

A PRELIMINARY OVERVIEW OF MONITORING FOR RAPTORS IN THE SLOVAK REPUBLIC

Predhodni pregled monitoringa populacij ptic roparic na Slovaškem

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In Slovakia, 33 diurnal and 12 nocturnal raptor species have been recorded so far. Of these, 18 diurnal raptor species and 10 owl species also breed in the country. Raptor monitoring has a long tradition in Slovakia; however, owl monitoring takes place mostly only at the local or regional level. For some species, specifically Imperial Eagle *Aquila heliaca*, Saker Falcon *Falco cherrug*, Golden Eagle *A. chrysaetos*, Red-footed Falcon *F. vespertinus* and Red Kite *Milvus milvus*, the entire breeding populations have been monitored in the long term. The most comprehensive raptor monitoring has been covered by the Raptor Protection of Slovakia (RPS), the NGO specialized exclusively in raptors through its network of working groups for particular species. The Slovak Ornithological Society (SOS/BirdLife Slovakia) is mostly involved in monitoring of common raptors and wintering population of the White-tailed Eagle *Haliaeetus albicilla*. Monitoring is mostly implemented with the ultimate objective of conserving the targeted species. Therefore, the most endangered raptor species at the international and national levels are the key monitored species. On-line databases became popular for storing monitoring data; recently, Aves-Symfony database operated by SOS, RPS and the Institute of Zoology has been developed. Well established network of professionals and volunteers present the major strength of monitoring for raptors in Slovakia. Unfortunately, not all raptor species are adequately covered by monitoring. Access to monitoring data is constrained by unwillingness of some experts to share data in common databases. Another problem is lack of capabilities to evaluate data at the scientific level. Modern monitoring methods, such as remote monitoring with radio or satellite tracking, are applied only rarely due to financial constraints. Monitoring activities do not sufficiently influence decision making.

Key words: raptors, birds of prey, owls, monitoring, Slovakia
Kľúčne besede: ptice roparice, ujede, sove, monitoring, Slovaška

1. Introduction

So far, 33 diurnal raptor species have been recorded in Slovakia, 18 of which are regular breeders. Only eight species, i.e. the Red Kite *Milvus milvus*, White-tailed Eagle *Haliaeetus albicilla*, Goshawk *Accipiter gentilis*, Sparrowhawk *A. nisus*, Buzzard *Buteo buteo*, Imperial Eagle *Aquila heliaca*, Golden Eagle *A. chrysaetos* and Kestrel *Falco tinnunculus*, are breeding residents. Most of the observed raptors are migrants,

either visiting Slovakia from spring to autumn to breed, or to winter or just occurring on migration. The group of vagrant visitors includes the Egyptian Vulture *Neophron percnopterus*, Black Vulture *Aegyptius monachus*, Griffon Vulture *Gyps fulvus* and Steppe Eagle *A. nipalensis*. In 2012, two new diurnal raptor species were observed in Slovakia for the first time – the Black-winged Kite *Elanus caeruleus* (VÁCLAV 2012) and Levant Sparrowhawk *A. brevipes* (DANKO & HRTAN 2012). While the Buzzard and Kestrel are

Table 1: Status and population size of diurnal raptors in Slovakia**Tabela 1:** Status in velikost populacij ujed na Slovaškem

