction period in the summer roosts was used. In the winter hibernating individuals were counted.

PMLs distribution and localization: In summer, mostly attics (especially sacral buildings), in winter various types of underground roosts within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals
Estimate of the population size in the Pannonian Bioregion: 500 – 1,000 individuals
Estimate of the population development trend: ALP: 0 PAN: –

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most significant threats and pressures in the roosts include speleology, recreational use of caves and the reconstruction of historical buildings in the case of attic roosts.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Assessment and notes on the monitoring results: The quality of the population in the Pannonian Bioregion is evaluated as favourable. Some localities in the Alpine Bioregion are evaluated as unfavourable-bad or inadequate. The quality of the habitat for the species is identically evaluated in both regions. The roosts created by anthropogenic activities (mining facilities, attics) are more threatened. In most monitored localities the future prospects of the species are estimated to be favourable, bad or inadequate prospects exist in some roosts in the Alpine Bioregion. During the monitoring in some roosts significant reduction in abundance of the bats in the colonies were recorded, in comparison with the previous records.


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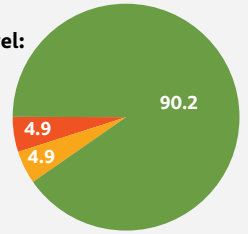
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: FV PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **FV**



By bioregion:

Rhinolophus hipposideros (Borkhausen, 1797)
(*Chiroptera, Rhinolophidae*)

Rhinolophus hipposideros occupies almost entire territory of Slovakia, the only exceptions are the highest mountain altitudes and large lowland areas (Podunajská rovina Lowland, Východoslovenská nížina Lowland). It is a species bound mainly to a sufficiently forested and karst areas.

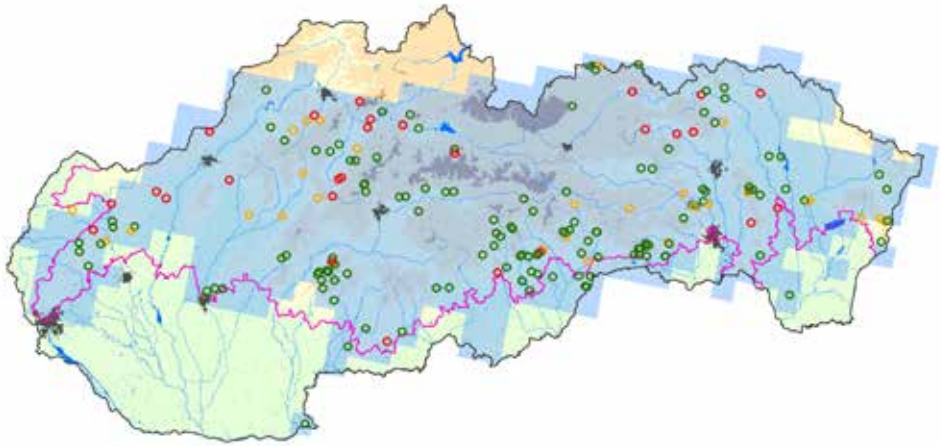
Number of PMLs: 212 **PML average area size:** 3 ha

Number of involved experts: 16 **Number of PML field visits:** 636

The most common accompanying species: *Rhinolophus ferrumequinum*, *Myotis emarginatus*, *Myotis myotis.*

Monitoring method: To determine the size of the reproductive colony, counting during the reproduction season in the summer roosts was used. In the winter hibernating individuals were counted.

PMLs distribution and localization: In summer, mostly attics (especially sacral buildings), in winter various types of underground roosts within the known area of species' distribution in the territory of Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 50,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 10,000 – 50,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality in PMLs:

Overall population quality: ALP: FV PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The most significant threats and pressures in the roosts include speleology, recreational use of caves, succession in the case of old mines and the reconstruction of historical buildings, in the case of attic roosting places.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Assessment and notes on the monitoring results: The quality of the population in the Pannonian Bioregion is evaluated as favourable; some localities in the Alpine Bioregion are evaluated as unfavourable-bad or inadequate. The quality of the habitat for species is evaluated identically in both regions. In most of the monitored localities the future prospects of the species are evaluated as favourable. The prospects in some roosts in the Alpine Bioregion are evaluated as bad or inadequate. The negative evaluation result relates mainly to localities with attic roosts.


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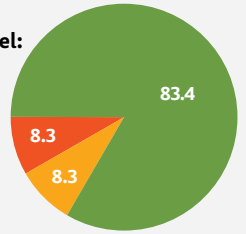
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: FV
Conservation status in SCIs: FV
Overall conservation status on national level: **U1**



By bioregion:

Vespertilio murinus Linnaeus, 1758
(*Chiroptera*, *Vespertilionidae*)

In the territory of Slovakia *Vespertilio murinus* occurs mainly in mountain beech, fir and spruce forests. In the winter it usually inhabits human settlements.

