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**Population estimates for the
five European vulture species**

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Population estimates for the five European vulture species: 2022 update.

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1. Introduction

1.1. Global overview

The need to regularly monitor breeding populations of threatened vultures is widely recognised as a priority to enable the effective implementation of targeted conservation actions in key areas across their ranges (Buechley et al. 2019; Santangeli et al. 2019). Regularly updated monitoring data and population estimates are necessary to review progress towards the main objectives of the Multi-species Action Plan to Conserve African- Eurasian Vultures (MsAP; Botha et al. (2017)), which are as follows:

- Rapidly halt current population declines in all species covered by the Vulture MsAP;
- Reverse recent negative population trends to bring the conservation status of each species back to a favourable level;
- Provide conservation management guidelines applicable to all Range States covered by the Vulture MsAP.

This report collates and describes the most recent minimum breeding population estimates for the five vulture species that occur in Europe and the range states that border the Mediterranean Sea: Egyptian Vulture, Bearded Vulture, Griffon Vulture, Rüppell's and Cinereous Vultures. The sources of the estimates include published reports from governmental and non-governmental organizations; unpublished data presented at conferences and workshops; personal communications with vulture experts; and other verifiable but unpublished resources. Recent trends therefore cover a maximum of **five breeding seasons since the publication of the MsAP**. The following pages present the updated population estimates for each of the five European vulture species that are available so far since the last publication from the VCF published in March 2019. Key highlights, areas of concern and gaps in knowledge are discussed for each species.

These new figures highlight overall positive population trends for the Griffon, Cinereous and Bearded Vultures, with small to large population increases observed in Western Europe and even in the Balkan countries (e.g. the impressive recovery of the Griffon Vulture in Bulgaria). The Egyptian Vulture remains the most vulnerable vulture species in Europe. Although steep population decline has been halted by conservation actions, most Egyptian Vulture populations seem to have stabilized after recovering partially with few populations still increasing at the national level over the last five years. Further monitoring and research are needed to better understand the anthropogenic factors limiting Egyptian Vultures populations in Europe and help strengthening its recovery. The Ruppell's vulture has been added for the first time to this report, as the species is now a regular breeder in southern Spain and Portugal.

Based on personal communications with local ornithologists, the status of European vulture populations seems to remain particularly worrying in North Africa and Turkey (see also Garrido et al. 2021). In addition, lack of quantitative assessments of local populations hinders the implementation of effective conservation actions. Developing local capacity for monitoring vulture populations in these Mediterranean countries is an important step to reach the Objective 11 of the MsAP.

1.2. Geographical scope

Data needed to estimate national vulture population size have been collected for this report across Europe (EU member states + North Macedonia, Serbia and Switzerland) and adjacent Mediterranean countries including Algeria, Egypt, Israel, Lebanon, Lybia, Morocco, Tunisia and Turkey (see Slotta-Bachmayr et al. 2005 for a similar geographical scope).

2. Population estimates

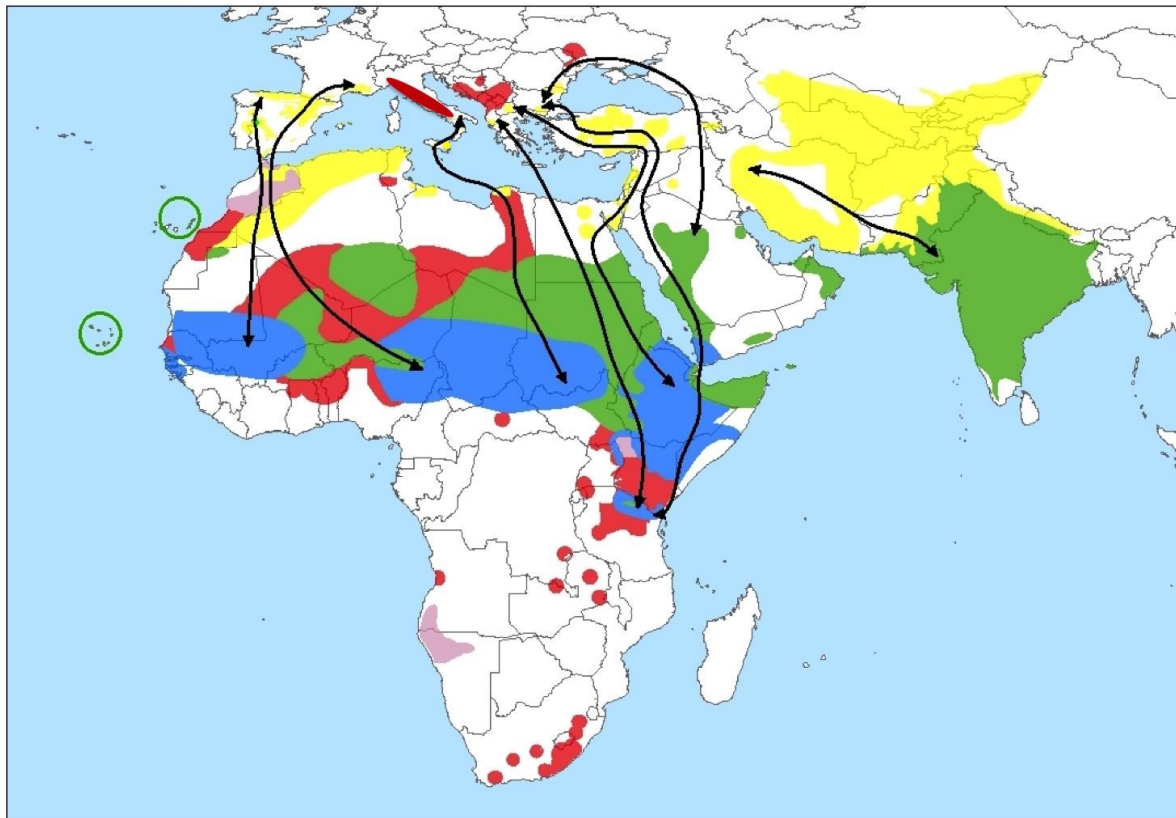
2.1. The Egyptian Vulture *Neophron percnopterus*.