Species / Vrsta	No. of breeding pairs/ Št. gnezdečih parov	Source / Vir
Honey Buzzard <i>Pernis apivorus</i>	900–1,300	KARASKA & DANKO (2002A)
Black-winged Kite <i>Elanus caeruleus</i>	Non-breeding	VÁCLAV (2012)
Black Kite <i>Milvus migrans</i>	40–60	CHAVKO & SIRYOVÁ (2002)
Red Kite <i>Milvus milvus</i>	8–10	MADERIČ (2012)
White-tailed Eagle <i>Haliaeetus albicilla</i>	9	CHAVKO (2012A)
Egyptian Vulture <i>Neophron percnopterus</i>	Non-breeding	DANKO (2002A)
Griffon Vulture <i>Gyps fulvus</i>	Non-breeding	DANKO & KROPIL (2002)
Black Vulture <i>Aegyptius monachus</i>	Non-breeding	DANKO (2002B)
Short-toed Eagle <i>Circaetus gallicus</i>	20–25	DANKO (2002C)
Marsh Harrier <i>Circus aeruginosus</i>	400–500	KARASKA <i>et al.</i> (2002)
Hen Harrier <i>Circus cyaneus</i>	Non-breeding	DANKO (2002D)
Pallid Harrier <i>Circus macrourus</i>	Non-breeding	DANKO (2002E)
Montagu's Harrier <i>Circus pygargus</i>	10–18	NOGA (2011)
Goshawk <i>Accipiter gentilis</i>	1,600–1,800	KARASKA & CHAVKO (2002A)
Sparrowhawk <i>Accipiter nisus</i>	1,500–2,000	KARASKA (2002)
Levant Sparrowhawk <i>Accipiter brevipes</i>	Non-breeding	DANKO & HRTAN (2012)
Buzzard <i>Buteo buteo</i>	5,000–7,000	KROPIL (2002A)
Long-legged Buzzard <i>Buteo rufinus</i>	Non-breeding	DANKO (2002F)
Rough-legged Buzzard <i>Buteo lagopus</i>	Non-breeding	KROPIL & DANKO (2002)
Lesser Spotted Eagle <i>Aquila pomarina</i>	800–900	KARASKA & DANKO (2002B)
Greater Spotted Eagle <i>Aquila clanga</i>	Non-breeding	DANKO (2002G)
Steppe Eagle <i>Aquila nipalensis</i>	Non-breeding	DANKO (2002H)
Imperial Eagle <i>Aquila heliaca</i>	41–44	CHAVKO & DANKO (2012)
Golden Eagle <i>Aquila chrysaetos</i>	90–95	KROPIL (2002B)
Booted Eagle <i>Aquila pennata</i>	0–6	DANKO (2002I)
Osprey <i>Pandion haliaetus</i>	Non-breeding	KARASKA & CHAVKO (2002B)
Lesser Kestrel <i>Falco naumanni</i>	Non-breeding	DANKO (2002J)
Kestrel <i>Falco tinnunculus</i>	4,000–6,000	DAROLOVÁ & KROPIL (2002)
Red-footed Falcon <i>Falco vespertinus</i>	3	CHAVKO (2012D)
Merlin <i>Falco columbarius</i>	Non-breeding	KARASKA & CHAVKO (2002C)
Hobby <i>Falco subbuteo</i>	600–800	KARASKA & DANKO (2002C)
Saker Falcon <i>Falco cherrug</i>	41–43	CHAVKO (2012B)
Peregrine Falcon <i>Falco peregrinus</i>	150–180	CHAVKO (2012C)

the most numerous raptors in Slovakia, the Short-toed Eagle *Circaetus gallicus*, Red Kite and White-tailed Eagle are considered rare breeders with only a few pairs in the country (BIRDLIFE INTERNATIONAL 2004). Table 1 includes an overview of diurnal raptors recorded in Slovakia.

As far as nocturnal raptors – owls are concerned, 12 species have been recorded in Slovakia, 10 of which are breeders (BIRDLIFE INTERNATIONAL 2004). While the Long-eared Owl *Asio otus* and Tawny Owl *Strix aluco* are the most frequently occurring species, the Snowy Owl *Bubo scandiacus* and Hawk Owl *Surnia*

ulula are rare visitors. Table 2 includes an overview of nocturnal raptors in Slovakia.