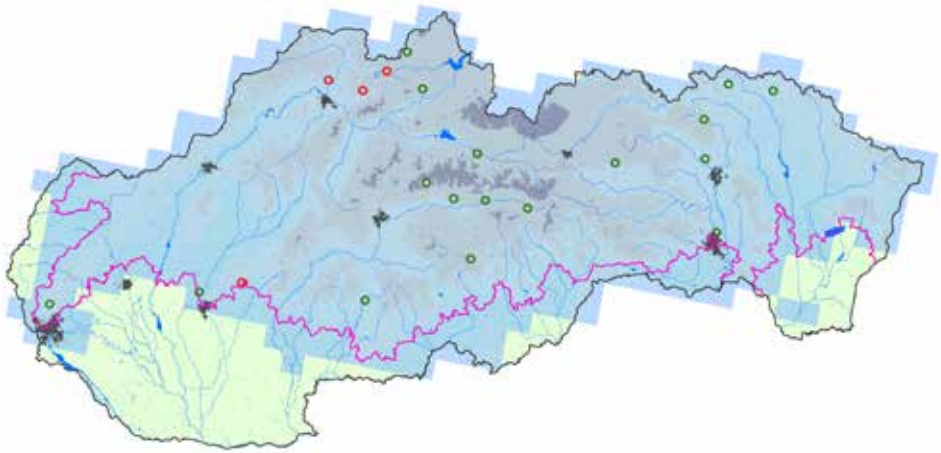
Number of PMLs: 150 **PML average area size:** 180 ha

Number of involved experts: 15 **Number of PML field visits:** 450

The most common accompanying species: *Eptesicus nilssonii*, *Myotis daubentonii*, *Nyctalus noctula*.

Monitoring method: To determine the existence of reproduction, mainly catching with mist nets in forest stands during summer nights was used and also during this period there was mapping of the occurrence on transects using an ultrasound (bat) detector installed in a car (auto-transects).

PMLs distribution and localization: Wide range of forest stands with varied tree species composition in economically used areas as well as in protected areas. Transects covered various habitats of the urban environment, agricultural landscape and forest areas throughout Slovakia.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 5,000 – 10,000 individuals
Estimate of the population size in the Pannonian Bioregion: 0 – 1,000 individuals
Estimate of the population development trend: ALP: × PAN: ×

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: FV

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN: FV

Pressures and threats: The hibernating individuals in urban areas may be negatively affected by the insulation of buildings. Considering the rare occurrence of the species it is not possible to determine other negative pressures and threats to its habitats.

Assessment and notes on the monitoring results: The monitoring by mist netting was relatively ineffective and most of the records come from the recordings on auto-transects. Therefore it was not possible to confirm the reproduction of the species in Slovakia. In the Alpine Bioregion the quality of the population and of the habitat and the future prospects are evaluated as favourable in most of the monitored localities. Using this monitoring methodology, the records in the Pannonian Bioregion were rare, but more frequent occurrence can be assumed in the winter in human settlements.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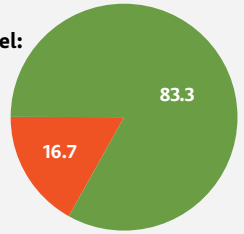
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN: FV

Conservation status in SCIs: FV

Overall conservation status on national level: U1



By bioregion:

**Bison bonasus* (Linnaeus, 1758)
(*Artiodactyla*, *Bovidae*)

It is the only living species of wild bison in Europe. In Slovakia, it inhabits forests and mountain meadows, the so-called poloniny in the area of Bukovské Vrchy Mountains. It lives in small groups, the adult males often live secluded.

Number of PMLs: 1 **PML average area size:** 10,773 ha

Number of involved experts: 2 **Number of PML field visits:** 4

The most common accompanying species: *Tetrastes bonasia, Aquila chrysaetos.*

Monitoring method: Registration of individuals, footprints or habitual signs on transects, situated in border areas between forest and open land. Registration takes place in winter from 1st of January to 28th of February, in the vegetation season from 1st of May to 30th September.

PMLs distribution and localization: The northern part of Poloniny National Park where the individuals reside permanently.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: 10 – 15 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: + PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: FV PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: FV PAN:

Pressures and threats: The species is negatively influenced mainly by urbanization and settlements. There is also a conflict with certain human economic activities: agriculture, forestry and hunting.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Assessment and notes on the monitoring results: The monitoring locality is situated in the area where the species permanently occurs. During every visit, the habitual signs or individuals of wild bison (*Bison bonasus*) were recorded. The methodology of monitoring which was used allows obtaining data on the presence of the species, however, this is not sufficient for evaluation of the population status. It will be necessary to modify the method in this regard in the future. The quality of the habitat and its future prospects are evaluated as favourable. However, due to low-numbered population which is in unfavourable status, the overall evaluation of this species, based on monitoring results, is unfavourable – inadequate.

The presence of settlement in evaluated area, represented by temporary shelters (caravans, sheds, vans, trailers etc.) results in the increase of likelihood of potential conflicts of interest in the protection of wild bison with the interests of the settlers. The management of the hunting of ungulate game, especially its feeding (hay racks and baits), means that the food offer in the area is enriched by components of unknown origin that, if consumed by the wild bison, come into conflict with the users of the hunting grounds.

To ensure the appropriate protection of the wild bison and to eliminate the conflicts with the settlers and hunters it would be appropriate to ensure practical protection of wild bison population in the form of economic compensations for the owners or users of the damaged land and by raising public awareness.