Red List Category: Endangered

Total Population: 12,400-36,000 mature individuals

Population Trends: Decreasing

Range: Africa, Asia, Europe



Legend

Native (breeding)
 Possibly extinct or extirpated
 Extinct or extirpated
 Native (resident)
 Native (non-breeding)

Figure 1. Distribution map of the Egyptian Vulture *Neophron percnopterus* (extracted from Botha et al. 2017).

Key findings, gaps of knowledge and area of concern

Largest European population is located in Spain (Table 1; Figure 2) and there is no new data since the last census of the Spanish population carried out in 2018 (Del Moral & Molina. 2018). Although the population showed a slight increase at the national scale, there were important variations between Spanish Autonomous communities. In 2018, the Egyptian Vulture population was still in decline in 7 communities out of 15 where the species is present during the breeding season. The communities where the decline was the strongest were also the most important communities in terms of total size of the Egyptian Vulture population, namely Castilla-y-Leon, Aragon and Extremadura. Further population monitoring is particularly needed in these areas to assess current population trends and potential recovery in the future.

In Italy, Egyptian Vulture populations seem to be stable or slightly increasing since 2018. However, local population declines are recorded again in France after long-term population stability or increase. For example, over the last 10 years, one territory loss was recorded per year in the western Pyrenees, the most densely populated area in France (Kobierzycki et al. 2021). The species remains vulnerable to anthropogenic threats and dependent on continued conservation efforts in Western Europe.

The Egyptian Vulture population remains overall stable in the Balkans with small fluctuations between years. For example, the number of breeding pairs has oscillated between 24-26 in Bulgaria, 12-13 in North Macedonia and 3-5 in Greece since 2017-2018. However, in 2021 the number of occupied territories has dropped from 9 to 5 in

Albania due to the loss of breeding individuals. New research published in 2021 has highlighted that population reinforcement alone was able to postpone extinction of the Egyptian Vulture in the Balkans but actions improving survival probability, particularly of juveniles, were also required to stabilise this population in the long-term (Oppel et al. 2021a).

New population estimates for Morocco and Turkey are missing. However, local experts indicated that the Moroccan population is very likely to be < 10 breeding pairs (Imad Cherkaoui, pers.comm). In Turkey, the species seems to be declining overall, with low breeding success recorded in the Eastern part of the country, while population seems to be increasing in Kars, Iğdır Ardahan (Emrah Çoban & Ilker Ozbahar, pers.comm).

A global international conservation approach is crucial for the Egyptian Vulture and is currently being adopted, at least among Balkan countries (Oppel et al. 2021b). Additional data on dispersal rates and connectivity between western and eastern European populations would help improving conservation actions.

Table 1: Table showing previous, current minimum estimates and productivity of the breeding population of Egyptian Vultures *Neophron percnopterus* across Europe and nations adjacent to the Mediterranean Sea. See list of contributors in the Appendix. Otherwise, information from Del Moral & Molina (2018).

Country	Species	Status	Breeding pairs: previous estimate	Year of previous estimate	Breeding pairs: current estimate	Year of current estimate	Trend over last 10 years	Short-term trend: since last assessment (2017)	Productivity: current estimate
Albania	<i>Neophron percnopterus</i>	Breeding	5	2018	5	2021	Large decline	Stable	0.5 (2021)
Algeria	<i>Neophron percnopterus</i>	Breeding	NA	2018	NA	No new data	No data	No new data	NA
Bulgaria	<i>Neophron percnopterus</i>	Breeding	26	2018	26	2021	Large decline	Stable	1.04 (2021)
Egypt	<i>Neophron percnopterus</i>	Breeding	NA	2018	NA	No new data	No data	No new data	NA
France	<i>Neophron percnopterus</i>	Breeding	75	2018	85	2021	Stable	Small decline	0.80 (2020)
Greece	<i>Neophron percnopterus</i>	Breeding	5	2018	5	2021	Large decline	Stable	0.6 (2021)
Israel	<i>Neophron percnopterus</i>	Breeding	50	2016	50-70	2021	Stable	Small increase	NA
Italy	<i>Neophron percnopterus</i>	Breeding	9	2018	13	2021	Decline	Moderate increase	1.0 (2021)
Lebanon	<i>Neophron percnopterus</i>	Breeding	NA	No new data	NA	No new data	No data	No new data	NA
Lybia	<i>Neophron percnopterus</i>	Breeding	NA	No new data	NA	No new data	No data	No new data	NA
North Macedonia	<i>Neophron percnopterus</i>	Breeding	13	2018	12	2021	Large decline	Stable	0.66 (2021)
Morocco	<i>Neophron percnopterus</i>	Breeding	NA	No new data	NA (<10 pairs)	2021	Large decline	No new data	NA

Portugal	<i>Neophron percnopterus</i>	Breeding	110	2012	67-90	2018	Large decline	Moderate Decline	NA
Spain	<i>Neophron percnopterus</i>	Breeding	1452	2015	1400-1600	2018	Stable/decline	Stable	0.78 (2018)
Syria	<i>Neophron percnopterus</i>	Breeding	25	2011	NA	No new data	No data	No new data	NA
Tunisia	<i>Neophron percnopterus</i>	Breeding	NA	No new data	NA	No new data	No data	No new data	NA
Turkey	<i>Neophron percnopterus</i>	Breeding	1000	2013	NA	No new data	Decline	No new data	NA
Total			2781		<u>2688-2931*</u>				

*Current estimated total is calculated by summing the current available estimates and the previous estimates when no current estimate is available (indicated as NA).

