Occurrence of the griffon vulture *Gyps fulvus* and the black vulture *Aegypius monachus* in Central Europe in the 21st century

Výskyt supa bielohlavého *Gyps fulvus* a supa tmavohnedého *Aegypius monachus* v strednej Európe v 21. storočí

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Abstract: The paper presents an overview of the occurrence of two vulture species: the griffon vulture (*Gyps fulvus*) and the black vulture (*Aegypius monachus*) in Central Europe in the 21st century. The number of records of griffon vultures has been increasing in recent years. After a first peak in the year 2007, the number of records has been steadily increasing again since 2010. In some years (especially 2007 and 2012) the occurrences showed the characteristics of an influx, similar to the development in Western and Western-Central Europe. In addition, this period coincides with changes in European sanitary legislation affecting the availability of livestock carcasses. Most of the records come from the summer months. It is likely that the increased occurrence is a result of increasing populations in South-Eastern but also in South-Western Europe, as well as being influenced by food shortages in south-western populations (mainly Spain). Both of these regions can be considered as likely origins of the birds observed in Eastern-Central Europe. The number of records of black vultures do not show a similar pattern, although there are indications that birds from the reintroduced populations in central France also turn up as far afield as Eastern Europe.

Abstrakt: Článok uvádza prehľad o výskytie dvoch druhol supov: sup bielohlavý (*Gyps fulvus*) a sup tmavohnedý (*Aegypius monachus*) v strednej Európe v 21. storočí. Počet záznamov supov bielohlavých vzrástal v posledných rokoch. Po prvom vrchole v roku 2007 sa neustále zvyšoval od roku 2010. V niektorých rokoch (najmä v roku 2007 a 2012) boli výskyty invázného charakteru, podobne vývoju v západnej a v západnej časti strednej Európy. Navýše, toto obdobie sa zhoduje so zmienami v európskej zdravotníckej a veterinárskej legislatíve, ovplyvňujúcej voľnú dostupnosť uhynutých tiel hospodárskych zvierat. Väčšina údajov pochádza z letných mesiacov. Je pravdepodobné, že zvýšený výskyt je výsledkom rastúcej populácie v juhovýchodnej, ale tiež v juhozápadnej Európe, ako aj možného vplyvu nedostatku potravy v juhozápadných populáciách (najmä Španielsko). Je možné, že vtáky pozorované vo východnej a strednej Európe pochádzali z týchto oblastí. Počet záznamov supov tmavohnedých nevyskúsoval podobný trend, ak jeď existujú názvky, že vtáky z reintrodukovaných populácií v strednom Francúzske tieto zaleteli až do východnej Európy.

Key words: faunistics, expansion, influx description, Austria, the Czech Republic, Hungary, Poland, Slovakia, western Ukraine

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Acknowledgements: We are grateful to the following persons for providing various information, observation data or photos: Ernst Albigger, Tibor Babó, István Balázs, Tomáš Bělka, Martin Čeřuš, Gašpar Čamlík, Christian Dotzer, Miklós Dudás, Miroslav Fulín, Gunther Greifmann, Tomáš Hullik, Jozef Chavko, Rudolf Jureček, Dušan Karaska, Andrej Košmicki, Richard Kvetko, Lukasz Ławicki, Gabriela Melichová, Petr Mückstein, Marcin Naurocki, Leonid Pokrytyuk, Clemens Purtshcher and Andreas Tiefenbach. We also thank Alexander Kürtthy for producing the map and an unknown reviewer for improvements in the text.
Introduction

Four species of vultures breed in southern Europe: the bearded vulture Gypaetus barbatus, the Egyptian vulture Neophron percnopterus, the black or cinereous vulture Aegypius monachus and the griffon vulture Gyps fulvus. Their main breeding grounds are located on the Iberian Peninsula (>90% of breeding European populations; BirdLife International 2004, Margalida et al. 2010), in southern France, in northern and southern Italy, on the Balkan Peninsula, on certain Mediterranean islands (Mallorca, Corsica, Sardinia, Sicily and Crete), on the Crimea and in the countries around the Caucasus Mts. The most abundant of them, G. fulvus, commonly flies to Central Europe, whereas G. barbatus does so most rarely (see Margalida et al. 2013). Despite the fact that N. percnopterus is the second most abundant and occupies a larger range, it only rarely strays north of its breeding range, as it is fully migratory. A. monachus is somewhat less abundant, but 98% of its European population breeds in Spain, with a strong increase in recent decades (Margalida et al. 2010, Moreno-Opo & Margalida in press). The remainder nests on Mallorca, in south-eastern France, north-eastern Greece and on the Crimean Peninsula, and therefore it is a rare vagrant in Central Europe (Mebs & Schmidt 2006). The closest breeding colonies of G. fulvus in relation to our study area are found in Croatia, where an estimated 90 pairs were breeding in 2005 (Susac & Pavkovic 2005), and in Serbia, with currently about 130 pairs (B. Grubač pers. comm.).

