Information Sheet on Ramsar Wetlands (RIS) – 2006-2008 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

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DD MM YY

Designation date | Site Reference Number

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2. Date this sheet was completed/updated:

August 19, 2006

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3. Country:

Slovak Republic

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4. Name of the Ramsar site:

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Caves of the Demanova Valley (Jaskyne Demänovskej doliny)

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only)**:**
a) Designation of a new Ramsar site ✓; or
b) Updated information on an existing Ramsar site ❑

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ❑

or
If the site boundary has changed:
i) the boundary has been delineated more accurately ❑; or
ii) the boundary has been extended ❑; or
iii) the boundary has been restricted** ❑

and/or

If the site area has changed:
i) the area has been measured more accurately ❑; or
ii) the area has been extended ❑; or
iii) the area has been reduced** ❑

** **Important note**: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site:
Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:
i**) a hard copy** (required for inclusion of site in the Ramsar List): ✓;

ii**) an electronic format** (e.g. a JPEG or ArcView image) ✓;

iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** ✓.

b) Describe briefly the type of boundary delineation applied:
e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.
The northern boundary of the site is identical with the present southern boundary of the national nature reserve Demanova Valley. Other boundaries of the site are identical with the boundaries of proposed protection zone of the Demanovske Caves.

8. Geographical coordinates (latitude/longitude, in degrees and minutes):
Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

Latitude (min-max) 49° 01' 14" - 48° 58' 12" /

Longitude (min-max) 19° 33' 10" - 19° 38' 03"

Centre: 48° 59' N , 19° 35' E

9. General location:
Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The territory is located in the northern Slovakia, in an attractive tourist resort of the Demanovska Valley, approximately 10 km southerly from the district city of Liptovsky Mikulas (population around 33,200) and 66 km SE away from the city of Poprad (around 54,440 inhabitants). The closest villages are Demanovska Dolina (around 200 inhabitants) and Pavcina Lehota (population around 340). The territory is a part of the Zilina Selfgoverning Region, the district of Liptovsky Mikulas and cadastral unit of Demanovska Dolina.

10. Elevation: (in metres: average and/or maximum & minimum)
(average and/or max. & min.) min. 747 m a.s.l., max 1700 m a.s.l.

11. Area: (in hectares)
1'448

12. General overview of the site:
Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The underground wetland represents a part of the longest cave system in Slovakia with the total measured length of 35,044 m and vertical range of 201 m (February 28, 2006). The system of the Demanovske Caves comprises the Pusta Cave, Demanovska Cave of Liberty, Udolna Cave, Cave pod Utesom, Trosky Cave, Vyvieranie Cave, Demanovska Cave of Peace, Pavucia Cave and Demanovska Ice Cave, which are speleologically interconnected. A large number of bigger and smaller caves are genetically related to the system (Benikova Cave, Sucha Cave, Stefanova Cave, Okno Cave and others). A part of proposed locality, except for the underground wetland, is also the most vulnerable section of its catchment area participating on karst water supplies refilling. Existence of rare and threatened organisms is connected with the underground wetland. Surface wetland habitats provide the suitable conditions for life and reproduction of uncommon animals, mainly the amphibians.

13. Ramsar Criteria:
Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1	2	3	4	5	6	7	8	9
✓	✓	✓	☐	☐	☐	☐	☐	☐

14. Justification for the application of each Criterion listed in 13 above:
Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1:
The territory presents a representative, rare and specific example of natural type of underground wetland within the biogeographic region (Palaearctic division - terrestrial biocycle: West Carpathian district, limnic biocycle: Southern Pontian district, details see point 15), and with great hydrological importance.

Criterion 2:
From the national importance point of view, the cave system contains rare, vulnerable and threatened species of invertebrates (Evertebrata), which are bound to specific conditions of subterranean karst system and its underground waters. According to the appendices 4 and 6 of the Regulation no. 24/2003 which executes the Act no. 543/2002 of the Legal Codes on Nature and Landscape Protection, the protected and priority species of national importance are: *Eukoenenia spelaea* (Palpigrada), *Niphargus tatrensis, Synurella intermedia* (both Crustacea), *Allorhiscosoma sphinx* (Diplopoda) and *Duvalius microphthalmus spelaeus* (Coleoptera).

Protected amphibians occur and reproduce in surface wetland habitats and entrance parts of caves. According to the appendix 6 of the Regulation no. 24/2003 of the Legal Codes of Slovak Republic, the species of European importance are: *Bufo viridis* (European Green Toad) and *Bombina variegata* (Yellow-bellied Toad), which are at the same time stated in the Appendix II of the Bern Convention *(Convention on the Conservation of European Wildlife and Natural Habitats)* and Appendices II and IV of the European Council Directive 92/43/EEC *(Habitat Directive).* Within the Bern Convention the status of strictly protected species (appendix II) or protected species (appendix III) have also: *Triturus montandoni* (Carpathian Newt), *Triturus alpestris* (Alpine Newt), *Salamandra salamandra* (Spotted Salamander), *Rana temporaria* (Common Frog) and *Bufo bufo* (Common Toad).
The caves within the proposed territory are used as hibernation sites by protected vertebrates, which are stated as species of European importance according to the Appendix 6 of the Regulation no. 24/2003 of the Legal Codes of Slovak Republic and also stated in the Appendix II of the Bern Convention, Appendix II of the Bonn Convention and Appendices II and IV of the Habitat Directive 92/43/EEC. The following bat species (Chiroptera) are concerned: – *Rhinolophus hipposideros* (Lesser horseshoe bat), *Myotis myotis* (Greater mouse-eared bat), *Myotis oxygnathus* (Lesser mouse-eared bat), *Myotis mystacinus/brandtii* (Whiskered / Brandt's bat), *Myotis daubentonii* (Daubenton's bat), *Myotis dasycneme* (Pond bat), *Eptesicus nilssonii* (Northern bat), *Eptesicus serotinus* (Serotine bat), *Barbastella barbastellus* (Western Barbastelle bat), *Plecotus auritus* (Brown long-eared bat), *Plecotus austriacus* (Grey long-eared bat).
In the Red List of IUCN of Threatened Species (2004), the following species are listed: *Barbastella barbastellus* and *Myotis dasycneme* classified in the category VU (vulnerable), and *Myotis myotis* in the category LR/nt (lower risk/near threatened).