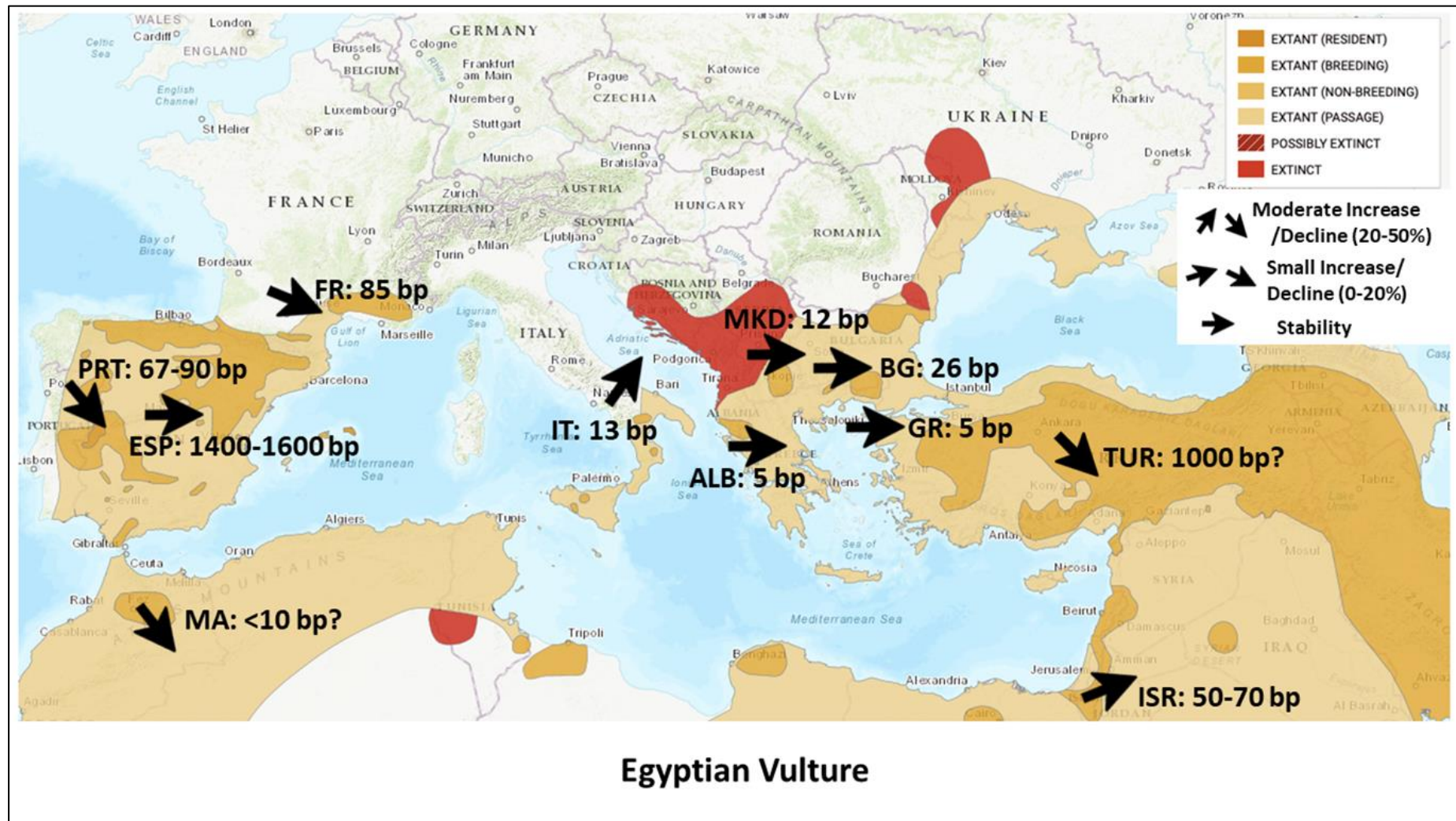


Figure 2. Estimated short-term trends (2017-present) in the breeding population of Egyptian Vultures *Neophron percnopterus* across Europe and nations adjacent to the Mediterranean Sea. Refer to Table 1 above.