In the 21st century so far, the occurrence of vultures in Europe has been strongly influenced by human activities. EU Regulation 1774/2002 of the European Parliament and of the Council of 3 October 2002 prohibited, due to sanitary reasons in the wake of the BSE (bovine spongiform encephalopathy) crisis, the dumping of dead animals in the wild. In Spain domestic legislation obliged farmers to incinerate carcasses of livestock from 2001 onwards (Tella 2001). This policy led to severe food shortages in the breeding areas of vultures, mainly on the Iberian Peninsula, and in parts of Spain up to 100% of cow carcasses were disposed of industrially (Donázar et al. 2009, Margalida et al. 2010). This dramatic, sudden reduction in food availability, paired with a marked general increase in griffon populations in Spain and France in recent years (BirdLife International 2004), is considered to be the main reason for the wider and more marked dispersal of vultures than in previous decades, resulting in invasion-like occurrences, primarily in Western Europe. Strong pressure, especially from Spain and conservation NGOs, led to the adoption of EU Commission Decision 2003/322/EC, amended by Commission Decision 2005/830/CE, permitting certain member states to feed endangered species living on dead animal carcasses, though the administrative hurdles connected with the creation of feeding stations led to a situation in which such feeding opportunities were concentrated on fewer sites than formerly (Donázar et al. 2009, Margalida et al. 2012). EU Regulation 1774/2002 was ultimately replaced by EU Regulation 1069/2009, which sets the legal framework for feeding scavenging birds with livestock carcasses, valid from March 2011 onwards.

The big influx of G. fulvus into Germany in the year 2006 was well documented by Krüger & Krüger (2007), and similar invasion-like occurrences were noted in the following year in Switzerland (more than 80 records, Jordi 2007), Belgium (about 200 individuals) and the Netherlands (about 140 individuals), with fewer birds recorded in Germany in that year (Gantlett 2008).

The latest data on the occurrence of vultures in the eastern part of Central Europe has recently been published (Radziszewski 2013). In other countries the Avifaunistic/Rarities Committees in Slovakia (Šrank 2007), in Hungary (MME Nomenclator Bizottság 2006, 2008, 2010, 2011a, b, 2012), in Austria (Ranner 2002, 2003, Ranner & Khil 2009, 2011), in the Czech Republic (Vavřík 2002, 2004, Vavřík & Faunistická komise 2010–2012), in Poland (Komisja Faunistyczna 2003–2012) have published information about them. Isolated occurrences in Slovakia were published by Noga (2007) and Sárossy (2007), in Hungary by Hadarics & Zalai (2008), in the Czech Republic by Vavřík (2002) and Pavelka (2002), in Poland by Tomiałoć & Stawarczyk (2003) and in western Ukraine by Komarnyckyj & Gorbann (2013) and Skypan & Gorbán (2013). All of the above-mentioned occurrence data are included in the present review.

The aim of this work was to compile observations of G. fulvus and A. monachus in Central Europe during the first twelve years of the 21st century and to compare them with the published results of the occurrence of these two species in Western Europe. The possible reasons for their dispersal into territories to the north and north-east of their breeding grounds are discussed.

Material and methods

Data on the occurrence of G. fulvus and A. monachus in Slovakia and in neighbouring countries were obtained from the following specialised web-sites: c.g. www.-
birding.sk, aves.vtaky.sk, www.rarebirds.hu, www.birding.hu, www.fakokecelyu.hu, www.birdlife-afk.at, www.club300.at, www.birds.cz, www.BirdWatching.pl and www.clanga.com, as well as from the published reports of Species Rarity Commissions, independent articles and information obtained from ornithologists and non-ornithologists who have occasionally observed and photographed vultures. All observations underwent ratification by the Faunistic Commissions of the relevant countries. Only the western part of Ukraine (the Zakarpattia and Lviv provinces) is evaluated, because both species breed in its south-eastern part, on the Crimean Peninsula (Appak et al. 2009), and from Austria only data from outside the area of regular occurrence in that country are considered (see below).

In the introductory part of the results for each country the last observations of both species in the 20th century in the territory of that country are presented, followed by details of observations recorded during the first 12 years of the 21st century in each country. The results are evaluated based on the number of records, the number of individuals found and the monthly phenological occurrence. An overview of all observations is presented in the discussion and in an Appendix.

**Results**

The occurrences of two vulture species in Central Europe, the griffon vulture (*Gyps fulvus*) (Fig. 1) and the black vulture (*Aegypius monachus*) (Fig. 2), has been documented. A total of 106 observations of both species of vultures were found, 95 of which were the griffon vulture and 11 black vultures (Fig. 3). Most of the observations of vultures occurred in the months April – October, with the peak in June (Fig. 4). Both species were recorded in six countries of Central Europe (this study), and from a total 106 observations 28 come from Austria, 25 from Poland, 20 from Hungary, 18 from Slovakia, 10 from the Czech Republic and 5 from

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**Fig. 1.** Geographical distribution of records of griffon vultures (*Gyps fulvus*) in Central Europe in the 21st century. The larger white circles with a thicker border indicate observations of mixed flocks of *G. fulvus* and *A. monachus* (not shown is the area of regular occurrence of *Gyps fulvus* in Austria, see text).

**Obr. 1.** Geografické rozložení záznamov supov bielohlávych (*Gyps fulvus*) v strednej Európe v 21. storočí. Väčšie biele krúžky s hrubším okrajom znázorňujú spoločný výskyt *G. fulvus* a *A. monachus* (ten nie je znázornený v časti Rakúska, kde sa *Gyps fulvus* vyskytuje pravidelne, pozri text).
Ukraine (Fig. 5). During the first 12 years of 21st century an increasing number of observations and the numbers of observed individuals were documented, primarily in the griffon vulture (Fig. 6). The number of observations and the number of individuals of griffon vultures in the years 2011–2012 per country is presented by Fig. 7. Observations of vultures are described in detail for each country.

**Austria**

**Griffon vulture**

In Austria the griffon vulture is a regular summer visitor to the central Alps, mainly the Hohe Tauern Mts. in the federal state of Salzburg. Currently around 35 birds spend the summer there with a continuing negative trend, however (Anonymus 2012a); in the late 20th century up to 80 birds could be counted. These birds originate from Croatia and northern Italy. On their way to and from the central Alps they also pass or stray over eastern Tyrol and western Carinthia.