Criterion 3:
At least 20 ecologically important species of invertebrates (troglobites/stygobites, troglophilous/stygophilous species) occur in the System of the Demanovske Caves, which represent key species in preserving the ecological stability and biodiversity within the biogeographic region *(see point 20)*. Zoogeographically the system of the Demanovske Caves can be considered as one of important refugia, where thanks to favourable life conditions a

higher number of endemic, subendemic, glacial-relict and other rare forms of cave invertebrates within the Western Carpathian Province was preserved – e.g. *Duvalius microphthalmus spelaeus* (Coleoptera), *Allorhiscosoma sphinx* (Diplopoda), *Protaphorura janosik, Deuteraphorura kratochvili, Pseudosinella paclti*, *Hypogastrura crassaegranulata, Oncopodura reyersdorfensis* (Collembola), *Eukoenenia spelaea* (Palpigradida), *Veigaia inexpectata, Arctoseius pristinus, Saprosecans baloghi* (Acarina). The diversity of springtails (Collembola) is remarkably high – by now 28 species were determined. Stygobitic species participate significantly on the overall biological diversity. Well-preserved state of cave water habitats indicates the presence of turbellarian *Dendrocoelum carpathicum*, amphipods *Niphargus tatrensis, Synurella intermedia,* copepods *Acanthocyclops languidus, Elaphoidella phreatica*.

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15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:
Alpine (Carpathian) region

According to zoogeographical division of the Palaearctic – terrestrial biocycle, the territory is a part of Palaearctic region, Euro-Siberian subregion, province of broad-leaved forests, Carpathian mountains subprovince and West Carpathian district (Jedlicka, Kalivodova, Landscape Atlas of Slovakia, 2002). Within the limnic biocycle – the territory belongs to the Euro-Mediterranean subregion, Ponto-Caspian province, Southern Pontian district and Upper Vah area (Hensel, Krno, Landscape Atlas of Slovakia, 2002).

b) biogeographic regionalisation scheme (include reference citation):
EU Council Directive 92/43/CEE – Natura 2000 Network

From the Slovak zoogeographical division point of view, the territory is a part of karst region of Nizke Tatry within zoogeographical supraregion of Central Carpathians (Eucarpaticum) in the internal district of the Western Carpathians province (Košel, 2000).
According to phytogeographical division the territory belongs to the region of Western Carpathians flora (Carpaticum occidentale), unit of Central Carpathians flora (Eucarpaticum), district Nizke Tatry (Futák, Atlas of SSR, 1980).

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16. Physical features of the site:
Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Geology and geomorphology:
The system of the Demanovske Caves is located in the Demanova Valley, on the northern side of the Low Tatras Mts. According to the geomorphological division, the Demanova Valley belongs to the Western Carpathians province, Inner Western Carpathians subprovince, Fatra-Tatra region, Nizke Tatry unit, Dumbierske Tatry subunit and Demanovske vrchy part. The straight length of the Demanovska Valley is 10 km. The valley is formed in following geological units: Tatricum (crystalline core and envelope), Fatricum (Krizna Nappe), Hronicum (Choc Nappe) and Quaternary sediments.
The southern part of the valley belongs to Tatricum, which is built by crystalline basement and envelope series rocks. The crystalline core is composed from granite rocks with dominating granodiorites. The envelope series of the crystalline basement is composed from

lower Triassic formations of quartzites, sandstones and shales. The most important part, from the karst phenomena point of view, is the overlying carbonate complex of the Krizna Nappe. It is represented mainly by middle Triassic Gutenstein limestones with prevailing inclination of beds to NE. The upper parts are formed by layers of middle Triassic dolomites, upper Triassic shales of Carpathian Keuper and overlying Jurassic limestones and Neokome marls and marly limestones. The Choc Nappe is only negligibly present in the territory. It consists of middle Triassic limestones and dolomites. Quaternary sediments are represented by glacier moraines, glacio-fluvial deposits, remains of river terraces, fluvial sediments, local deluvial sediments and debris. The Demanova Valley leads to the Liptovska Basin, which is formed by Palaeogene sediments. The contact of karst and non-karst territory is located in the area of Lucky. From among the surface karst phenomena, there are dolines and ponors situated in the riverbed of Demanovka River and its tributaries.
The system of Demanovske Caves was formed by corrosion and erosion activities of ponor allochthonous mountain streams mostly on the right hand side of the Demanova Valley. The caves in this part represent an example of cave levels genesis by ponor waters in a fluviokarst valley in middle mountain position of the Western Carpathians. There are nine developmental levels in the lower and middle part of the cave system, out of which the most important is the fourth cave level. Oval, river modelled passages of both larger and smaller dimensions, dome spaces reshaped by collapses and frost weathering dominate in the caves. The cave spaces are rich in flowstone fills and are remarkable by unusual variegation. Except for the classical dripstone forms (stalagmites, stalactites, columns), there are also unique lacustrine forms, eccentric stalactites and mighty flowstone waterfalls.