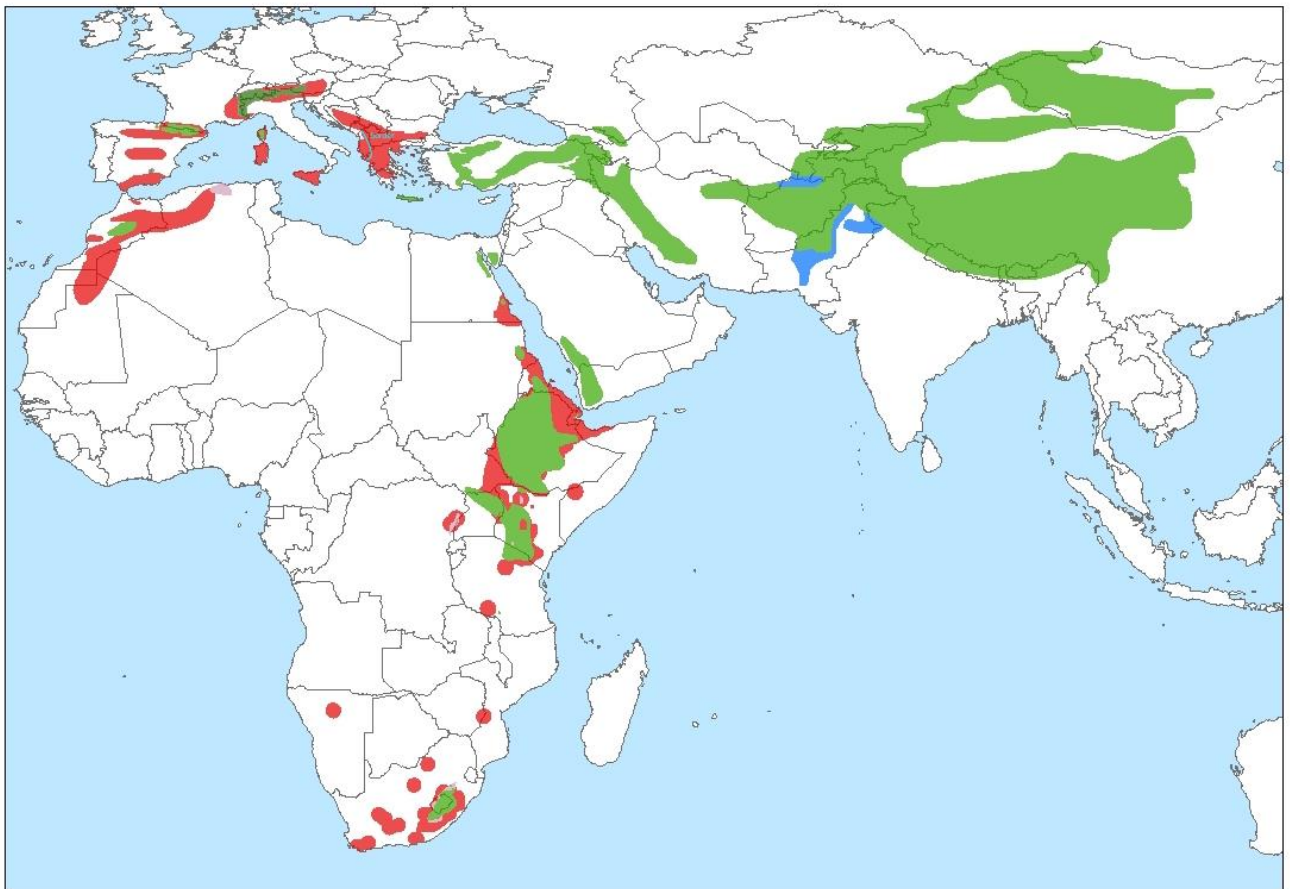
2.2. The Bearded Vulture *Gypaetus barbatus*

IUCN Red List Category: Near Threatened

Total (world) Population: 1675-6700 mature individuals

Population Trends: Decreasing

Range: Africa, Asia, Europe



Legend

■ Native (breeding)
 ■ Possibly extinct or extirpated
 ■ Extinct or extirpated
 ■ Native (resident)
 ■ Native (non-breeding)

Figure 3. Distribution map of the Bearded Vulture *Gypaetus barbatus* (extracted from Botha et al. 2017).

Key findings, gaps of knowledge and area of concern

Overall, European population of Bearded Vultures maintained a positive dynamic since the last update with an increase in the number of occupied breeding territories observed in most countries (Table 2; Figure 4).

Data from IBM and associated partners suggest that Bearded Vulture populations keep increasing in Switzerland (4 new breeding pairs since 2018), Austria (7 new breeding pairs), Italy (4 new breeding pairs) and France (13 new breeding pairs). The positive dynamic in France is driven by the Alpine and Pyrenean populations while the status of the species remains critical in Corsica with 1-2 pairs lost since the last update and a very low productivity observed for the 2 breeding pairs monitored in 2021. Overall, the year 2021 marked a new success for the Bearded Vulture reintroduction project in the Alps with 62 occupied territories producing a record number of 44 fledglings (IBM, 2021).

In Spain, the population seems to be stable or slightly increasing in the Pyrenees while new breeding territories were recorded in areas where the species was recently reintroduced (e.g. 5 new pairs in Andalusia, 2 new breeding pair in Asturias, one in La Rioja) all within the old distribution range. In Crete, the population increased since 2018 from 7 to 10 breeding pairs. Quantitative estimates of the populations breeding in Morocco and Turkey are missing. Previously extinct or absent in Morocco (Garrido et al. 2005), now local experts estimate that less than 10 pairs remain in Morocco while in Turkey the overall population trend is declining (Ilker Ozbahar pers. comm).

New research article has unravelled the main demographic drivers of population growth in the Pyrenean population (Margalida et al. 2020), providing key parameters to focus conservation actions on. An update of the main mortality causes across European populations will be available in 2022.

Table 2. Table showing previous, current minimum estimates and productivity of the breeding population of Bearded Vultures *Gypaetus barbatus* across Europe and nations adjacent to the Mediterranean Sea. See list of contributors in the Appendix.

Country	Species	Status	Breeding pairs: previous estimate	Year of previous estimate	Breeding pairs: current estimate	Year of current estimate	Trend over last 10 years	Short-term trend since last assessment (2017)	Productivity: current estimate
Andorra	<i>Gypaetus barbatus</i>	Breeding	1	2016	1	2021	Stable	Stable	NA
Austria	<i>Gypaetus barbatus</i>	Breeding	2	2018	9	2021	Small increase	Moderate increase	0.222
France	<i>Gypaetus barbatus</i>	Breeding	63	2018	76	2021	Small-large increase	Moderate increase	0.38 (Pyrenees) 0.57 (Alps) 0 (Corsica)
Greece	<i>Gypaetus barbatus</i>	Breeding	7	2018	10	2021	Moderate increase	Moderate increase	0.60
Italy	<i>Gypaetus barbatus</i>	Breeding	12	2018	16	2021	Large increase	Moderate Increase	0.75
Morocco	<i>Gypaetus barbatus</i>	Breeding	5	2018	NA (<10)	No new data	Decline	No new data	NA
Spain	<i>Gypaetus barbatus</i>	Breeding	127	2017	163	2021	Moderate-small increase	Moderate increase	0.27 (2020-Pyrenees) 0.43 (2021-Andalusia) 0 (2021-Picos de Europa)
Switzerland	<i>Gypaetus barbatus</i>	Breeding	21	2018	25	2021	Large increase	Small increase	0.85
Turkey	<i>Gypaetus barbatus</i>	Breeding	160	2013	NA	No new data	Decline	No new data	NA
Total			398		465*				

*Current estimated total is calculated by summing the current available estimates and the previous estimates when no current estimate is available (indicated as NA).