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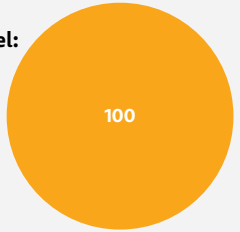
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

*Rupicapra rupicapra tatrica Blahout, 1972

(*Artiodactyla, Bovidae*)

Rupicapra rupicapra tatrica Blahout 1972 occurs in Slovakia in the Belianske Tatry Mountains and the Západné Tatry Mountains and in the Ďumbier part of the Nízke Tatry Mountains. The distribution area lies in the subalpine, Alpine and subnival zones. In the winter period the presence of the species is recorded also in the upper forest limit.

Number of PMLs: 2 **PML average area size:** 7,394 ha

Number of involved experts: 2 **Number of PML field visits:** 8

The most common accompanying species: *Marmota marmota latirostris*, *Ursus arctos*, *Corvus corax*, *Aquila chrysaëtos*, *Prunella collaris*, *Anthus spinoletta*.

Monitoring method: Inventory of the species in the entire area of occurrence twice a year, in the spring and autumn periods, in the form of visual registration of individuals, including detection of age and sex structure of the population in three categories (adult, sub-adult and juvenile).

PMLs distribution and localization: Grassland communities, snowfields and steep rocky terrains from the upper forest limit, with the exception of continual stands of dwarf pine.

Monitoring results:

Estimate of the population size in the Alpine Bioregion: more than 900 individuals

Estimate of the population size in the Pannonian Bioregion:

Estimate of the population development trend: ALP: + PAN:

Population quality in PMLs:

Overall population quality: ALP: U1 PAN:

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN:

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN:

Pressures and threats: The most common pressures and threats of moderate intensity include anthropogenic threats, unregulated sport and recreational activities – mountain climbing, extreme skiing, paragliding and hiking. The natural endangering factors include avalanches, predation by carnivores and birds of prey and habitat succession.

Assessment and notes on the monitoring results: The abundance of the *Rupicapra rupicapra tatrica* has had an increasing trend in the recent years. The number of young chamoises is increasing every year. The highest density (number per area) is in the Belianske Tatry Mountains. The pattern of the relief and the variety of food on limestone and silicates in the particular orographic units are factors that influence the population density. The habitat quality is evaluated as unfavourable – inadequate based on the monitoring. Unregulated sport and recreational activities, especially in the winter period, and failure to comply with the visitors´ rules including walking dogs into the habitats of chamoises etc. result in decreasing numbers. Annual deaths are recorded in the winter period, especially in avalanches, as a result of disturbance in severe rocky terrains. To maintain the stable population of *Rupicapra rupicapra tatrica* it is important to maintain the alpine environment on such a level that there is no disturbance during reproduction, nursing and mating seasons.

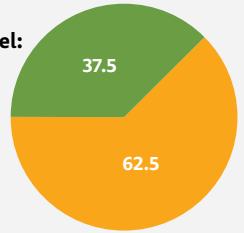
Overall assessment of the conservation status of species

Conservation status on national level:

Con. status of species: ALP: U1 PAN:

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:

Lutra lutra (Linnaeus, 1758)
(*Carnivora*, *Mustelidae*)

Lutra Lutra is a native inhabitant of water courses, wetlands and water bodies with sufficient food and natural character. The main component of its diet are fish, less often amphibians, reptiles, mammals, birds, molluscs and aquatic insects (Urban et al., 2012).

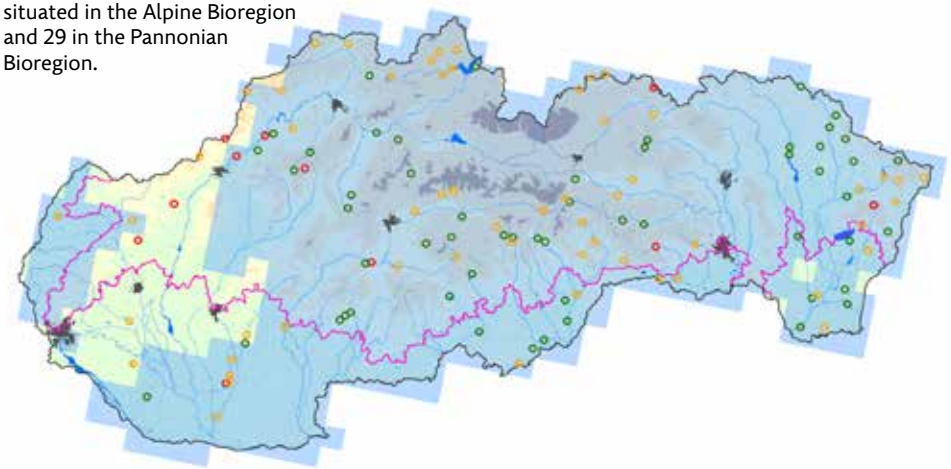
Number of PMLs: 123 **PML average area size:** 66.4 ha

Number of involved experts: 34 **Number of PML field visits:** 449

The most common accompanying species: *Cinclus cinclus*, *Castor fiber*, *Motacilla cinerea*, *Alcedo atthis*, *Anas platyrhynchos*, *Martes foina*, *Vulpes vulpes*, *Ardea cinerea*, *Buteo buteo*, *Cervus elaphus*.