Soil types and sediment characteristic:
The karst territories contain humus-carbonate soils – rendzic leptosols with loamy-sandy, sandy-loamy and loamy texture classes. The soil reaction is in range from slightly acid to alkaline, highly carbonated with as much as 50% contents of $CaCO_3$.
The non-karst area of the valley is characterized by acid cambic podzols and humic podzols (pH 3,5 - 5,1).
Origin: natural
Hydrology:
The main hydrological artery of the territory is formed by allochthonous waters of Demanovka River and its most important tributaries, which are Priecno and Zadna voda, also with springs in non-karst territory. Other intermittent tributaries of Demanovka are formed by autochthonous karst waters in smaller side valleys. The density of surface river network as well as the intensity of flowage is a function of bedrock permeability and amount of rainfall total. When entering the karst area the waters of Demanovka either partially or entirely sink underground depending on the immediate rate of flow. This sinking is concentrated in ponors situated in its riverbed. Many of them are now filled with granite material, which limits their permeability. Sinkholes of surface waters underground are visible also in side valleys (Machnata, Pusta, Vyvieranie, Okno, Cierna, Nizny Blatnik, Vysny Blatnik). The course of underground ways of sinking surface waters is not always exactly known.
Slope gradient settings of Demanovka are uneven. The watercourse has inclination of 110,9 ‰ in the upper part (from the springs of Demanovka to confluence with Zadna voda). In the central part as far as the end of the valley the inclination considerably decreases. The underground Demanovka, flowing through a part of cave system, gets out on the surface in a strong karst spring lying at the end of the Vyvieranie Valley at elevation of 791 m a.s.l. The yield is according to older works given in range between 227-1,466 litres per second. The waters rising from underground on the surface through this spring join the waters of surface

flow of Demanovka after several meters. During low rainfall totals, mainly in summer, the riverbed of surface Demanovka can be completely dry at this point.
Within the framework of hydrogeological division of Slovakia, the territory is a part of hydrogeological region MG 017 – Mesozoic and Crystalline Basement of NW slopes of Low Tatras Mts. Underground waters of carbonate structure are formed by sinking surface allochthonous streams from crystalline rocks and authochthonous streams from the Mesozoic, which participate in so called horizontal circulation of waters in the cave environment. The slope settings and discontinuities of carbonate massif determine preferred ways of flowing and overall movement of underground waters in the karst massif. A part of these waters probably penetrates into underground flow of Demanovka, a part gets deeper, where it becomes a part of siphonal circulation of underground waters. Its existence was proven by results of trace experiments realized in the Demanovka basin. The observations during winter seasons and relatively low rates of flow show that the cave system accumulates great amount of underground water, which is not related to the sinking from surface streams. It is assumed that the flowage in cave riverbed of Demanovka is in this case mainly a function of underground water supplies quantity. A part of the vertical circulation underground are seepage precipitation waters which refill various sized, both temporary and permanent underground lakes. The largest of them is the Velke jazero (Great Lake) in the Demanovska Cave of Liberty, which is 52 m long, 5-12 m wide and more than 7 m deep.
From the hydrogeological settings point of view there are different hydraulic conditions of environment in the area of crystalline rocks and Mesozoic complexes. The granite rocks of Tatricum are characterized by fissure permeability. The carbonate rocks have hydraulic properties typical for karst environment. Karst and karst-fissure permeability dominate. Quaternary sediments considerably influence the hydrogeological settings of the crystalline basement. They offer suitable environment for infiltration of precipitation waters, which here accumulate, and percolate to the zone of disruption of bedrock or flow away on the surface.

Water quality:
The quality and character of chemism of carbonate structure underground waters is influenced by qualitative attributes of waters, which participate in their origin. Except for precipitation waters, which infiltrate into carbonate environment, also surface and underground waters from crystalline basement and karst waters forming in the environment of karbonate structures take part. Allochthonous waters from the crystalline basement representing a part of surface waters in the area (surface Demanovka, Zadna voda), represent low mineralised waters of minor Ca-Mg-HCO_3-SO_4 type. An increased ratio of alkali, chlorides and sulphids is frequent. The waters formed in the environment of carbonate complex show higher values of mineralization. Their pH is shifted to mildly alkaline area. They represent the basic major Ca-Mg-HCO_3 type of chemism. Within the carbonate structure the mutual mixing of these two types of waters takes place, with a dominant influence of waters from crystalline rocks. Their mineralisation ranges between 100-200 mg/l. From the underground waters quality point of view, the quality of precipitation waters is important, since they are characteristic by increased acidity causing the rise of sulphate aggressively of waters. The quality of underground waters is, except for pollution of precipitation waters, threatened by intensive tourist traffic in the Demanova Valley. In spite of a very high load of the territory by the tourist resort, the quality of underground waters still remains satisfactory, only bacterial pollution connected with increased occurrence of coliform, psychrophilic, mesophilic bacteria and organic matter (abioseston) persists.