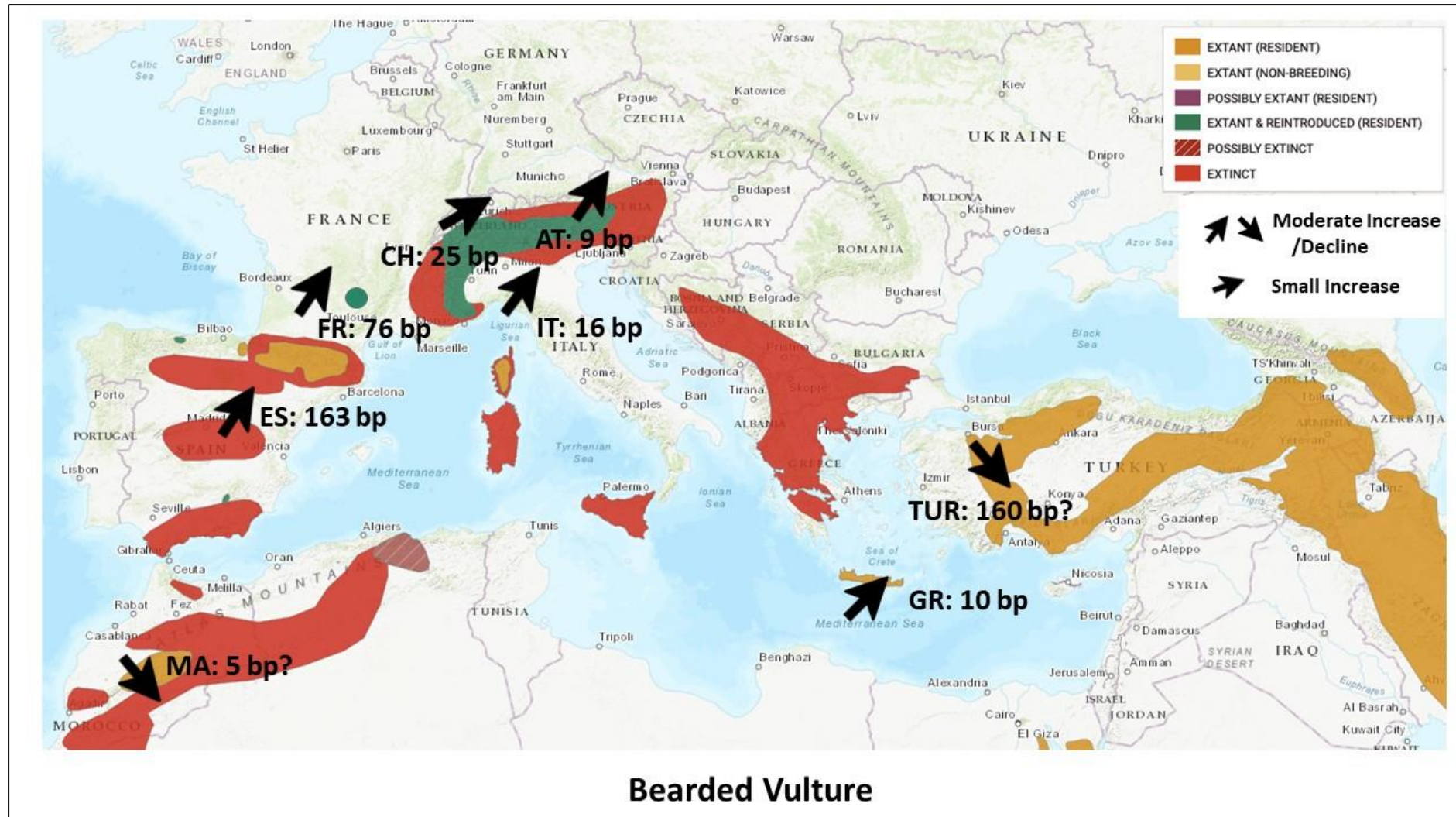


Figure 4. Estimated short-term (2017-present) trends in the breeding population of Bearded Vultures *Gypaetus barbatus* across Europe and nations adjacent to the Mediterranean Sea. Refer to Table 2 above.