Monitoring method: Visual registration of habitual signs (excrements, odour marks), footprints, observed/dead individuals in the sections of water courses in the lenght of 600 m from 1st May to 30th September. Tracking in fresh snow from 1st December to 28th February.

PMLs distribution and localization: *Lutra lutra* occurs mainly in the areas of submontane rivers and their tributaries in central, northern and north-eastern Slovakia. It is absent in some areas of the lowlands and highlands of western and south-eastern Slovakia (Urban et al., 2012). Out of the 123 PMLs, altogether 94 were situated in the Alpine Bioregion and 29 in the Pannonian Bioregion.



Monitoring results:

Estimate of the population size in the Alpine Bioregion: 1,000 – 1,500 individuals
Estimate of the population size in the Pannonian Bioregion: 100 – 200 individuals
Estimate of the population development trend: ALP: + PAN: +

Population quality in PMLs:

Overall population quality: ALP: U1 PAN: U1

Habitat quality for the species in PMLs:

Overall habitat quality for the species: ALP: U1 PAN: FV

Future prospects of habitat for the species in PMLs:

Overall future prospects of habitat for the species: ALP: U1 PAN: FV

Pressures and threats: The most frequently reported pressure, of high or moderate intensity, in the Alpine Bioregion were transport networks and the impact of transport. This can cause mortality, limit the possibility of migration and cause fragmentation of habitats and populations. The second most frequently mentioned pressure is the pollution of surface waters which is also related to the release of pollutants and extraction of minerals, which were mentioned among the negative effects too. In the Pannonian Bioregion, the most frequently reported pressures include biological processes (succession, eutrophication etc.), hunting and trapping, pollution of surface waters and sport fishing and fish farming.


© Ján Kautman

Assessment and notes on the monitoring results: Results from the monitoring show that occurrence of *Lutra lutra* is more frequent in the river basins of the Alpine Bioregion. The abundance of more fragmented populations in the Pannonian Bioregion has been low in the long term.

A slight increase in the abundance has been observed in the Alpine Bioregion in the last decade. The estimated abundance, based on the surface area of localities inhabited by *Lutra lutra* in the model regions (Turčianska kotlina basin, Poľana Mountains, Tatra National Park) in 1990-2004 was in the range of 1.1-3.3 adult ex./100 km² (Kadlečík & Urban, 1997, Urban 1999, Urban & Topercer, 1999, Boďová & Kadlečík, 2004). Based on the analysis of field data from the monitoring of *Lutra lutra* in PMLs in 2013-2015 it has been found out that the estimated abundance ranged around 4-6 ex. /100 ha. For example in the neighbouring Czech Republic, the estimated abundance of *Lutra lutra* was in the range of 1-10 adult ex./100 km² (Anděra & Gaisler, 2012).


© Mária Apfelová

The quality of population is evaluated as inadequate in both bioregions due to permanent anthropogenic impacts in individual river basins (e.g. sport fishing). The habitat quality in the Alpine Bioregion is classified as inadequate (due to development of line constructions, removal of bankside vegetation and the river modifications). The future habitat prospects are evaluated similarly. Habitat quality and its future prospects are evaluated as favourable in the Pannonian Bioregion.

In the localities of *Lutra lutra* also other vertebrate species were found, such as *Castor fiber*, *Martes foina*, *Vulpes vulpes*, *Mustela erminea*, *Arvicola amphibius*, *Neomys fodiens*, *N. anomalus*, *Ondatra zibethicus* etc.

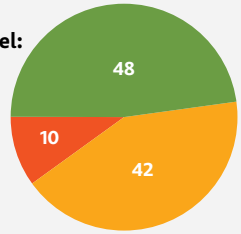
Overall assessment of the conservation status of species

Conservation status on national level:

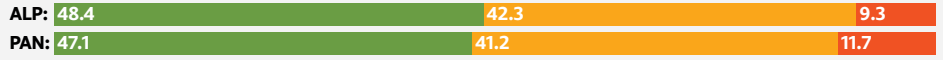
Con. status of species: ALP: U1 PAN: U1

Conservation status in SCIs: U1

Overall conservation status on national level: **U1**



By bioregion:



Martes martes (Linnaeus, 1758)
(*Carnivora*, *Mustelidae*)