Climate:
Cave system:

Different elevations of individual caves in connection with other specific natural characteristics significantly influence the variability of cave microclimate. It means that the microclimatic characteristics of cave environment cannot be generalized to all caves in the system. Stated are the data on temperature and realive humidity in three biggest caves of the Demanovsky Cave system: Demanovska Cave of Liberty (average air temperature 6,1 to 7,0 ^{o}C, relative air humidity 94 to 99 %), Demänovská Ice Cave (average air temperature in glaciated parts around 0 ^{o}C, rises towards non-glaciated parts to 1,3 up to 5,7 ^{o}C, relative air humidity 92 až 98 %) and the Cave of Peace (average air temperature 3,3 to 6,5 ^{o}C, relative air humidity 95 až 100 %).

Surface:

According to the Atlas of Landscape of the Slovak Republic, the territory belongs to the cool and very humid region, moderately cool and cool mountainous subregions. Temperature conditions are oppositely proportional to elevation i.e. with increasing elevation the temperature decreases. The warmest months are July and August, the coldest is January. There is no climatic station in the proposed territory. Long-time average annual rainfall total from years 1951–1980 from the closest precipitation measurement stations is the following: Liptovsky Mikulas (570 m a.s.l.) - 689 mm, Jasna (1196 m a.s.l.) - 1327 mm and Chopok (2008 m a.s.l.) - 1139 mm. The highest long-time average rainfall totals fall to June and July and the lowest to winter season. Average annual totals of current and potential evapotranspiration are within range of 350 – 400 mm. The values rise with dropping elevation. Prevailing direction of air masses movement is NW (Low Tatras Mts.).

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17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

The territory is a part of Demanovka catchment area, which has a total area of about 61 km^2. The Demanovka River is formed by confluence of Luková stream springing on the north-eastern side of Chopok and Siroka, springing under Krupova hola. The strongest tributaries of Demanovka are Priecny stream and Zadna voda stream, which springs in rocky kettles of northern slopes of Derese and Polana. After crossing the karst area (the basic characteristics is in point 14), the Demanovka River quits the Low Tatras Mts. and enters the Liptovska Basin. Westerly from Liptovsky Mikulas Demanovka flows into Vah.

The highest parts of the Demanova Valley, mountain ridge parts and parts of northern slopes and forks formed by Tatricum rocks belong geomorphically to the Dumbier unit (subregion Dumbierske Tatras). They are characterized by grassy upland up to glacial grassy upland relief with cliff but also smooth surface. The territory is strongly affected with frost weathering and gravitational movements with occurrence of kettles and glacial cirques, which are preserved here from the Pleistocene glaciaton. Highly acidic stony soils are dominant.

The northern part of the catchment area is characteristic with occurrence of significant biotopes of plant and animal species, from which two locations – Jelsie and Demanovske slatiny were included in the list of territories with European importance (Natura 2000). There is also a nationally important wetland “the mouth of the Demanova Valley”, characterized by vegetation diversity and occurrence of endangered and vulnerable plant species.

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18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Hydrological and hydrogeological characteristics of the territory significantly influence the character of cave system as for its fragility and vulnerability. Underground wetland offers suitable conditions for existence of rare and endangered species of water invertebrates and also terrestric organisms, which are influenced by presence of water areas. The proposed

territory participates in refillment of waterbearing layers interconnected with underground wetland. The underground hydrological system forms an underground aquifer, a part of which is used as the most important source of drinking water supplies for people in Liptovsky Mikulas city (purpose-built offtake of underground waters from the Vyvieranie Cave amounting to 120 – 140 l/s for group water main of Liptovsky Mikulas).
The surface habitats of wetland character are important for a part of life cycle – reproduction of amphibians.

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19. Wetland Types

a) presence:
Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp Ts • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:
List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

Zk(b), M, N

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20. General ecological features:
Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.
Surface and underground wetland habitats in the Demanova Valley predominantly form a mutually interconnected complex, communicating by way of numerous ponors, springs, resurgences and percolating waters. That is the reason why any changes in water regime and quality on the surface are influencing substantially and change also the hydrological underground conditions.
The cave system contains both terrestric and water animals, characterised by various adaptations to this peculiar environment. We can find here the genuine cave animals (troglobites), as well as animals occurring except for caves also in their original edaphic environment (troglophils), or accidental individuals strayed from adjacent surface habitats (trogloxenes). The character of underground wetland (permanent water courses, episodic water courses, stagnant water of intermittent and permanent lakes) creates conditions for existence of water invertebrates (stygobites and stygophils). Presence of water arthropods is bound mainly to interstitial and hyporeal zones of underground flow of Demanovka. Several of them are of epigeic origin, which is apparently connected with the fauna of Vrbicke pleso tarn and water courses in the upper part of Demanovka basin. On the surface of standing waters (lakes), it is possible to observe subpopulations of springtails (Collembola), which are a component of so called epineuston. The Demanovsky Cave system represents a specific biospeleological locality at least as for the Central Europe, because of occurrence of rare and unique (endemic) forms of invertebrates and also species with the northest known boundary of existence in Europe. The highest species diversity of fauna is concentrated in the contact zone of cave system and surface habitats, where occur mainly troglophils and trogloxenes. On the contrary, the glaciated parts have lower diversity of species. In spite of the fact that two

cave are open for the public, the well-preserved state and stability of their biocenoses are indicated by stabile and abundant occurrence of some cave species. Cavernicolous societies contain dominant saprophagous springtails (Collembola) with larvae of diptera (Diptera) and predator mites (Acarina). Cave habitats of this area are, thanks to their natural conditions, suitable sites for bat (Chiroptera) populations, which use the caves for hibernation. Their occurrence in caves contributes to a certain measure (mostly in the isolated parts of the system) also to development of cave invertebrates societies, for which the organic matter from guano is one of a few nutritive sources. The presence of surface water habitats secures an adequate environment for reproduction of several amphibian species (Amphibia). They use entrance parts of caves for dormancy or waiting out the unfavourable conditions.