Additionally, single pairs from a free-flying group of griffon vultures from the Salzburg Zoo regularly breed on Untersberg Mt. near the city of Salzburg. Aside from these regular occurrences, the griffon vulture is a rare visitor, and all of these records were assessed by the Austrian Avifaunistic Commission. The last record of this species in the 20th century in Austria was on July 30, 1999, when remains of a dead individual were found near the village of Grünau in the federal state of Upper Austria (Ranner 2003). During the first twelve years of the 21st century 26 records were logged (Fig. 1 and 5), five of which occurred in each of the federal states of Vorarlberg and Upper Austria, four each in Lower Austria, Styria (Fig. 8) and Tyrol, and two each in Carinthia and in Vienna. These observations were made at elevations ranging from 230 m to 2,080 m. The first data come from the year 2001, and the highest number of observations (6) is from the year 2012. Regarding phenology, twelve records are from June, five from September, three from July, two each from April and May and one each from August and October. The largest flock consisted of 34 individuals, with single flocks of 15 and 11 birds. Flocks of ten birds were recorded twi-

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**Fig. 2. Geographical distribution of records of black vultures (Aegypius monachus) in Central Europe in the 21st century. The larger white circles with a thicker border indicate observations of mixed flocks of G. fulvus and A. monachus.**

**Obr. 2. Geografické rozložení záznamov výskytu supov hnedých (Aegypius monachus) v strednej Európe v 21. storočí. Väčšie biele krúžky s hrubším okrajom znázorňujú spoločný výskyt G. fulvus a A. monachus.**
ce. Three individuals were seen together once, two individuals five times and single birds on 15 occasions. Individual exhausted birds were found in three cases.

**Black vulture**
The last record of this species in the 20th century in Austria is from July 10, 1996, when an adult was found at a roosting site of griffon vultures in the Rauris Valley, federal state of Salzburg (Ranner 2002). During the first 12 years of the 21st century the species was recorded twice in Austria (Fig. 2 and 5): on June 30 – July 1, 2012, an immature bird was seen in a flock of 11 griffon vultures in the Lechtaler Alpen Mts. (Tyrol, Fig. 9) at an elevation of 2,050 m a. s. l. (Anonymous 2012b). The second record concerned an individual on August 10, 2012, near Cellon Mt. in the Kärnische Alpen Mts. (Carinthia) at an elevation of 2,080 m together with three *G. fulvus*.

**Czech Republic**

**Griffon vulture**
The last 20th century record of a griffon vulture in the Czech Republic was on July 2, 1984, at Supí hřbet in the Hrubý Jeseník Mts. (www.fkcso.cz). During the first 12 years of the 21st century there were seven records (Fig. 1 and 5), three of which were in the Vysočina region, while the others were single observations in the Jihočeský, Karlovarský, Královéhradecký and Středočeský regions at elevations from 200 m to 990 m a. s. l. The first data are from the year 2003, and the most records (3) were made in 2007. There were two observations each in June and August and one each in April, July, September and December. All cases concerned single individuals, and two of them were exhausted birds.

**Black vulture**
The last Czech record of this species in the 20th century was on April 9, 1929, in northern Moravia near the village of Kylęšovice (Hudec et al. 1966). During the first 12 years of the 21st century, the species was recorded three times (Fig. 2 and 5). Two records date from 2001: on August 4 an individual was observed near the village of Bystřice pod Černochovem in the Zlín Region, and on August 12 one was seen near the village of Náměšť nad Oslavou in the Vysočina Region (both at an elevation of 365 m). The third record is from January 24, 2009, when a single *A. monachus* was recorded near the village of Pouzdřany (at an elevation of 180 m) in the South Moravia Region. This bird was marked with decolour.
ated secondaries, on the basis of which its origin could be tracked: it had been marked and released on December 7, 2008, in the southern Alps in France. On January 13, 2009, it was observed in the northern Alps near Alleves in France and 11 days later it was found in the Czech Republic. An overview of the observations of this vulture appears on the web-site http://verdon.lpo.fr/programme/Thecla_bas.html.

HUNGARY

GRiffON Vulture

The last record of a griffon vulture in Hungary in the 20th century was made on September 5, 1995, when one individual was observed between the villages of Vác and Naszály in the Pest and Komárom districts (Hadarics & Zalai 2008). During the first 12 years of the 21st century 18 records (Fig. 1 and 5) were reported in the territory of Hungary, four of which occurred in the Győr-Moson-Sopron district, three in the Fejér district, two each in the Komárom, Pest and Szolnok districts and one each in the Hajdú-Bihar, Nógrád, Somogy, Tolna and Veszprém districts, at elevations from 85 m to 450 m. The first data are from 2003, and the most observations (4) occurred in the year 2005. Five observations were made in June, four in September, three in July, two each in May and October and one each in April and August. Two individuals were seen together once, and all other cases involved single birds; in two of those cases exhausted individuals were found. One of these was captured on May 17, 2010, and after rehabilitation and ringing, it was released on June 9 near the village of Jásziványa (Fig. 10) in the Szolnok district. Three days later this bird was observed 76 km from the release site, at Szanda Castle, located in the Cserhát Hills in the Nógrád District, and on June 20 it was observed in north-eastern Italy (Balázs et al. 2012).

BLACK VULTURE

The last record of the species in Hungary in the 20th century was on May 20, 1932, in the Heves district (Hadarics & Zalai 2008). There were two records in the first 12 years of the 21st century (Fig. 2 and 5). The same bird has been seen twice in May 2008 in the Csongrad and the Bekes districts in south-eastern Hungary.