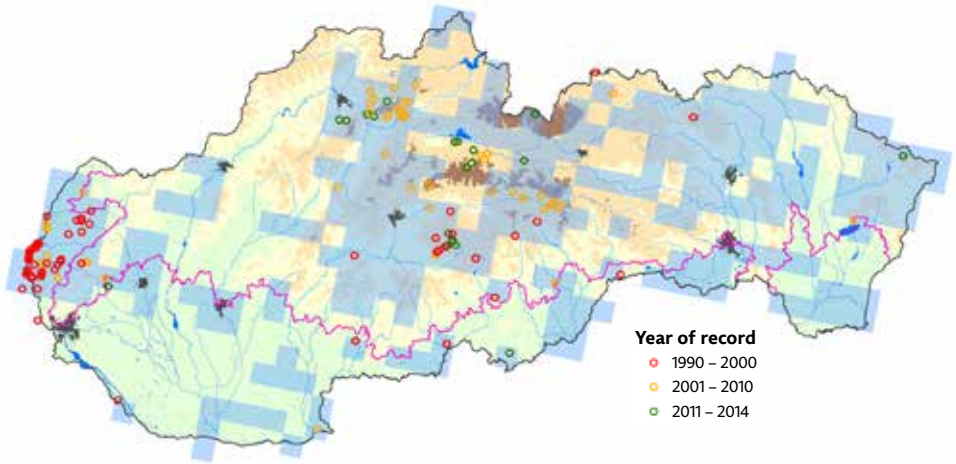
Martes martes is a typical species living in trees. Their home range is about 300-600 ha and it is capable of making movements of around 5 to 25 kilometres in a day (Škaloud, 2000).

Number of PMLs: 0 **Number of records since 1990:** 137

The most common accompanying species: *Martes foina*, *Sciurus vulgaris*, *Clethrionomys glareolus*, *Apodemus flavicollis*, *Microtus subterraneus*, *Glis glis*, *Dryomys nitedula*, *Lynx lynx*, *Ursus arctos*, *Buteo buteo*, *Pernis apivorus*, *Strix aluco*, *S. uralensis*, *Aegolius funereus* and others.

Monitoring method: Registration of individuals on transects in summer from 1st July to 31st August and tracking in fresh snow from 1st December to 28th February. Registration using digital scouting cameras, hair traps, etc. in selected localities, or collection of data through questionnaires.

Records distribution and localization: Current knowledge on the distribution of *Martes martes* in the territory of Slovakia is insufficient. Distribution is determined by the most recent records on the occurrence, accompanied by museum items from precise known locations (mostly skulls). These museum items come mostly from the regions of eastern and northern Slovakia and Považie Region. By 2012, the



highest number of observations was from around Zvolen city, Kremnické vrchy Mountains and Poľana Mountains, the least number of observations was in the western, southern and eastern Slovakia. Based on published records (Krištofík & Danko, 2012) and those registered in databases from 1970-2014 (167 records) we can assume that *Martes martes* inhabits all types of forests in the entire territory of Slovakia – from lowlands to upper forest limit, in altitudes from 100 to 1,600 m above the sea level (Mošanský, 1974).

Monitoring results:
Estimate of the population size in the Alpine Bioregion: 20,000 – 100,000 individuals
Estimate of the population size in the Pannonian Bioregion: 5,000 – 10,000 individuals
Estimate of the population development trend: ALP: 0 PAN: 0

Population quality: Based on incomplete time series and sporadic data on spatial distribution and density of the target species, it is not possible to responsibly evaluate the quality of population in Slovakia.

Habitat quality for the species: With regard to well-known facts about bionomics of *Martes martes* and its habitat preferences it can be assumed with a certain degree of probability, that the habitat quality is currently inadequate in Slovakia.

Future prospects of habitat for the species: The future prospects of the habitat for species are unfavourable-bad at the whole territory.

Pressures and threats: The pressures and threats to species in both bioregions included clearcutting and removal of dead wood from forest stands, hunting, installing traps, poisoned baits and poaching (Černecký et al., 2014).


© Stanislav Harvančík

Assessment and notes on the monitoring results: *Martes martes* has not been designated its own permanent monitoring localities as was done for the other species. The species should be recorded during monitoring of other species which inhabit the same habitats or the methods and ways of their monitoring are similar. The species was recorded only seven times during the project period, twice by the footprint and once by finding of excrements (possible confusion with *Martes foina*). The records depicted on the map rather show the rate of activity of the involved experts than the actual distribution of the species.

Some idea on the population abundance of *Martes martes* in the past provide published data. Feriancová (1955) states that there were approximately 1,500 individuals in Slovakia. Based on analysis of data from eastern Slovakia, Mošanský (1984) considered this species as a commonly occurring in the forests of eastern Slovakia. The abundance of *Martes martes* in the district of Bardejov was estimated by Weisz (1967) at 300 individuals. Sixteen individuals of *Martes martes* were found in beech and spruce forests of Kremnické vrchy Hills (Sielnica – Brestová – Skalka) in a 10 km transect (n = 14 countings, variation range of the abundance is 8-21 specimen) from January to March 2001-2009 (Krištín, unpubl.).

It is recommended, in accordance with the methodology of monitoring for this species, to establish PMLs in the future in the form of transects for tracking/monitoring of the species, or to carry out data collection using questionnaires in order to complete data collected regularly in hunting information database. It is possible to carry out more detailed monitoring using scouting cameras (photo traps) at the localities with known occurrence or with a high potential of occurrence of the target species. The habitats of *Martes martes* are also inhabited by other significant species of animals, such as *Ursus arctos*, *Felis sylvestris*, *Picoides tridactylus* etc.