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21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Occurrence of noteworthy flora species and societies is connected with surface parts of the locality. The territory is very varied as for flora. 449 taxons of vascular plants were found in the karst part of the Demanovska Valley, out of which 31 is protected according to the Regulation no. 24/2003 of the Legal Codes of Slovak Republic and 47 is on the Red List of plants and animals of Slovakia (14 taxons less threatened, 27 vulnerable and 5 endangered). It is possible to find her pulsatilla *(Pulsatilla slavica),* bellflower – fairies' thimbles *(Campanula cochlearifolia), Thesium alpinum,* snowbell *(Soldanella carpatica), Cortusa matthioli, Kernera saxatilis.*

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22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

<u>Cave fauna:</u>

The list of until now found and identified species in the cave system is given at the end of RIS in Annex I (66 invertebrate species, 11 bat species). A good assumption to supplement the list offers the finishing of the present hydrobiological research.

Platyhelminthes: occurrence of stygobite *Dendrocoelum carpathicum* was registered. Crustacea: occurrence of greater number of copepods (Copepoda) is remarkable in aquatic fauna, mainly two stygobitic – *Acanthocyclops languidus, Elaphoidella phreatica* and stygophilic *Paracyclops fimbriatus*. An important finding is *Mesoniscus graniger* – eutroglophilous representative of terrestric isopods (Isopoda). Chelicerata: The two show caves in the area contain rare gamasid mites *Arctoseius pristinus, Saprosecans baloghi*. Important species are also troglobite *Poecilophysis spelaea* and *Veigaia inexpectata*, for which the Demanovska Cave of Liberty is by now only second known locality in Slovakia. Hexapoda (Insecta): remarkably high is the diversity of springtails (Collembola), represented by 28 species. Genuine cave forms *Protaphorura janosik, Deteraphorura kratochvili, Pseudosinella paclti* rank among endemic species of the central part of the Western Carpathians. A rare troglophilic species *Hypogastrura crassaegranulata* is a glacial relict. Occurrence of *Oncopodura reyersdorfensis* means only second finding Slovakia. Except for above mentioned invertebrates, there are more other species living underground, with a strong affinity to subterranean environment (eutroglophilous species), which are quite common in the majority of Slovak caves, e.g. mite *Parasitus loricatus*, springtails *Arrhopalites pygmaeus, Protaphorura armata* and others. Chiroptera: Eleven bat species were determined in underground spaces. Demanovska Ice Cave and Sucha Cave belong among the most important hibernation places of *Eptesicus nilssonii* in Slovakian territory.

Surface fauna:
The surface fauna is also very varied and with occurrence of rare vertebrate and invertebrate species. Seven protected amphibians (Amphibia) are the most important animals of surface wetland habitats, situated along the Demanovka River, its side valleys with intermittent water courses (Vyvieranie Valley), but also in entrance parts of caves (description in point 12 – criterion 2).

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:
The territory of the Demanova Valley belongs to whole-year attractive tourist and recreation resorts, which offers the visitors except for sports activities (hiking, skiing, mountaineering) also a variety of accommodation and complementary facilities (social, catering facilities, parking places). There are two show caves in the proposed area (Demanovska Cave of Liberty, open for public from 1924 and Demanovska Ice Cave with primary opening for public in the half of 19th century). The caves offer suitable space for a wide range of scientific activities (geological, speleological, biospeleological, hydrological, hydrochemical, microclimatic, gamaspectrometric, palaeomagnetic research etc.) which are oriented also on protection. There was no systematic archaeological research conducted in the area. Only smaller archaeological findings come from the Okno Cave and are connected with Eneolite.
Thanks to favourable conditions of cave microclimate, there had been healing speleoclimatic stays organized in the Demanovska Cave of Liberty during 1993-1998.
Environmental functions of forests are strongly prevailing over production one, since forestry in the area is concentrated on protected forests and forests of special purpose from the title of nature protection.
Another socio-economic asset is the ability to concentrate sufficient supplies of quality drinking water for the city of Liptovsky Mikulas.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?
If Yes, tick the box ❑ and describe this importance under one or more of the following categories:

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:
a) within the Ramsar site:

The majority of land is owned by private persons (78%). Only negligible part (1%) is owned by state. 21% of the territory is owned by associations of private owners. Dominating type of land-use is forest. The caves are according to the Constitution of the Slovak Republic owned by state, and their administration is secured by the Slovak Caves Administration seated in Liptovsky Mikulas.

b) in the surrounding area:
Similar ownership structure.