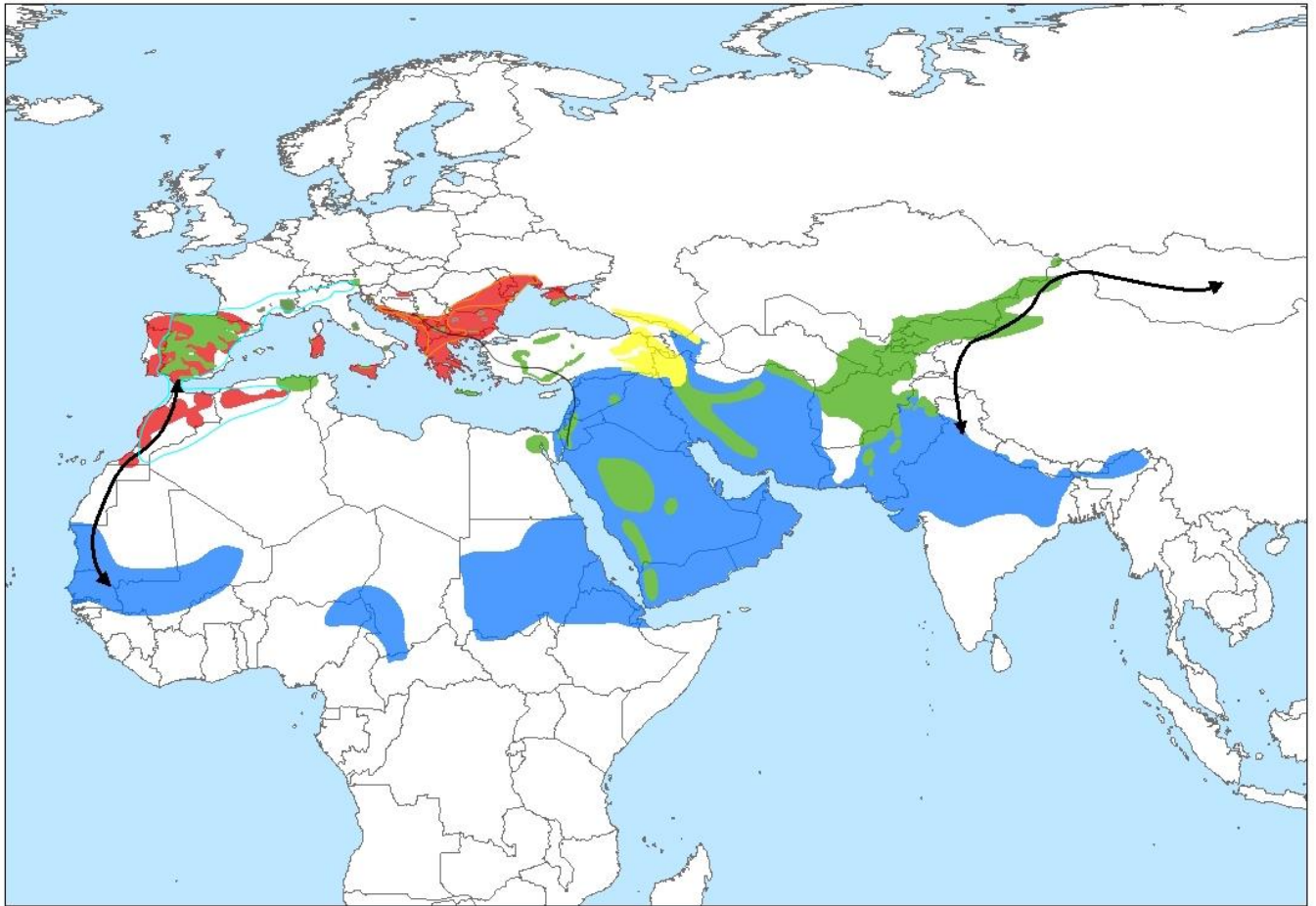
2.3. The Griffon Vulture *Gyps fulvus*

IUCN Red List Category: Least Concern

Total Population: 80,000-900,000 mature individuals

Population Trends: Increasing

Range: Africa, Asia, Europe



Legend

Native (breeding)
 Possibly extinct or extirpated
 Extinct or extirpated
 Native (resident)
 Native (non-breeding)

Figure 5. Distribution map of the Griffon vulture *Gyps fulvus* (extracted from Botha et al. 2017)

Key findings, gaps of knowledge and area of concern

Since the publication of the last European update, new data were available for Spain and France in 2018 and 2019 and show a steady increase of the Griffon Vulture populations in these two countries since 2014 (Table 3; Figure 6):

1) the population trend in Spain is clearly positive, with a 17,6-26% increase over the decade 2008-2018, however the growth rate tends to decline since the beginning of the national censuses in the 1980's. This suggests that the Spanish population of Griffon Vulture could be reaching carrying capacity and will stabilize over the coming years (Del Moral y Molina, 2018). A group of Griffon vultures has colonized the Balearic Islands in 2008 and has now established an expanding breeding population of about 20 pairs (Cortès-Avizanda & Tavecchia, 2021).

2) the population in France keeps increasing as well, with a geographic expansion linked to past reintroduction projects that ended in 2007 in the Pre-Alps, accompanied by an overall increase in the number of breeding pairs at the national scale. A striking 51% increase in the number of breeding pairs was recently recorded in the French Pyrenees between 2012 and 2019 (OFB, 2020).

In the Balkans, population trends for this species are also overall positive, but spatial variations in population growth rates are observed between countries with strongest increases in Bulgaria and Serbia and decreasing trends in Greece and North Macedonia (Dobrev et al. 2021). However, short-term trends in population size since last update (2018-2021) seem to be positive in all Balkan countries but North Macedonia (Table 3; Figure 6).

The Griffon Vulture population seems stable in Israel. However, this apparent stability at the national scale hides the fact that the population from Gamla (near Golan Heights) has vanished while small increases have been recorded in the two other populations near Haifa and in the Neguev desert (Hatzofe, O. pers.comm). The species attempted to breed in Morocco in 2021 after more than 30 years of absence (two territorial pairs

recorded in 2021). Finally, no new data are available for Turkey, but the population seems to be declining with a total number of pairs estimated to 150-500 pairs.

Table 3: Table showing previous, current minimum estimates and productivity of the breeding population of Griffon Vultures *Gyps fulvus* across Europe and nations adjacent to the Mediterranean Sea. See list of contributors in the Appendix. Otherwise, information from Del Moral & Molina (2018).