Raptor monitoring has a long tradition in Slovakia (see UHRIN *et al.* 2008, 2009, 2010, 2011 & 2012). In the past, there was no mechanism or systematic effort made to concentrate monitoring data, and neither was there any information on ongoing monitoring programmes readily available. Horizontal inventory of existing databases within the country and verification/evaluation of existing data started some ten years ago with Slovakia's preparation to access the EU and related need to mobilize data for the purpose

Table 2: Status and population size of owls in Slovakia**Tabela 2:** Status in velikost populacij sov na Slovaškem

Species / Vrsta	No. of breeding pairs/ Št. gnezdečih parov	Source / Vir
Barn Owl <i>Tyto alba</i>	400–600	SÁROSSY (2002)
Scops Owl <i>Otus scops</i>	40–80	DANKO & SÁROSSY (2002)
Eagle Owl <i>Bubo bubo</i>	300–400	DANKO & KARASKA (2002)
Snowy Owl <i>Bubo scandiacus</i>	Non-breeding	DANKO <i>et al.</i> (2002)
Hawk Owl <i>Surnia ulula</i>	Non-breeding	SANIGA (2002)
Pygmy Owl <i>Glaucidium passerinum</i>	1,000–1,500	PAČENOVSKÝ (2002A)
Little Owl <i>Athene noctua</i>	800–1,000	PAČENOVSKÝ (2002B)
Tawny Owl <i>Strix aluco</i>	2,500–3,000	PAČENOVSKÝ & OBUCH (2002)
Ural Owl <i>Strix uralensis</i>	1,400–2,500	KRIŠTÍN <i>et al.</i> (2007)
Long-eared Owl <i>Asio otus</i>	2,500–4,000	KROPIL (2002C)
Short-eared Owl <i>Asio flammeus</i>	0–50	DANKO & CHAVKO (2002)
Tengmalm's Owl <i>Aegolius funereus</i>	400–600	PAČENOVSKÝ (2002C)

of identifying and designating its Special Protection Areas (SPAs), including those for raptors. Generally, monitoring of diurnal raptors has been developed in more comprehensive manner compared to owl monitoring.

2. Main players in raptors monitoring

Currently, the main actors in monitoring for raptors in Slovakia can be classified into three categories:

Government bodies and agencies

Ministry of the Environment (MoE) holds general responsibility for the Integrated Environment Monitoring System in Slovakia (includes 12 subsystems/themes, one being “Biota”) and for the preparation of the State of the Environment Reports (<http://www1.enviroportal.sk/spravvy-zp/en>).

The State Nature Conservancy of the Slovak Republic (SNC SR) is a government agency generally responsible for the long- and medium-term monitoring of the Biota and holds responsibility for “Biota” monitoring subsystem. It is also specifically responsible for gathering detailed data for the purpose of Birds and Habitats Directives, including data for assessing conservation status of raptor species of conservation concern and for reporting purposes. Data are gathered by the SNC technical staff as well as by contracted individual experts, or more rarely by contracted institutions.

In 2005, the SNC published a manual for the preparation of management plans including criteria and indicators for assessing conservation status of

habitats and species of European importance (POLÁK & SAXA 2005). In this manual, criteria and indicators along with simple monitoring methodology are described for 13 diurnal and five nocturnal raptors. Monitoring data are stored in the “Information system on Taxa and Habitats” database, the access to which, however, is restricted to the public. Besides, two online databases for the SNC are under development. The raptor monitoring by SNC is financed by the state budget and, recently, also through projects mostly co-financed by the European Union. It is mostly concentrated on designating protected areas, particularly the Special Protection Areas in accordance with the EU Birds Directive.

Academic institutions (universities, Slovak Academy of Sciences, museums) are involved in monitoring on project basis. Mostly, they have no long-term raptor monitoring programmes. Few exceptions include the Faculty of Natural Sciences of Comenius University in Bratislava, which has been dedicated for several years to monitoring of the wintering White-tailed Eagles along the Danube River (BOHUŠ 2011), studying the diet composition of owls (OBUCH & KARASKA 2010, OBUCH 2011) as well as population dynamics and diet of the Buzzard (ŠOTNÁR & TOPERCER 2009A & 2009B), and the Orava Museum with long-term regional monitoring scheme for the Lesser Spotted Eagle *A. pomarina*.