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25. Current land (including water) use:
a) within the Ramsar site:
As for the area, the prevailing land-use within the proposed site is the forest. Within the framework of forest management activities, the majority of forests are ranked protected forests and minority forests of special purpose determined primarily for nature protection. All the forests are managed according to approved forest management plan.
Tourist activities are dominating in the territory at present as for the potential negative influence on the proposed Ramsar site. Also the infrastructure is being adapted to this use of the valley for recreation which brings the threats to the quality of karst waters. There are several accommodation and catering facilities for the visitors. A part of the underground wetland (including underground Demanovka River) is accessible during the visit of the Demanovska Cave of Liberty. Other parts of underground hydrological system are inaccessible for a common tourist.
State road of second class no. II/584 passes through the territory together with several smaller purpose-built communications and tourist trails.
An important water source is located on the site and the karst water of underground system springing in the Vyvieranie Cave is mainly used for the water supply of Liptovsky Mikulas.

b) in the surroundings/catchment:
Similarly as within the proposed site also the dominant spatial land-use is forest and tourist activities, which are expanded to providing complex services for visitors. Except for the water source Vyvieranie, there are other smaller water sources in the southern part of Demanovka basin, used for recreation area Demanova – Jasna.

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26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:
a) within the Ramsar site:
The present way of using the Demanova Valley for sports and recreation activities together with network and operation of existing facilities (hotels, mountain chalets, ski tows and cableways) means a risk of worsening the quality of underground waters in cave system. Maintaining the ecological character of the territory requires regulation of all other building activities in the locality. The increasing number of tourists causes substantial increase of car traffic in the area. There is a risk of threatening the karst water quality (leakage of oils, parking away from parking places, unsuitable state of existing parking places – absence of oil catchers). The risks come also from the maintenance of state road in winter by using spread materials. Unsuitable material was used for spreading on roads later in the past (rinsed scoria and ecologicaly inferior blast furnace clinker), now replaced by ecological spread. That is partially supplemented by unsuitable admixture of chemical spread (NaCl). Since the road is situated immediately at the surface Demanovka, the road spread fills up the ponors and karst conduits underground, which means in case of using higher proportion of chemical spread a potential threat of underground waters quality.

Also the access making works before and during opening the Demanovska Cave of Liberty and Demanovska Ice Cave for public meant a considerable intervention to natural environment of underground wetland. At present, the operation of caves is secured according to the valid visitors' rules, so that the visitors may not influence the cave negatively.
According to valid forest management plan nothing substantial threats the locality, there is only a local threat when building the forest access roads and soil erosion or leakage of oil matters can occur.

b) in the surrounding area:
The same negative factors, influencing the ecological character of the site as well as the proposed site itself, are valid.

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27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site: In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

All proposed territory is a part of Low Tatras National Park (NAPANT) declared on June 14, 1978, where according to the law of National Council of the Slovak Republic no. 543/2002 on Nature and Landscape Protection, the third level of protection is applied. Generally binding regulation of the Regional Authority in Zilina no. 2/1997 establishes the visiting rules for NAPANT. A care program was worked out in 1997 for securing better protection of national park.
Whole territory of the Ramsar site is a part of the European protected bird territory – SK CHVÚ018 Nizke Tatry (Low Tatras), which was included in the National List of proposed protected bird territories.
A part of the territory of proposed Ramsar site (95%) belongs also to the territory of European importance Dumbier Nizke Tatry with the code SK UEV0302, which was declared as European important according to the order of the Ministry of the Environment of Slovak Republic no. 3/2004-5.1 from July 14, 2004, declaring the National List of Territories with European Importance that came to force on August 1, 2004.
According to law no. 543/2002 on Nature and Landscape Protection and regulation no. 17/2003, the national nature reserve Demanovska dolina was declared, having the total area of 844,18 hectares (state to January 1, 1988 and protected since 1973 as state natural reserve – according to adaptation of the Ministry of Culture no. 2771/1973-OP from April 24, 1973 according to §10 section 2, of the law of SNR no. 1/1955 Zb. On State Nature Protection. At present, the fifth and third levels of protection are applied on its territory. The territory of national nature reserve Demanovska dolina fills 58 % of the total area of the proposed Ramsar site.
The Demanovske Caves are according to the Regulation of the Ministry of Environment of Slovak Republic no. 293/1996 established a national nature monument. Another regulation no. 292/2001 declares the caves Stefanova and Okno also national nature monuments. The law no. 543/2002 on Nature and Landscape Protection defines in § 24 sections 4 and 5 activities, which are forbidden in caves and for which the permission of nature protection authority is required.
In 1972 the Demanovske Caves were declared protected natural formation together with protection zone with total area of 1,517.05 ha. The law no. 287/1994 on Nature and Landscape Protection cancelled the protection zone. A proposal for a new protection zone was worked out in 2000 for area of 1,149.85 ha, which were not declared. According to the law no. 287/1994 the cave was protected as national nature monument with the highest fifth level of protection.
The visiting rules in show caves (including duties and behaviour of the visitors), in relation to protection of cave environment and its sustainable use for cultural and educational purposes, are regulated by the Regulation of the Regional Authority of Environment in Zilina no. 5 and 6/2004 on Visiting rules of the Demanovska Ice Cave and Demanovska Cave of Liberty.

The territory of the Low Tatras is declared by the order of the government of Slovak Republic no. 13/87 on Some Protected Areas of Natural Accumulation of Waters, as protected water management area (CHVO). Forbidden activities in the area are stated in §31 of the law no. 364/2004 Z. z. On Waters. The protection of water sources in the Demanova Valley is secured by zones of hygienic protection of 1st and 2nd degree and 2nd degree with stricter regime of protection. These zones were determined together with a proposal of protection measures by the decision no. SVS 1920/1995 of November 7, 1995.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ✓ Ib ❑; II ✓; III ✓; IV ❑; V ❑; VI ❑

c) Does an officially approved management plan exist; and is it being implemented?:

The site has not approved management plan up to now because we recognize it as a site of international importance in our legislation and the methodology for such sites will have been prepared by May next year.

d) Describe any other current management practices:

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28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

A proposal for protection zone of the national nature monument of Demanovske Caves was prepared in 2005, having the area of 604.53 ha. This area overlaps partly with the area of proposed Ramsar site (42% of the proposed Ramsar site taking its southern part as far as the existing boundary of national nature reserve Demanovska dolina). In case of declaring the protection zone, the § 24 sections 9,10 of the law of NR SR č. 543/2002 on Nature and Landscape Protection will come to force and more forbidden and limited activities will require permission of the nature protection authority, which will significantly reduce the risk of threatening of underground waters in the cave system.