Country	Species	Status	Breeding pairs: previous estimate	Year of previous estimate	Breeding pairs: current estimate	Year of current estimate	Trend over last 10 years	Short-term trend since last assessment (2017)	Productivity: current estimate
Algeria	<i>Gyps fulvus</i>	<i>Gyps fulvus</i>	126	2012	200	2021	Stable?	Stable?	NA
Andorra	<i>Gyps fulvus</i>	Breeding	2	2016	NA	NA	Small increase	NA	NA
Bulgaria	<i>Gyps fulvus</i>	<i>Gyps fulvus</i>	100	2019	163	2020	Large increase	Large Increase	0.61 (2021)
Croatia	<i>Gyps fulvus</i>	Breeding	108	2017	121	2021	Decline	Small Increase	0.781 (2021)
Cyprus	<i>Gyps fulvus</i>	Breeding	3	2017	3-4	2021	Decline	Stable	0.66 (2021)
Egypt	<i>Gyps fulvus</i>	Breeding	NA	2018	NA	No new data	No data	No new data	NA
France	<i>Gyps fulvus</i>	Breeding	2300	2018	2848	2021	Moderate increase	Small Increase	0.661 (2020)
Greece	<i>Gyps fulvus</i>	Breeding	350	2015	359	2021	Moderate increase	Small Increase	NA
Israel	<i>Gyps fulvus</i>	Breeding	42	2016	48	2021	Decline	Small Increase	<0.6 (2021)
Italy	<i>Gyps fulvus</i>	Breeding	200	2019	270-290	2021	Moderate increase	Moderate Increase	NA
North Macedonia	<i>Gyps fulvus</i>	Breeding	14	2015	7	2021	Decline	Moderate decline	NA
Morocco	<i>Gyps fulvus</i>	Breeding	NA	No new data	2	2021	Large decline	Small Increase	NA

Portugal	<i>Gyps fulvus</i>	Breeding	750	2007	1124-1210	2017-2018	Moderate increase	Large Increase	NA
Serbia	<i>Gyps fulvus</i>	Breeding	150	2016	230-233	2020	Large increase	Large Increase	0.742-0.752 (2020)
Spain	<i>Gyps fulvus</i>	Breeding	24609	2012	30100-36500	2019	Large increase	Moderate increase	0.78 (2018)
Syria	<i>Gyps fulvus</i>	Breeding	30	2009	NA	No new data	Decline	No new data	NA
Turkey	<i>Gyps fulvus</i>	Breeding	150	2013	NA	No new data	Small decline	No new data	NA
Total			28 556		<u>35 438- 41 948</u>				

*Current estimated total is calculated by summing the current available estimates and the previous estimates when no current estimate is available (indicated as NA).