© Milan Janák

Mustela eversmanii Lesson, 1827
(*Carnivora*, *Mustelidae*)

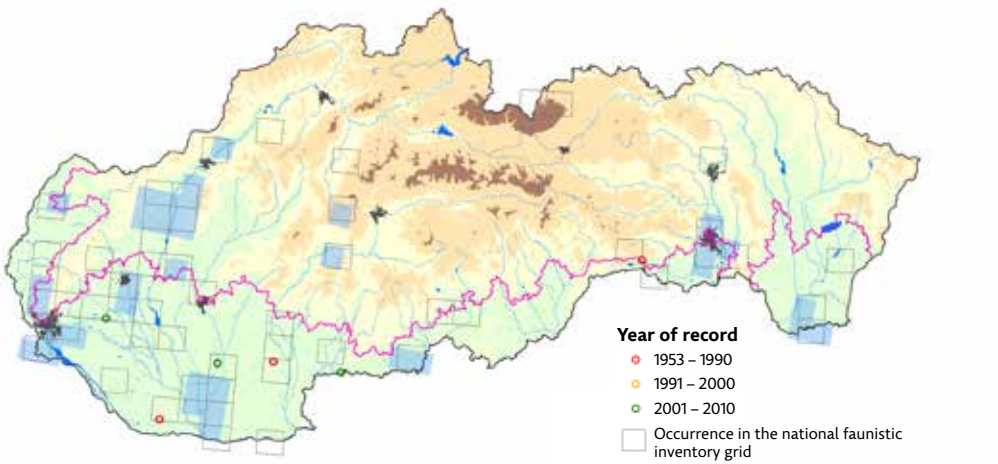
Rare species of a small carnivore, active at dusk and at night. It occurs naturally in an open landscape with meadows and pastures. Linked to presence of *Spermophilus citellus* and *Cricetus cricetus* as its main prey.

Number of PMLs: 0 **Number of records since 1990:** 11

The most common accompanying species: *Spermophilus citellus*, *Cricetus cricetus*, *Anthus campestris*, *Falco vespertinus*, *Vanellus vanellus*.

Monitoring method: Registration of individuals (living/dead) on transects along the roads. Registration in selected localities using scouting cameras (photo traps), by hair traps or by capturing individuals into live traps (e.g. Tomahawk type) and their marking. Collection of data via questionnaires.

Records distribution and localization: Open agricultural landscape with meadows and pastures, salt marshes, grassy steppes in the lowlands and low-altitude basins of Slovakia.



Monitoring results:
Estimate of the population size in the Alpine Bioregion: 300 – 600 individuals
Estimate of the population size in the Pannonian Bioregion: 500 – 1,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality: Based on the available literature data on the occurrence, it can be concluded that the quality of the population is inadequate in the Pannonian Bioregion. The situation in the Alpine Bioregion cannot be evaluated due to lack of data on the occurrence and abundance after 1990.

Habitat quality for the species: The quality of the habitat deteriorates on a national level due to changes in land management – it is best manifested in the Pannonian Bioregion.

Future prospects of habitat for the species: With the current pressure of anthropic changes in the landscape, the future prospects of this species are unfavourable-inadequate to bad.

Pressures and threats: The pressures and threats affecting the species in both bioregions include the changes in the method of land management (in particular the conversion of permanent grasslands to arable land, as well as abandonment of farming, or of grazing), removal of green belts, hedges, bushes and young wood, hunting, laying traps, poisoning, poaching and modification of water courses (Černecký et al., 2014). Rapid loss of permanent grasslands, or on the other hand, their non-management mainly in the lowland areas of Slovakia, caused the extinction of a number of already isolated populations of *Spermophilus citellus* to which the *Mustela eversmanii* is bound in terms of food chain. The loss of suitable habitats affects *Mustela eversmanii* directly and also indirectly through depletion of food resources (prey).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Assessment and notes on the monitoring results: *Mustela eversmanii* has not been designated any permanent monitoring localities as was done for other species. The species should be recorded during monitoring of other species. No records were obtained during the project in this way.

Within the other project of DAPHNE – Institute of Applied Ecology, aimed at identifying sites to complete the Natura 2000 network, in the autumn of 2014 the mapping of *Mustela eversmanii* was carried out in selected localities, which represented suitable habitats and were located near the findings of the species in the past 10 years. The method of capturing into live traps with bait and the mapping of habitual signs and carcases on roads were used to map the areas of Senec, Šurany and Tešmak. Despite these efforts only footprints of polecat were recorded in two localities, without the possibility of identifying the species. However, in the localities Senec and Šurany European hamster *Cricetus cricetus* (Šálek, 2014) was captured. This supports the thesis about the suitability of these habitats for *Mustela eversmanii*.

The highest concentration of findings and shots (over 60 %) is located in western Slovakia in the times before 1965 and also later on. Findings of *Mustela eversmanii*, deposited in the collections of Slovak science museums, come mainly from Dolné Považie Region (Trnava, Trenčín), Záhorie Region, from town of Komárno, Košická kotlina Basin and Východoslovenská nížina Lowland. The data on its occurrence in central Slovakia are insufficient at the present (Krištín et al., 2012).