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29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The territory belongs to localities where an ongoing research of a wide range of geoscientific disciplines is running. The results of geomorphic, geological, speleological, palaeomagnetic, microclimatic researches realized in various parts of the cave system serve to increasing the knowledge on the system and improvement of its protection. The most important research projects are oriented to biotic components of the cave environment and its hydrological, hydrogeological and hydrochemical settings, having in mind the preservation of natural values of the underground wetland and occurrence of endemic species. The monography of A. Droppa from 1957 embraces the most basic data on hydrological settings of the Demanovska Valley, including information on situation of ponors of Demanovka and its tributaries and a detailed description of then known parts of the cave system. The authors E. Kullman – S. Gazda (1976) were engaged in the task of basic hydrogeological research of Mesozoic of NW slopes of Low Tatras and presented hydrological balance of the territory within 1971-1975. J. Šavrnoch (1978) was working on hydrological settings of Demanovka basin. The characteristics of hydrological and hydrogeochemical settings of the Demanova Valley with concentration on the Cave of Peace was evaluated in the work of V. Tereková (1983). Also important results were published from searching hydrogeological survey of partial structure of carbonates of the Krizna Nappe in the Demanovka basin (1985), which was executed by IGHP n.p. Zilina with V. Droppa and S. Klauco. The opinions on formation of chemical

composition of karst waters of the Demanovsky karst and their corrosive attributers were published (V. Droppa – S. Klauco, 1986; A. Droppa, 1995).
Very useful were the water tracing experiments realized by the Institute for Research, Production and Usage of Radioisotopes from Prague in 1988, when radioisotopes were used as indication substance. They helped to interpret the flowage ways and connections of surface waters with underground water in cave system. At present, the Slovak Caves Administration realizes several hydrochemical measurements and maps the current state of ponor areas.
The first mention on fauna in the Demanova Valley comes from 1870, when Reitter described a new species of cave beetle „*Trechus spelaeus*", presently known as *Duvalius microphthalmus spelaeaus*. More intensive biospeleological researches in this locality were conducted from the second half of the 20th century, but always concentrated on selected animal groups, mainly springtails (Paclt 1957, 1972; Nosek 1969) and water fauna (Hrabe 1954; Sterba 1964). The most extensive research of arthropods in the cave system was realized as late as 2000 by a collective of zoologists (Kováč a kol. 2000) from three scientific institutions (SAV Kosice, PF UPJS Kosice, PriFUK Bratislava) and since 2004 a detailed inventory research of water invertebrates was started to be continued until the end of 2006 (Visnovska, not yet published). Supplementary research on species diversity of amphibians in the karst territory of the Demanovska Valley was done during 2001-2003 (M. Hatinova – K. Urbanova, 2004). The data from bat monitoring in the caves of the Demanova Valley are summarized by Brindzik and kol. (2002).

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30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

The visitors of show caves in the Demanovsky Cave System except for the cave visit receive also a vocational commentary comprising information on values of the underground hydrological system. General public has access to publications and information brochures issued by the Slovak Caves Administration with more detailed information on the character of cave environment and its surrounding.
The Administration of Low Tatras National Park has an information centre on the southern part of the Demanova Valley (out of the proposed Ramsar territory), and cooperates in creation and issuing folders and brochures with basic information on the Demanova Valley. There are three educational paths in the locality. The educational path to Demanovska Ice Cave was constructed in 1997, the educational path to Demanovska Cave of Liberty and Demanova Valley were opened for public in 1988. One panel of the latter is in the territory of proposed Ramsar site. Natural values of the underground wetland were mentioned on several vocational and scientific events.
The distinctive potential of the locality for educational activities leads to plans for establishment of larger environmental centre of Slovak Caves Administration, Slovak Museum for Nature Protection and Caving and Low Tatras National Park.

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31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

The Demanova Valley belongs to the Low Tatras region of tourism of the 1st category of international importance with complete service facilities for visitors. There is a recreation resort Jasná in the southern part of the valley – as one of the most important tourist and winter sport resorts in the Low Tatras.
The locality itself offers a possibility for sport activities – mainly summer hiking. There are several marked tourist trails on the surface. Also both show caves are attractive for tourists. The Demanovska Ice Cave (open from May 15 to September 30) with attendance of 106,294 in 2005 and Demanovska Cave of Liberty (open the year round, except for November 16 to

December 14) with attendance of 160,144 in 2005. There are several smaller accommodation facilities with complete services directly in the proposed area.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Ministry of the Environment of the Slovak Republic, Namestie Ludovita Stura, 812 35 Bratislava
Regional Office of Environment, Janka Krala 4, 010 40 Zilina
District Office of Environment, Vrbická 1993, 031 01 Liptovský Mikuláš
Municipality of Demänovská Dolina