POLAND

GRiffON Vulture

The last record of the species in the 20th century in Poland dates from July 5–8, 1998, when an individual with a Swiss ring was captured near the village of Gniewino near Wejherowo (Tomiałojć & Stawarczyk 2003). During the first 12 years of the 21st century 24 records were noted (Fig. 1 and 5), seven of which were in the Małopolskie province, three each in the Podkarpackie and Zachodniopomorskie provinces, two each in the Kujawsko-Pomorskie, Mazowieckie (Fig. 11), Opolskie and Wielkopolskie provinces and one each in the Łódzkie, Podlaskie and Śląskie provinces, at elevations from sea level up to 1,700 m (on Babia Góra Mt.). The first record comes from the year 2001, and the most records (5) were made in the year 2011. It is interesting to note that in the following year, in 2012, griffon vultures were seen only twice – one exhausted immature (4 cy) bird that was caught, and one juvenile bird. There were six records in June, five in May, four
in July, three in August, two each in October and September and one each in February and March. In two instances three individuals were seen together, on June 12, 2005, near the village of Dalecyn, in the Wielkopolskie province, and on May 31, 2010, in Magurski National Park in the Podkarpackie province. In the other cases only single individuals were observed. In four cases exhausted birds were captured, and two individuals were found dead. One of them was found on February 2, 2001, near Krašnik. It had been ringed in November 1999 in the Dios region in France. Other ringing recoveries were four birds with Croatian rings, one with a Spanish ring and one captured exhausted bird with a Serbian ring (Radziszewski 2013, Komisja Faunistyczna 2013).

Black vulture

The last record of the species in Poland in the 20th century was in mid-August, 1982, when a young individual was captured near the town of Skarżysko-Kamienna in the Świętokrzyskie province (Tomiałoję & Stawarczyk 2003). During the first 12 years of the 21st century only one observation was recorded (Fig. 2 and 5): an individual on June 23, 2011 (Fig. 12), over the Polish and Slovakian parts of Babia Góra Mt. in the Małopolskie province, together with a single griffon vulture (see below under Slovakia).

Slovakia

Griffon vulture

In the territory of Slovakia the last record of this species from the 20th century was on May 23–24, 2000, when an individual was observed near Zemplinske Hradište (Mošanský 2001) on the Východoslovenská rovina Lowland. During the first 12 years of the 21st century 16 records were noted (Fig. 1 and 5): three in the territory of the Záhorská nížina Lowland and two in the territory of the Tribeč Mts. in western Slovakia, while the others were single observations in the territories of eleven orographic units, from elevations of 150 (Záhorská nížina Lowlands) to 1,700 m. (Babia hora Mt. in the Oravské Beskydy Mts.). The first data are from the year 2005, while the highest number of observations (5) was in 2006. Regarding phenology, four observations occurred
in June, three each in May and July and two each in April, August and September. Besides the occurrence of three individuals of *G. fulvus* on May 30, 2012, above Veľký Rozsutec Mt. in the Malá Fatra Mts., only single individuals were observed in all the other cases. The majority of observations concerned birds flying over, or soaring birds; in one case an exhausted individual was found and one was lingering around a rubbish dump. An interesting record comes from the Slovak Karst Mts., where an individual was seen sitting on a tree in a valley (Fig. 13), which corresponds to a breeding claim for the species (Fig. 14).

**Black vulture**
The last record of a black vulture in Slovakia in the 20th century was on May 25, 1946, in the eastern part of the country, in the Slovak Karst Mts. (Feriane 1977). There were two records in the first 12 years of the 21st century (Fig. 2 and 5). The first concerned one individual on June 23, 2011 (Fig. 12), in northern Slovakia, at an elevation of 1,700 m above Babia hora Mt. in the Oravské Beskydy Mts. together with an individual of *G. fulvus* (Košmicki in litt.), which flew away over the territory of Poland. The second record was in May 2012 in eastern Slovakia over the south-western slopes of the Vihorlatské vrchy Mts. at an elevation of 400 m. It concerned an individual that – after continuous soaring – flew across the border into the territory of Ukraine near the city of Uzhgorod.

**Ukraine**

**Griﬀon vulture**
The last record of the species in western Ukraine in the 20th century was on May 15, 1999, in the Zakarpattia province near the Oľšany village in the Tjacič region around Menčul Mt. (J. F. Tančyńec, in litt.). In the first 12 years of the 21st century there were four records (Fig. 1 and 5), three of which were in the Lviv province – two from 2009 and one from 2012 – at elevations from 240 m to 400 m. The first data are from the year 2007 from the Zakarpattia province, from the Svidovec pastures (1,200–1,500 m a. s. l.) in the Tjacič region. One observation was made in April, two in May and one in August. In one case two individuals were seen together over a large garbage dump on April 15, 2009, near the Roztoča nature reserve near Ivano-Frankovo. In all other instances only one individual was observed (Skyrpan & Gorban 2013).

**Black vulture**
The last record in the 20th century is from the year 1935, when on May 17 an individual was shot in the Lviv province (Godyń 1938). In the 21st century, as of the end of the year 2012, two records are known (Fig. 2 and 5); two sub-adult individuals were recorded on July 25, 2006, near Rafajnov in the Berechovo District in the Zakarpattia province, and on May 5, 2012 (Komarnyckýj & Gorban 2013), one was seen flying from Slovakia into the territory of the Zakarpattia province over the city of Uzhgorod (see above under Slovakia).