NGOs

Most important players from the NGO community in Slovakia with adopted raptor monitoring schemes

are the Raptor Protection of Slovakia and the Slovak Ornithological Society/ BirdLife Slovakia.

The Raptor Protection of Slovakia (RPS) is the only institution in the Slovak Republic exclusively specializing in raptor monitoring (both *for* raptors and *with* raptors) and conservation. The RPS (in the 1975–2004 period known as Group for Research of Birds of Prey and Owls) regularly and comprehensively monitors raptor species, both diurnal and nocturnal, and collects data on their breeding performance and threats. It holds records on raptors since the 1970s regularly published in annual reports (DANKO 1976, 1977A, 1977B, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1987, 1988, 1989, 1990, 1991, 1992, 1994A, 1994B, DANKO *et al.* 1995A, 1995B & 2000). Results of monitoring in the past were published mostly in the journal *Buteo* (1986–2007). Monitoring is carried out by its members, both volunteers and professionals. From the late 1990s, monitoring of raptors was funded mostly on project basis (e.g. LIFE Nature & Biodiversity, CORO-SKAT, INTERREG *etc.*). The backbone for monitoring is the well functioning system of working groups for particular species.

The Slovak Ornithological Society/BirdLife Slovakia (SOS/BirdLife Slovakia) carries out long-term monitoring of certain raptor species within the framework of international monitoring programmes. Monitoring of common raptors is part of the *Pan-European Common Bird Monitoring Scheme* (PECBM), in which SOS/BirdLife Slovakia has been participating in cooperation with the Technical University in Zvolen since 2005 (SLABEYOVÁ *et al.* 2009A). No other organisation in Slovakia holds such comprehensive data on common raptors and their trends (<http://vtaky.sk/stranka/97-Scitanie-beznych-druhov.html>). Besides, monitoring of the wintering White-tailed Eagles is part of the *Winter Waterbird Census* in Slovakia that has been implemented in Slovakia since 1991. Through this census, Short-eared Owl *A. flammeus* has been occasionally recorded as well (SLABEYOVÁ *et al.* 2008, 2009B & 2011). In the monitoring of other raptors, SOS/BirdLife Slovakia has been involved only on occasional basis, through projects. In cooperation with the RPS and SAS Institute of Zoology, it operates partly publicly accessible on-line database at Aves-Symphony (<http://aves.vtaky.sk>), where data on raptors are also registered, although many of them remain confidential and are not publicly accessible.

Monitoring data gathered by the RPS and SOS/ BirdLife Slovakia are annually processed, with reports containing more general information on breeding populations and breeding success provided to the

MoE and SNC. General information on species is also provided to other institutions on *ad hoc* basis when negotiating implementation of specific conservation measures, for instance, with energy distribution companies, foresters, *etc.* Accordingly, monitoring data are above all used for conservation purposes, mainly for assessing status and trend of raptor species, formulation of conservation measures, and formulation of management and policy documents, public awareness and education.

3. National coverage

Raptor monitoring is generally taking place in the whole territory of Slovakia. However, there is no “formal” (i.e. run by state authorities) raptor-specific national monitoring network. Most comprehensive coverage of raptor monitoring is implemented by the RPS through working groups system.

The following species are covered by the RPS working groups: Imperial Eagle, Golden Eagle, Lesser Spotted Eagle, White-tailed Eagle, Red Kite, Montagu’s Harrier *Circus pygargus*, Saker Falcon *Falco cherrug*, Peregrine Falcon *F. peregrinus*, Red-footed Falcon *F. vespertinus*, Eagle Owl *Bubo bubo*, Scops Owl *Otus scops*, Pygmy Owl *Glaucidium passerinum*, Long-eared Owl and Little Owl *Athene noctua*. Groups dealing with Imperial Eagle, Golden Eagle, Red Kite, Saker Falcon and Red-footed Falcon are covering the entire breeding population in Slovakia in the long-term. As far as owls are concerned, the Long-eared Owl and Little Owl are best covered by monitoring. Particularly active is the working group for the latter species, although it embarked on its activities only recently. Records for the Long-eared Owl are available from 1993 onwards, gathered during winter censuses.