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Slovak Caves Administration - Sprava slovenskych jaskyn Liptovsky Mikulas, Hodzova 11, 031 01 Lipt. Mikulas; caves@ssj.sk, haviarova@ssj.sk
State Nature Conservation of Slovak Republic, Správa NAPANT, Zelena 5, 974 01 Banska Bystrica; napant@sopsr.sk

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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Annex I: Survey of fauna of the Demanovske Caves

*** - stygobite/troglobite**

PLATYHELMINTHES
- Turbellaria
  - *Dendrocoelum carpathicum* Komárek, 1926 (*)

ARTHROPODA
- Crustacea
  - Copepoda
    - *Acanthocyclops languidus* Sars, 1863 (*)
    - *Cyclops strenuus* Fisher, 1851
    - *Diacyclops bicuspidatus* (Claus, 1857)
    - *Eucyclops serrulatus* (Fischer, 1851)
    - *Megacyclops viridis* (Jurine, 1820)
    - *Paracyclops fimbriatus* Fisher, 1853
    - *Bryocamptus (Rheocamptus) spinulosus* Borutzky, 1934
    - *B. (R.) typhlops* Mrázek, 1893
    - *B. (R.) zschokkei* (Schmeil, 1893)
    - *B. (Limnocamptus) echinatus* (Mrázek, 1893)
    - *Paracamptus schmeili* (Mrázek, 1893)
    - *Elaphoidella phreatica* (Chappuis, 1925) (*)
  - Amphipoda
    - *Synurella intermedia hrabei* Straškraba, 1962 (*)
    - *Niphargus tatrensis* Wrzesniowski, 1888 (*)
  - Isopoda
    - *Mesoniscus graniger* Frivaldszky, 1865
- Chelicerata
  - Palpigradida
    - *Eukoenenia spelaea* (Peyerimhoff, 1902) (*)
  - Araneae
  - Opiliones
  - Acari
    - Actinedida – Rhagidiidae
      - *Poecilophysis spelaea* (Wankel, 1861) (*)
    - Actinedida – ostatné
    - Acaridida
    - Gamasida
      - *Arctoseius pristinus* Karg, 1962
      - *Arctoseius semiscissus* (Berlese, 1892)
      - *Paragarmania dentritica* (Berlese, 1918)
      - *Parasitus loricatus* (Wankel, 1861)
      - *Proctolaelaps pygmaeus* (Müller,1860)

Saprosecans baloghi Karg, 1964
Veigaia inexpectata Kalúz, 1993

Myriapoda
Chilopoda
Lithobius piceus Koch, 1862
Diplopoda
Allorhiscosoma sphinx (Verhoeff, 1907)
Hexapoda
Collembola
Hypogastrura purpurescens (Lubbock, 1867)
Hypogastrura crassaegranulata (Stach, 1949)
Hypogastrura viatica (Tullberg, 1892)
Ceratophysella bengtssoni (Agren, 1904)
Ceratophysella granulata Stach, 1949
Protaphorura armata (Tullberg, 1869)
Protaphorura janosik Weiner, 1990 (*)
Protaphorura tricampata (Gisin, 1956)
Protaphorura subarmata (Gisin, 1957)
Deuteraphorura kratochvili (Nosek, 1963) (*)
Deuteraphorura silvaria (Gisin, 1952)
Folsomia candida Willem, 1902
Folsomia inoculata Stach, 1947
Folsomia lawrencei Rusek, 1984
Folsomia penicula Bagnall, 1939
Folsomia quadrioculata (Tullberg, 1871)
Folsomia spinosa Kseneman, 1936
Desoria propinqua (Axelson, 1902)
Entomobrya marginata (Tullberg, 1871)
Isotomiella minor (Schäffer, 1896)
Pseudosinella paclti Rusek, 1961 (*)
Heteromurus nitidus (Templeton, 1835)
Plutomurus carpaticus Rusek et Weiner, 1978
Oncopodura crassicornis Shoebotham, 1911
Oncopodura reyersdorfensis Stach, 1936
Megalothorax minimus Willem, 1900
Megalothorax incertus Böörner, 1903
Arrhopalites pygmaeus (Wankel, 1860)
Psocoptera
Thysanoptera
Hymenoptera
Exephanes amabilis Kriechbaumer, 1895
Coleoptera
Carabidae
Duvalius microphathalmus spelaeus (Reitter, 1870)
Staphylinidae
Quedius mesomelinus (Marsham, 1802)
Lesteva nivicola Fanvel, 1872
Cholevidae
Choleva glauca Britten, 1918
Pselaphidae
Bryaxis monstrosetibialis (Stolz, 1923)
Lyctidae
Dermestidae
Dermestes maculatus De Geer, 1774

Cryptophagidae
Cryptophagus sp.

Diptera
Trichoceridae
Trichocera maculipennis Meigen, 1818
Sciaridae
Bradysia forficulata (Bezzi, 1914)
Trichoptera
Lepidoptera
Triphosa dubitata (Linné, 1758)

CHIROPTERA
Rhinolophus hipposideros (podkovár malý)
Myotis myotis (netopier obyčajný)
Myotis oxygnathus (netopier ostrouchý)
Myotis mystacinus/Brandtii (netopier fúzatý)
Myotis daubentonii (netopier vodný)
Myotis dasycneme (netopier pobrežný)
Eptesicus nilssonii (večernica severská)
Eptesicus serotinus (večernica pozdná)
Barbastella barbastellus (uchaňa čierna)
Plecotus auritus (ucháč svetlý)
Plecotus austriacus (ucháč sivý)

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