**Discussion**
On the basis of the data presented here, there were 95 occurrences of *Gyps fulvus* with a total of 185 individuals and 11 occurrences of *Aegypius monachus* with 13 individuals in the years 2001–2012 in an area defined by the state borders of Poland, the Czech Republic, Austria, Hungary and western Ukraine. Up to and including the year 2004 the number of records of *G. fulvus* was comparable with the preceding period, but from the year 2005 this began to rise (Fig. 3). The first influx was recorded in Germany in 2006 (Krüger & Krüger 2007); the largest number was 71 individuals in two flocks. Birds flew up to the north-eastern part of the country, to Szczecin Bay on the Baltic Sea. In comparison with this, in 2002 in the neighbouring Western Pomerania in Poland, one individual flew even further north, up to the Baltic Sea coast (Komisja Faunistyczna 2003). According to maps published in the article cited above, the largest number of vultures in Germany in the year 2006 was recorded in the central and north-eastern parts of the country; in the eastern part only two individuals were observed in the vicinity of the Czech border and a number of individuals were observed not far from the Polish border. On the other hand, this influx into Western Europe in the year 2006 is not manifested in our study area: there were three records in Slovakia that year and two each in Poland and Austria. Another influx year in Western Europe was 2007, when perhaps 200 individuals were recorded in Belgium and some 140 in the Netherlands. Something over 100 records came from Germany, especially from its western part, with a maximum of 30 individuals in the federal state of Lower Saxony (Gantlett 2008). An invasive occurrence was also recorded in Switzerland in 2007, from where more than 80 observations were reported. The main occurrence was in the western part of the country. The largest flock was made up of 22 individuals. It was assumed that the birds came from France (Jordi 2007). The year 2007 also saw the largest number of records in our study area during the period of 2001–2012. In the following year,
2008, the number of observations dropped significantly, but since 2009 it has risen again, with the number of observations increasing steadily until 2012 (Fig. 3). During these years the largest number of records was reported from Austria and in 2011 from Poland, but in 2012 only two occurrences of G. fulvus were recorded there.

Griffons usually start arriving in our study area in April, with the monthly number of records increasing in May and reaching its peak in June and then falling until October (Fig. 4).

Of course, the main question is the origin of these birds and the reasons for the increasing number of records in recent years. Recoveries of ringed birds in Poland demonstrate that the origin of these birds was the Balkan Peninsula; the birds had been ringed as nestlings in Croatia and Serbia. This can probably be expected to be true for many of the records in the eastern part of our study area. Furthermore, this is in line with the origin of the regular summering birds in the Austrian central Alps. Notwithstanding this, in one case a bird flew into Poland from France, but this was a bird released in the course of a reintroduction programme. Nevertheless, the records from Austria and also perhaps the Czech Republic do indicate that more birds originating from the south-west of Europe are involved (wild and reintroduced, see below for the black vulture). Especially in the year 2007 the timing and geographical distribution of the records in these two countries fit into the pattern of the influx in Western Europe described.

Fig. 11. Juvenile griffon vulture observed in Poland, Plock, October 2012.

Fig. 12. Soaring black vulture observed over Babia hora Mt., Poland / Slovakia, 23 June 2011.

Fig. 13. Detail of occurrence place of griffon vulture in Žadielska dolina Valley, Slovakia, 8 September 2012.

Fig. 14. View on Žadielska dolina Valley with marked resting place of griffon vulture (circle), Slovakia, 8 September 2012.

Obr. 11. Juvenilný sup bielohlavý pozorovaný v Poľsku, Plock, október 2012.

Obr. 12. Krúžiaci sup tmavohnedý, Babia hora, Poľsko / Slovensko, 23. jún 2011.

Obr. 13. Detail miesta výskytu supa bielohlavého v Žadielskej doline, Slovensko, 8. september 2012.

Obr. 14. Pohľad Žadielsku dolinu s polohou miesta odpočinku supa bielohlavého (krúžok), Slovensko, 8. september 2012.
above. Flocks with more than five birds have only been recorded in Austria, and here the biggest flocks (of more than 10 birds) were found just inside or right along the northern edge of the Alps. This could be an indication of birds coming from the west and using the Alps as a line of orientation on their way to Central Europe. If these had been birds from the Balkan Peninsula it could have been expected that such flocks would show up in the south-east of Austria, along the eastern edge of the Alps or nearer to their regular summering grounds in the central Alps. It can be postulated therefore that birds from south-eastern Europe (the Balkan Peninsula) and from the south-west (the Iberian-French population) have flown more and more regularly into our study area in recent years, and indeed might have come into mutual contact here. The reasons for this development are not yet fully clear and probably are manifold: a still partial food shortage due to the EU regulation mentioned (see Donázar et al. 2009, Margalida et al. 2010, Margalida & Colomer 2012) and a long-term population increase leading to new dispersal patterns might be the main drivers, but climatic reasons cannot be ruled out either. It was shown by Margalida & Colomer (2012) that a severe reduction in meat availability can result in population declines due to changed spatial distribution, mainly in griffon vultures.

The frequent occurrences in recent years are probably a result of overall increasing breeding populations and changing dispersal behaviour, but also partly of successful reintroduction projects in Italy and Bulgaria. Presently there are four reintroduction sites in Bulgaria and one in Italy. In Bulgaria alone more than 150 birds were released in the course of the LIFE project (Andevski 2013). Meanwhile, a reintroduction plan for griffon and black vultures has been finalised for Hungary (Dudás et al. 2011). For its implementation international cooperation is needed due to the transboundary nature of the former breeding range (Slovakia, Romania, Hungary). For the bearded vulture it has been shown that reintroduced birds tend to have a wider dispersal than wild ones (Margalida et al. 2013). If this is also true for other vulture species, the increasing number of released birds and the establishment of reintroduced populations might also be a factor contributing to the steadily growing number of records of vultures far outside their previously known non-breeding range.