It is recommended, in accordance with the methodology of monitoring for this species, to establish PMLs for this species in the future, in the form of transects near roads where living and dead individuals would be recorded, or to carry out data collection using questionnaires in order to supplement the data collected regularly in the hunting information database. In the localities with known presence or high potential of species occurrence, monitoring can be done by using scouting cameras, capturing and marking the individuals, or by the collection and analysis of hair (hair traps).

Habitats of *Mustela eversmanii* are inhabited by other significant species of animals, such as *Falco vespertinus*, *Coracias garrulus*, *Lanius minor*, *Acrida ungarica*. Unfortunately, the populations of all these species are declining in Slovakia, almost to the boundary of extinction.


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Mustela putorius Linnaeus, 1758
(*Carnivora*, *Mustelidae*)

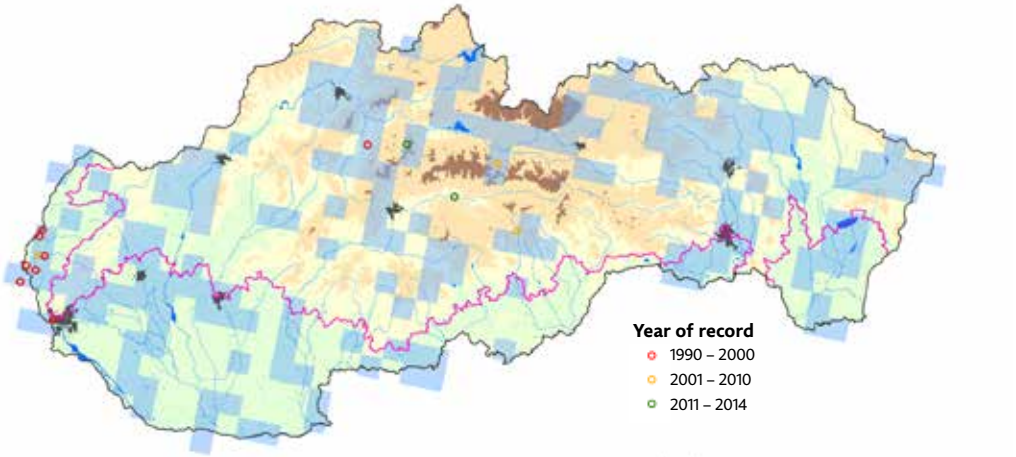
Mustela putorius is an endemic species of Europe that prefers habitats in the vicinity of flowing and standing waters, especially in the agricultural landscape (Krištín et al., 2012).

Number of PMLs: 0 **Number of records since 1990:** 13

The most common accompanying species: *Lutra lutra*, *Martes foina*, *Vulpes vulpes*, *Mustela erminea*, *Castor fiber*, *Cinclus cinclus*, *Motacilla cinerea*, *Alcedo atthis*, *Anas platyrhynchos*, *Ardea cinerea*.

Monitoring method: Registration of individuals (living/dead) on transects along the roads. Registration in selected localities using scouting cameras (photo traps), hair traps or capturing individuals into live traps and marking.

Records distribution and localization: *Mustela putorius* is likely to occur in the entire territory of Slovakia from lowlands (from about 100 m above the sea level) to an altitude of 1,000 m with rare occurrences recorded even in higher altitudes. Before 1965, the highest number of confirmed occurrences came from western and eastern Slovakia. The species' distribution can be assumed on the basis of verified findings in the form of skeletal material (skulls), deposited in several Slovak museums. It documents



the occurrence of *Mustela putorius* in 1958-2002 mainly in Považie Region (vicinity of Trnava, Trenčín, Žilina and Martin cities) and from the vicinity of town of Komárno. The least number of data comes from eastern Slovakia, while in the north-east of the country there are no data at all on its occurrence (Krištín et al., 2012). In the last fifteen years there was a noticeable decrease in number of individuals killed on roads in the Žilinský kraj County (Hlôška in litt.). In contrast, there was an increased number of individuals killed on roads in the foothills of the Vysoké Tatry Mountains after the windstorm calamity in 2004 (Chovancová in verb.).

Monitoring results:
Estimate of the population size in the Alpine Bioregion: 2,000 – 5,000 individuals
Estimate of the population size in the Pannonian Bioregion: 3,000 – 6,000 individuals
Estimate of the population development trend: ALP: – PAN: –

Population quality: Information on population dynamics of the evaluated species and on the changes in its distribution, as well as on the negative factors affecting them is incomplete at present. Increases in the abundance has been recorded recently in some regions of Slovakia (e.g. in the foothills of the Vysoké Tatry Mountains, Popradská kotlina Basin), while in other areas it is declining.

Habitat quality for the species: The habitat quality is favourable especially in the Alpine Bioregion; in the Pannonian Bioregion it is inadequate.

Future prospects of habitat for the species: Deterioration of habitat quality due to development of road infrastructure, connected with disturbance to bank-side vegetation and fragmentation of suitable habitats can be assumed in the long term.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Pressures and threats: The pressures and threats having influence on the species include land use changes, removing of green belts, hedges, bushes and young wood, hunting, trapping, poisoning, poaching and modification of water courses in both bioregions (Černecký et al., 2014).