This system has been functioning for years, mostly on voluntary basis, and is able to generate at least basic data even in the absence of external funds. The RPS also implements *ad hoc* or local monitoring of other raptors, not specifically covered by working groups, but not on systematic basis. Short reports by working groups are available annually in the “Dravce a sovy” (Raptors and Owls) journal, published by RPS (since 2005). Scientific articles on birds of prey and owls are published in the specialized journal *Slovak Raptor Journal* (from 2007).

The SNC and SOS/BirdLife Slovakia also operate at the national level. However, the intensity and coverage of their raptor monitoring schemes depend on specific circumstances, such as methodology employed, availability of funding and, last but not least, on capacity. For instance, in common birds

census run by SOS/BirdLife Slovakia, the point count sampling method has been employed for recording all birds, including raptors. More intensive raptor monitoring run recently by the SNC is concentrated in protected areas, particularly in SPAs. It is a part of the larger EU funded project and is focused, among other, on gathering data on distribution and abundance of key raptor species that are protected through the SPA network in Slovakia.

4. Key species and key issues

Monitoring is mostly implemented with ultimate objective of conservation of the species concerned. Therefore, the most endangered raptor species are key species addressed by monitoring for raptors in Slovakia and involve: the globally threatened Imperial Eagle and Saker Falcon (VU and EN categories, IUCN 2013), nationally rare breeders like Short-toed Eagle, Red Kite, Black Kite, Red-footed Falcon, White-tailed Eagle and Montagu's Harrier, and particularly endangered species in Slovak Republic like Golden Eagle, Lesser Spotted Eagle and Peregrine Falcon.

Monitoring of these species is generally focused on censuses, searching for the presence of species within known home ranges, searching for newly occupied territories, detection of active nests, evaluation of breeding success and determining reasons for breeding failures. Such "basic" monitoring is frequently complemented with studies of ecology, biology, ethology and genetics of the species, monitoring threatening factors and their influence on the targeted species' conservation status (e.g. CHAVKO *et al.* 2007, DRAVECKÝ *et al.* 2008A & 2008B, VÍLI *et al.* 2009, CHAVKO 2010, PAČENOVSKÝ & ŠOTNÁR 2010, DOBRÝ 2011).

The main threats to raptors in Slovakia include: electrocution, bird crime (illegal activities, poisoning, illegal shooting etc.), disturbance and logging in breeding territories, loss and degradation of natural breeding and feeding habitats.

5. Strengths and weaknesses

Doubtless, the major strength of monitoring for raptors in Slovakia is the well established network of skilled, experienced and highly committed professionals and volunteers, organized particularly within a framework of RPS, but also within the SOS/BirdLife Slovakia and SNC. This, along with quite a long record of data for some raptor species, creates a good basis for future raptor monitoring. Furthermore, the efforts to streamline monitoring and evaluation through officially established criteria and indicators

for assessing conservation status are definitely going the right way. Web databases, such as the Aves-Symphony or databases operated by the SNC, provide for collection of data and, subject to agreement with data owners, can be utilized for conservation purposes.

As to weaknesses, not all raptor species are adequately covered by monitoring. Moreover, not all monitoring data are entered in databases. Some experts are reluctant to share data because of a fear of their abuse. Monitoring results generally suffer from the lack of capabilities to evaluate data at the scientific level, not only for RPS and SOS/BirdLife Slovakia, but also for the SNC. Missing statistical evaluation of long-term data sometimes causes problems with using these data in international evaluations and nature conservation at the EU level, e.g. for infringement procedures. Modern approaches, like remote monitoring with radio or satellite tracking, are applied only rarely due to financial constraints. Last but not least, it is necessary to mention that the "follow up mechanism" has not been sufficiently developed, i.e. monitoring activities do not sufficiently influence decision making processes.