Occurrences of black vultures in the 21st century have been almost as rare as in the past, but in just the last two years there has been a slight but notable increase in the number of records. In our study area the species has been recorded 11 times, most often (three times) in the Czech Republic, twice each in Slovakia, Hungary and Austria and once each in Poland and Zakarpattia Ukraine. In two cases two individuals were observed together; in other cases only one bird occurred, and in four cases black vultures were seen together with griffons G. fulvus. The most frequent occurrences (three each) were recorded in the months of May, June and August, and one each in January and July (Fig. 4). Regarding the origin of this species the following considerations can be made: In 2012 up to two A. monachus spent several weeks at a vulture feeding site at Lago di Comino in northern Italy. One of them had been ringed as a chick in the Cevennes Mts. in southern France, and this bird had previously been present at that Italian feeding site in 2011 (F. Genero in litt. via E. Albegger). It therefore originated from a population that was reintroduced to France between 1992 and 2004, currently comprising some 20 breeding pairs (http://eng.cevennes-parcnational.fr/downloaded on March 17, 2013). In fact, a bird spotted in Austria on July 1, 2012 seemed to be wearing a large white leg-ring (see Fig 12) in the same fashion as on the ringed bird in Italy, which was noted at the Italian feeding site from July 19, 2012 onwards. Thus, it seems possible that the black vulture seen in Austria in the company of 11 griffons was this same French bird on its way to Italy, or was another French bird (thus further strengthening the notion that French griffons themselves reach our study area). To conclude, it therefore seems likely that the black vultures reintroduced into southern France might be caught up in dispersing flocks of griffon vultures from south-west Europe and accompany them to Central Europe. As the black vulture project in France was successful and as griffon vulture dispersal to Central Europe is obviously becoming more regular, this spectacular species might become a more frequent sight here in years to come.