Assessment and notes on the monitoring results: No permanent monitoring localities have been designated for *Mustela putorius*, unlike for other monitored species. The plan was to record the species during the monitoring of other species occurring in the same habitats, or where the method and the way of their monitoring are similar or comply with the monitoring methodology of this species. There are 13 records of confirmed occurrence of this species in CIMS at present (mostly dead individuals, less frequent direct observations or captures into live trap) from different time periods in 1989-2013. The species was recorded only once during the project period, a deceased individual on the road no. I/66 near Podbrezová town.

Collected materials proving the occurrence of *Mustela putorius*, deposited in museum collections, document its occurrence from 1958-2002 at a limited area only. The published data does not allow for reliable time and spatial analysis of its population dynamics, with the exception of hunting statistics, which register a decrease in catches. For this reason, negative population trends are assumed.

The monitoring of the species did not bring expected results and it is necessary to continue in designated PMLs, e.g. in the form of transects near roads, where the species will be recorded observed alive or dead, or to implement data collection using questionnaire in order to supplement the data collected in hunting information database. In the localities with known presence or high potential of the species occurrence, detailed monitoring can be executed by using scouting cameras, capturing, marking and releasing of individuals, or by collection and analysis of hair (hair traps).

The habitats of *Mustela putorius* are inhabited by other significant species of animals, such as *Lutra lutra*, *Martes foina* or *Castor fiber*.


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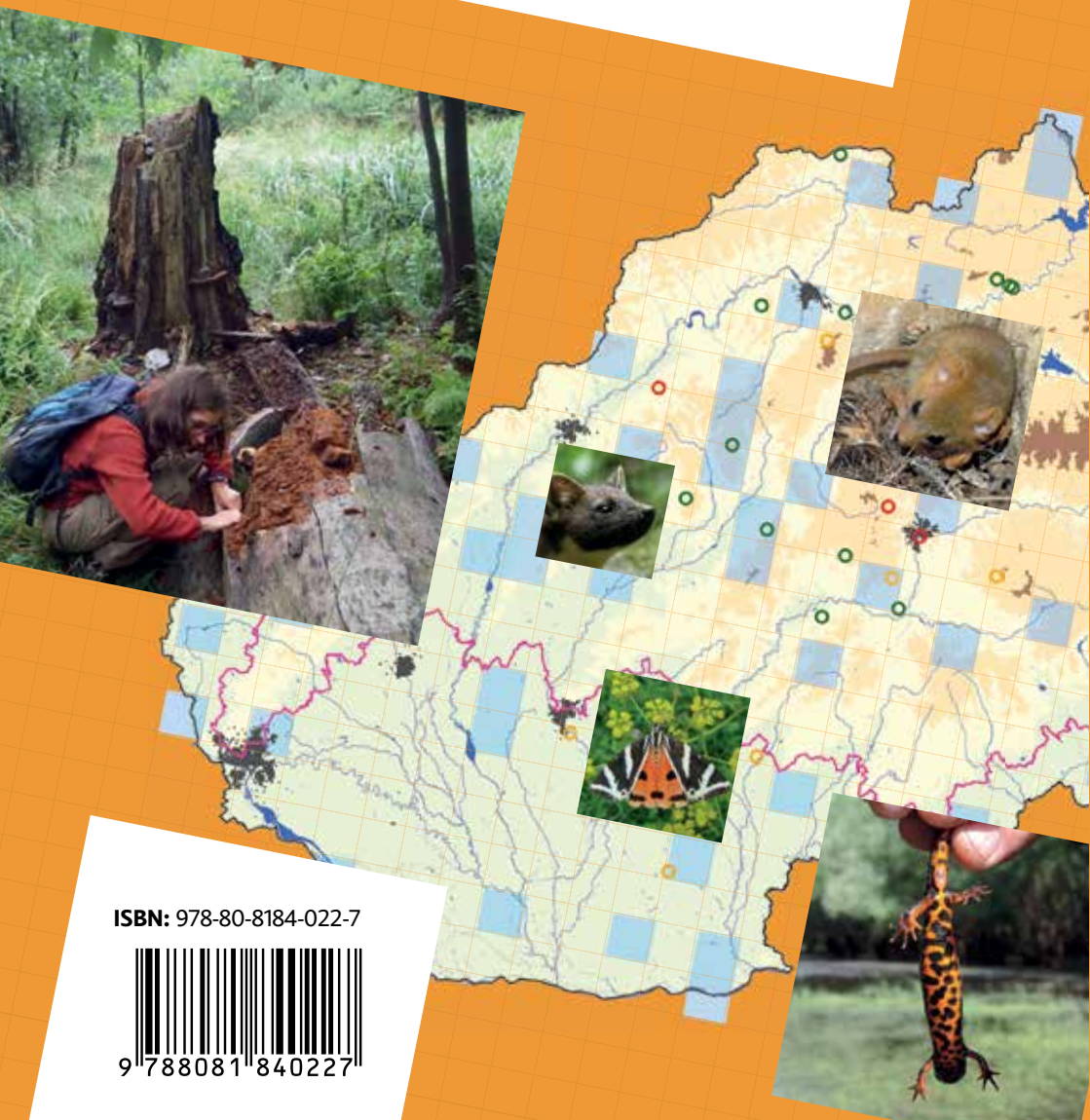

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