6. Priorities, capacity-building

Monitoring of raptors in the Slovak Republic must be continuously promoted as an instrument for adaptive policy development and nature management, decision making and learning. Stimulated interest in monitoring and evaluation from decision making sphere might positively influence further development of raptor monitoring schemes. Monitoring data, however, must be complex, timely, reliable, correctly evaluated and readily available.

With the objective to gain a complete picture of raptor populations and their dynamics at the national level, efforts should be made to achieve monitoring coverage of all raptors. Tailor-made monitoring schemes, including simple criteria and indicators for assessing conservation status, should be designed for those species that are not included in regular monitoring, yet in consideration of their conservation status and population size. Statistical literacy of raptor experts, i.e. the capacity to design, analyse and interpret statistical data that can support decision makers and their partners from public and private sectors, must be enhanced.

Developing procedures and systems for the exchange or sharing of information and statistical data on raptors both at the national and international levels is also important. This can contribute to more efficient utilisation of monitoring data and avoid

duplicated monitoring efforts by different experts or entities.

Personal capacities need to be extended for raptor monitoring; particularly important is to stimulate young professionals' interest in raptors. This needs to be complemented with promotion of using modern remote monitoring methods. It is also important to strengthen public/voluntary capacities to participate in raptor monitoring through organising monitoring courses or by other tools, for instance by developing simple raptor monitoring manual promoting collection and on-line reporting of "minimum standard data". In conclusion, it should be noted that each capacity strengthening effort should involve all key players in raptor monitoring at the national level.

7. Povzetek

Na Slovaškem je bilo doslej zabeleženih 33 vrst ujed in 12 vrst sov, med katerimi 18 vrst ujed in 10 sovjih vrst tudi gnezdi. Monitoring ptic roparic ima na Slovaškem sicer dolgo tradicijo, vendar monitoring sov v glavnem poteka le na lokalni in regionalni ravni. Nekaterne vrste, in sicer kraljevi orel *Aquila heliaca*, sokol plenilec *Falco cherrug*, planinski orel *A. chrysaetos*, rdečenoga postovka *F. vespertinus* in rjavi škarnik *Milvus milvus*, so deležne dolgoročnega monitoringa njihovih celotnih populacij. Za najbolj celosten monitoring ptic roparic skrbi nevladna organizacija "Zaščita slovaških ptic roparic" (RPS), ki se prek svojega omrežja delovnih skupin posveča izključno tem pticam. Slovaško ornitološko društvo (SOS/BirdLife Slovaška) pa se po drugi strani ukvarja predvsem z monitoringom pogostih ptic roparic in s prezimujočo populacijo belorepca *Haliaeetus albicilla*. Sicer pa je končni cilj vseh monitoringov ohraniti ciljne vrste – ključne vrste so najbolj ogrožene ptice roparice tako na mednarodni kot državni ravni. Za shranjevanje podatkov monitoringa so postale zelo priljubljene spletne baze podatkov; nedavno je bila razvita tako imenovana Aves-Simfony, baza podatkov, ki jo upravljajo SOS, RPS in Inštitut za zoologijo. Največja prednost pri monitoringu ptic roparic na Slovaškem je zagotovo že dobro uveljavljeno omrežje strokovnjakov in prostovoljcev. Žal pa niso ustrezno spremljane vse vrste ptic roparic. Dostop do podatkov, pridobljenih z monitoringom, je omejen zaradi nepripravljenosti nekaterih izvedencev, da bi podatke v skupnih bazah delili z drugimi. Drug problem pa je nezadostna sposobnost vrednotenja podatkov na znanstveni ravni. Sodobne metode, kot na primer monitoring z radijskim in satelitskim sledenjem, se zaradi finančnih omejitev uporabljajo le predkoma.

Poleg tega pa dejavnosti monitoringa nimajo dovolj velikega vpliva na sprejemanje odločitev, ki posredno ali neposredno zadevajo ptice roparice.

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