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| E | N | date | site | note |
|---|---|------|------|------|
| 1 | 1 | 21°03’ | M. Fülöp | exhausted, photo |
| 1 | 1 | 48°36’ | S. Jrković, C. J. J. Bjerregaard | in litt. |
| 1 | 1 | 17 Apr 2005 | | |
| 1 | 1 | 48°36’ | M. Fülöp | exhausted, photo |
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| 1 | 1 | 29 May 2006 | | |
| 1 | 1 | 49°08’ | M. Fülöp | exhausted, photo |
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| 1 | 1 | 29 May 2006 | | |
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| 1 | 1 | 49°12’ | M. Fülöp | exhausted, photo |
| 1 | 1 | 29 May 2006 | | |
| co. | site | E   | N   | date            | no. | observer                      | reference       | notes    |
|-----|------|-----|-----|-----------------|-----|-------------------------------|-----------------|---------|
| AT  | Dorfer Berg bei Molin, ÖÖ | 14° 10' | 47° 49' | 5–6 Jun 2006 | 3   | A Banker & M Kirchwege       | Ranner & Khil 2009 | obs.    |
| AT  | Arbesbach, NÖ | 14° 57' | 48° 29' | 6–7 Jun 2006 | 1   | J Hiebeler & K Roitner et al | Ranner & Khil 2009 | imm. obs., photo |
| AT  | St. Georgen ob Judenburg, Strmk | 14° 30' | 47° 12' | 17 May 2007 | 2   | P Sackl & M Loncar           | Ranner & Khil 2011 | ad. obs. |
| AT  | Schadonaalpe s. Schoppernau, Vbg | 10° 01' | 47° 15' | 28–30 Jun 2007 | 1   | H Strolz                     | Ranner & Khil 2011 | obs., photo |
| AT  | Böschistobel Nenzing, Vbg | 9° 41' | 47° 11' | 5–13 Jul 2007 | 2   | H Salzgeber & H Salzgeber    | Ranner & Khil 2011 | imm. obs., photo |
| AT  | Hochstrass, NÖ | 15° 59' | 48° 08' | 22 Jul 2007 | 1   | M Riesing, S Hofbauer        | Ranner & Khil 2011 | ad. obs. |
| AT  | Feistritz im Rosenthal, Ktn | 14° 10' | 46° 31' | 1 Sep 2007 | 1   | G Male & A Male              | www.birdlife-afk.at | obs.    |
| AT  | Kirchdorf, Tirol | 12° 26' | 47° 33' | 12 Oct 2009 | 1   | S Stadler                    | www.birdlife-afk.at | imm. exhausted |
| AT  | Keutschacher See, Ktn | 14° 09' | 46° 35' | 4 Apr 2010 | 2   | W Petutschnig                | www.birdlife-afk.at | obs.    |
| AT  | Sarojalpe, Frastanz, Vbg | 9° 34' | 47° 11' | 28 Apr 2010 | 1   | E Schuchter                  | www.birdlife-afk.at | ad. obs., photo |
| AT  | Sulzspitze, Allgäuer Alpen, Tirol | 10° 32' | 47° 27' | 24 May 2010 | 10  | R Kartheining                 | www.birdlife-afk.at | obs.    |
| AT  | Obereberg am Inn, ÖÖ | 13° 20' | 48° 19' | 10 Jun 2010 | 1   | S Stadler                    | www.birdlife-afk.at | imm. exhausted |
| AT  | Bad Haring, Tirol | 12° 07' | 47° 31' | 23 Jun 2010 | 1   | S Stadler                    | www.birdlife-afk.at | ad. exhausted |
| AT  | Kanisfluh, Vbg | 9° 54' | 47° 23' | 18–19 Jun 2011 | 2   | H-G Bauer et al                | www.birdlife-afk.at | obs., photo |
| AT  | Michelendorf, ÖÖ | 14° 07' | 47° 53' | 26 Jun 2011 | 10  | G Juen et al                  | www.club30.at | photo |
| AT  | St. Wolfgang-Kienberg, Strmk | 14° 40' | 47° 03' | 8 Jul 2011 | 1   | S Zinko                       | www.birdlife-afk.at | obs.    |
| AT  | Satzberg, Wien | 16° 15' | 48° 12' | 11 Aug 2011 | 1   | C Purtischer                  | www.birdlife-afk.at | imm. obs., photo |
| AT  | Lustenau, Vbg | 9° 40' | 47° 25' | 27 Sep 2011 | 1   | J Bartas                      | www.birdlife-afk.at | obs.    |
| AT  | Gamskogel, Bad Ischl, ÖÖ | 13° 44' | 47° 42' | 3 Jun 2012 | 15  | J Kranabdit                   | www.birdlife-afk.at | obs.    |
| AT  | Remschning, Strmk | 15° 25' | 46° 39' | 13 Jun 2012 | 1   | A Held                        | www.birdlife-afk.at | imm. obs., photo |
| AT  | Lorealm, Lechalter Alpen, Tirol | 10° 47' | 47° 21' | 30 Jun – 1 Jul 2012 | 11  | C Dotzer et al                 | www.birdlife-afk.at | obs., photo |
| AT  | Ebensee, ÖÖ | 13° 45' | 47° 48' | 4 Sep 2012 | 1   | A Lahnsteiner                  | www.birdlife-afk.at | obs., photo |
| AT  | Gippel, NÖ | 15° 35' | 47° 47' | 9 Sep 2012 | 1   | M Gottfried                    | www.birdlife-afk.at | obs.    |
| AT  | Hartberger Gmoos, Strmk | 15° 58' | 47° 16' | 15 Sep 2012 | 1   | A Tiefenbach et al           | www.birdlife-afk.at | imm. obs., photo |
| CZ  | Humpolec | 15° 21' | 49° 32' | 24 Aug 2003 | 1   | A Toman                       | Vavlk 2004 | exhausted, photo |
| CZ  | Častrov | 15° 11' | 49° 18' | 30 Jun 2007 | 1   | J Ješeta                      | Vavlk & FK ČSJ 2012 | exhausted, photo |
| CZ  | Adříšpach rocks | 16° 07' | 50° 37' | 7 Jul 2007 | 1   | O Krechbach                   | Vavlk & FK ČSJ 2012 | obs., photo |
| CZ  | Vyskytná nad Jihlavou | 15° 22' | 49° 26' | end Aug – 2 Sep 2007 | 1   | P Mückstein et al            | Vavlk & FK ČSJ 2011 | obs., photo |
| CZ  | Žehuň-ponds | 15° 18' | 50° 09' | 21 Dec 2008 | 1   | M Jelinek                     | Vavlk & FK ČSJ 2011 | obs.    |
| CZ  | Volary | 13° 53' | 48° 54' | 2 Apr 2012 | 1   | L Stančík                    | www.birds.cz | obs., photo |
| CZ  | Přebruz, Krasický Špičák | 12° 34' | 50° 22' | 16 Jun 2012 | 1   | M Mimra & P Schütze          | www.birds.cz | imm. obs. |
| PL  | Krašnik pod Choszczem, Choszczeński | 15° 39' | 54° 13' | 2 Feb 2012 | 1   | T Mizer et al                | Tomalaječ | subad. died |
| PL  | Koparan, Slawieński | 16° 26' | 54° 27' | 27 Mar 2002 | 1   | S Springer et al             | Kf 2003 | obs.    |
| PL  | Godżyń, Gołczański | 17° 01' | 51° 53' | 3 May 2003 | 1   | T Mizer                      | Kf 2004 | imm., photo |
| PL  | Sarbsk, Łębski | 17° 39' | 54° 45' | 23 Aug 2003 | 1   | B Kotlarz, T Klosowski       | Kf 2013 | juv., caught |
| PL  | Irki, Lubliniec | 18° 49' | 50° 39' | 2 Oct 2003 | 1   | C Tyrol et al                | Kf 2004 | caught juv., photo |
| PL  | Dalezyn, Miedzychodzki | 16° 09' | 52° 33' | 12 Jun 2005 | 1   | H Andrezewski                | Kf 2006 | imm., obs., photo |
| PL  | Kondrajec Pański, Ciechanowski | 20° 14' | 52° 48' | 26 May 2006 | 1   | A Pająk & J Betleja          | Kf 2007 | died, photo |
| PL  | Zakopane, Tatrzanski | 19° 57' | 49° 18' | 31 May – 1 Jun 2006 | 1   | T Zwijacz-Kozica et al     | Kf 2008 | imm., photo |
| co. | site | E    | N    | date          | no. | observer               | reference | notes         |
|-----|------|------|------|---------------|-----|------------------------|-----------|---------------|
| PL  | Smolnik, sanocki | 22° 07' | 49° 16' | 29 Jun 2007 | 1   | M Ostafiński          | KF 2008   | imm. obs.    |
| PL  | Gać – Brzezina, brzeski | 17° 23' | 50° 53' | 3–17 Jul 2007 | 1   | M Stajszczak et al    | KF 2008   | imm., photo  |
| PL  | Radoszyce, sanocki | 22° 03' | 49° 18' | 29 Jun 2008  | 1   | D and J Gawroński     | KF 2009   | ad. obs.     |
| PL  | Czarna Rola, radomski | 21° 05' | 51° 33' | 18 Jul 2008  | 1   | R Kropieska           | KF 2009   | caught, photo|
|     |      |      |      |               |     | & M Słupek             |           |               |
| PL  | Opole, island Bolko, opolski | 17° 55' | 50° 39' | 9 Jun 2009   | 1   | M Kowalski             | KF 2010   | ad., photo    |
| PL  | Opole, island Bolko, opolski | 17° 55' | 50° 39' | 28 Aug 2010  | 1   | M Kowalski et al      | KF 2010   | ad., photo    |
| PL  | Magurski PN, jasielski | 21° 29' | 49° 28' | 31 May 2010  | 3   | M Miczek et al        | KF 2011   | photo         |
| PL  | Lubień Dolny, lobeski | 15° 26' | 53° 45' | 9 Jun 2010   | 1   | K Bierkowski          | KF 2011   | photo         |
|     |      |      |      |               |     | & M Grabarczyk        |           |               |
| PL  | Babia Mt., nowosadecki | 19° 33' | 49° 34' | 23 Jun 2011  | 1   | A Kośmicki & A Kośmicka | KF 2012   | photo, with Aegypius |
| PL  | Bochnia, bocheński | 20° 26' | 49° 58' | 23 Jul 2011  | 1   | M Kica                | KF 2012   | photo         |
| PL  | Dabrowica, dabrowski | 21° 07' | 50° 18' | 24–29 Jul 2011 | 1   | M Twaróg              | KF 2012   | photo         |
| PL  | Zagórzany, gorlicki | 21° 09' | 49° 42' | 9–10 Sep 2011 | 1   | S Czyz & K Niemiec    | KF 2012   | caught juv., photo |
| PL  | Brzozkwinia, krakowski | 19° 43' | 50° 06' | 28 Sep 2011  | 1   | D Wiehe et al         | KF 2012   | same ind.    |
| PL  | Debinek, bydgoski | 17° 54' | 53° 04' | 6 Aug 2012   | 1   | M Krzywiński           | www.clanga.com | exhausted, photo |
|     |      |      |      |               |     | & R Nowicka            |           |               |
| PL  | Płock, mazowieckie | 19° 20' | 52° 13' | 10–30 Oct 2012 | 1   | M Nawrocki             | www.komisjaafunystyczna.pl | obs., photo   |
|     |      |      |      |               |     |                       |           |               |
| UA  | Polonyna Svidovec, Lopuchow, Tjahviksk rajon, Zakarpattia | 24° 00' | 48° 22' | 23 Aug 2007 | 1   | V Kostiak              | Skypan & Gorbaň 2013 | obs.         |
| UA  | Ivano-Frankovo, NR Roztoča | 23° 44' | 49° 56' | 15 Apr 2009  | 2   | M Skypan               | Skypan & Gorbaň 2013 | obs., photo   |
| UA  | Lviv | 24° 02' | 49° 50' | 9 May 2009    | 1   | I Gorbaň               | Skypan & Gorbaň 2013 | obs.         |
| UA  | Ivano-Frankovo, NR Roztoča | 23° 44' | 49° 56' | 22 May 2012   | 1   | I Gorbaň               | Skypan & Gorbaň 2013 | obs.         |
|     |      |      |      |               |     |                       |           |               |
|     |      |      |      |               |     |                       |           |               |
| **Aegypius monachus** |      |      |      |               |     |                       |           |               |
| SK  | Oravská Polhora, Babia Mt. | 19° 30' | 49° 34' | 23 Jun 2011  | 1   | A Kośmicki & A Kośmicka | Kośmicki, in litt. | obs. with Gyps |
| SK  | Priekopa | 22° 17' | 48° 45' | 5 May 2012    | 1   | Š Danko                | MME NB 2011 | obs. immat.   |
| HU  | Tömörkény and Pusztaaszer | 20° 01' | 46° 35' | 1–11 May 2008 | 1   | C Tölgyesi, K Áron et al | MME NB 2011 | obs. subad.   |
| HU  | Geszt, Begóczi-víztároló | 21° 33' | 46° 55' | 16–23 May 2008 | 1   | G Horváth, M Porkoláb et al | MME NB 2011 | obs. subad.   |
| AT  | Lorealm, Lechtafer Alpen, Tirol | 10° 47' | 47° 21' | 30 Jun – 1 Jul 2012 | 1   | C Dotzer et al        | www.birdlife-afk.at | obs. imm. with Gyps photo |
| AT  | Cellon, Karnische Alpen, Ktn | 12° 56' | 46° 36' | 10 Aug 2012   | 1   | H Verderber            | www.birdlife-afk.at | obs. with Gyps |
| CZ  | Bystřice pod Lopeníkem | 17° 46' | 48° 58' | 4 Aug 2001    | 1   | J Pavelka & J Vystrčil | Vavřík 2002 | obs. ad.     |
| CZ  | Náměšť nad Oslavou | 16° 09' | 49° 12' | 12 Aug 2001   | 2   | L Severa               | Pavelka 2002 | obs. ad.     |
| CZ  | Pouzdřany | 16° 37' | 48° 56' | 24 Jan 2009   | 1   | P Štěpánek             | Pavelka & FK ČSO 2010 | obs. ad.     |
| PL  | Babia Mt., nowosartski | 19° 33' | 49° 34' | 23 Jun 2011   | 1   | A Kośmicki & A Kośmicka | KF 2012   | obs., photo with Gyps |
| UA  | Rafajnovo, Beregovo rajon, Zakarpattia | 22° 29' | 48° 19' | 25 Jul 2006  | 2   | JV Demian              | Komarnycký & Gorbaň 2013 | obs.         |