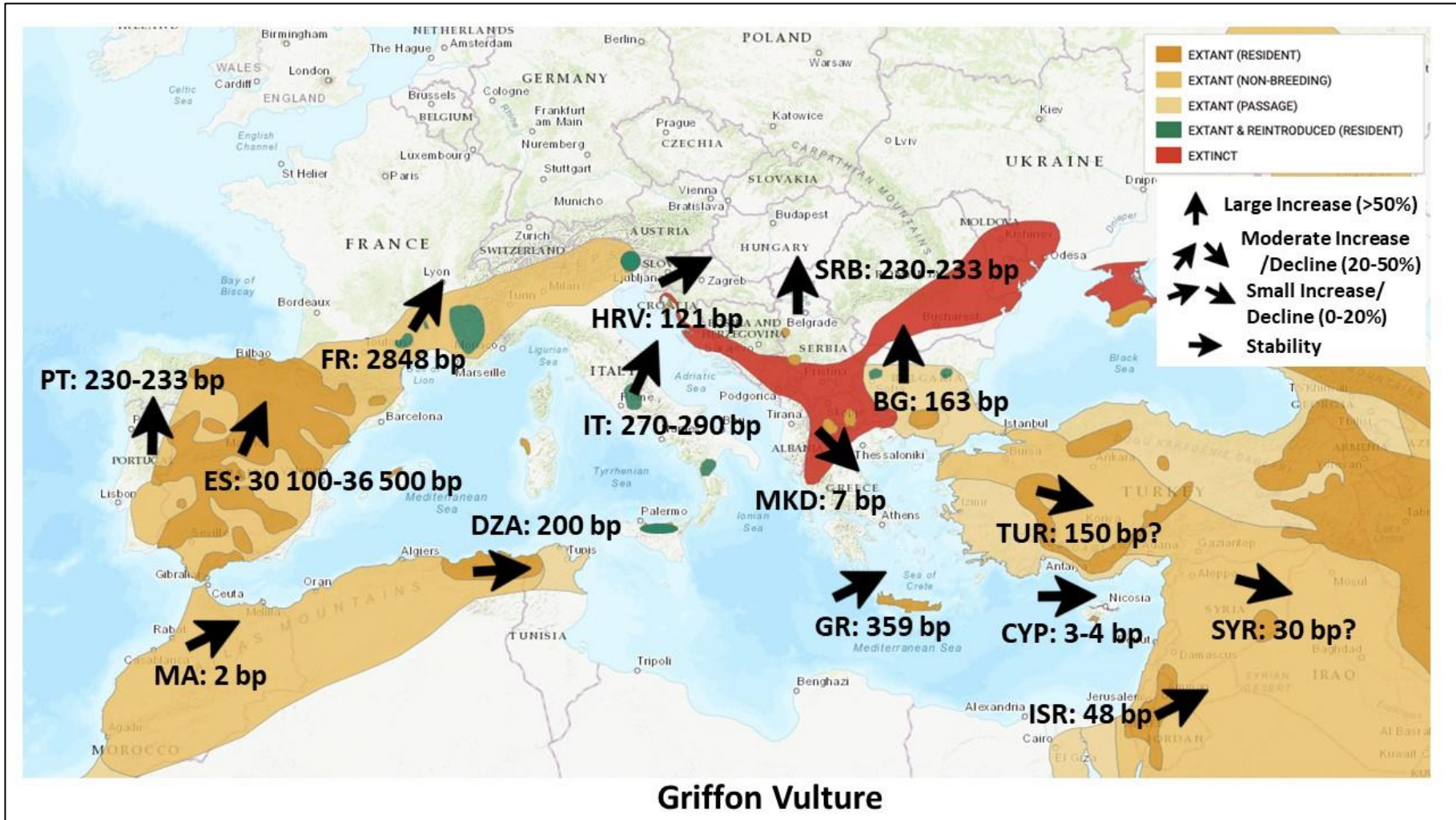


Figure 6. Estimated short-term (2017-present) trends in the breeding population of Griffon Vultures *Gyps fulvus* across Europe and nations adjacent to the Mediterranean Sea. Refer to Table 3.

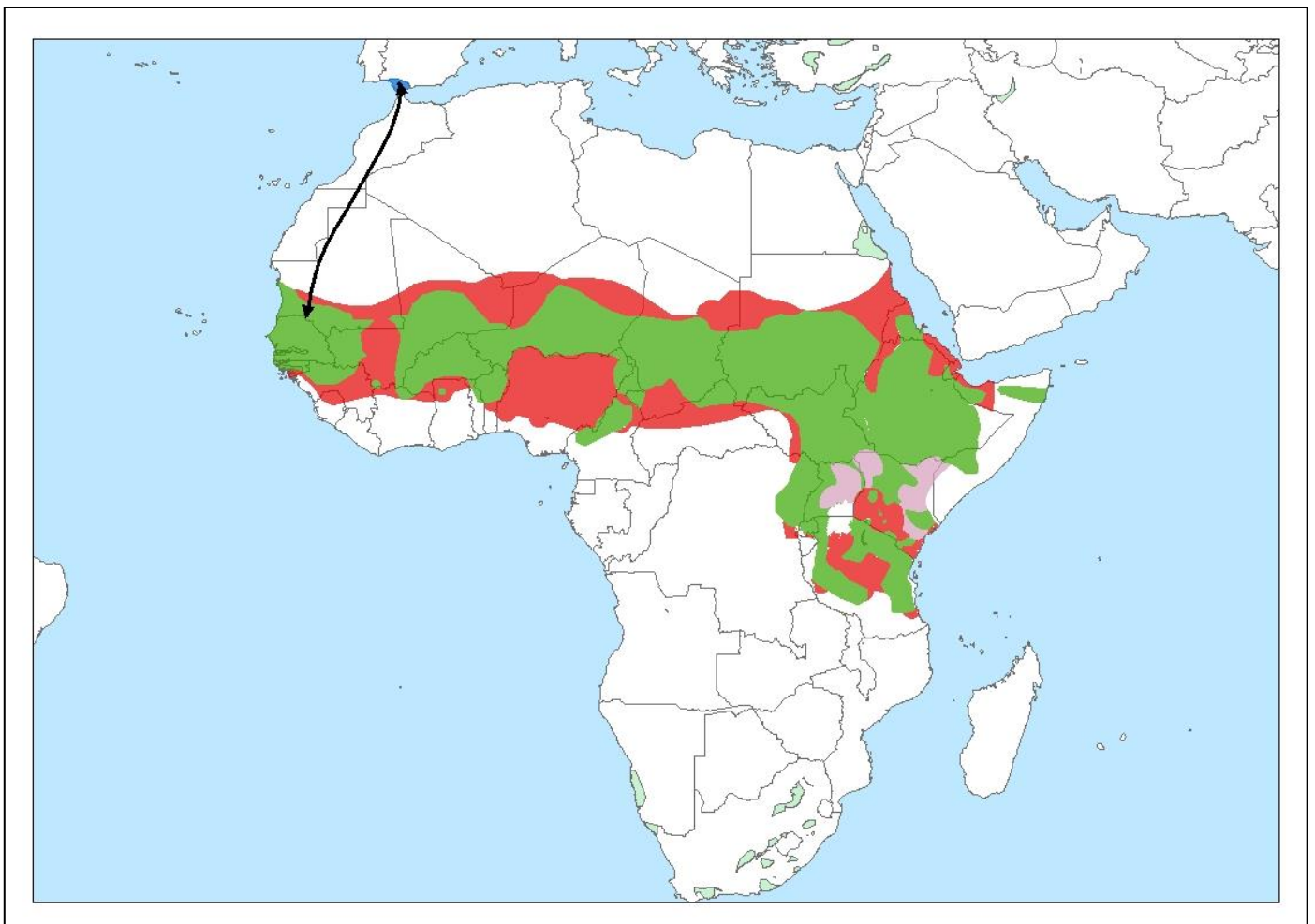
2.4. The Rüppell's Vulture *Gyps rueppelli*

IUCN Red List Category: Critically Endangered

Total Population: 22,000 mature individuals

Population Trends: Decreasing

Range: Africa, Europe



Legend

Native (breeding)
 Possibly extinct or extirpated
 Extinct or extirpated
 Native (resident)
 Native (non-breeding)

Figure 7. Distribution map of the Rüppell's Vulture *Gyps rueppelli* (extracted from Botha et al. 2017).

Key findings, gaps of knowledge and area of concern

The Rüppell's vulture is one of the most threatened vulture species worldwide and populations of this species are decreasing across most of the species' distribution range due to poisoning, persecution and habitat loss. Surprisingly, the number of sightings has been increasing these last years in southern Europe (mainly Portugal and Spain, El Khamlichi, 2020). Increased occurrence of this species has been linked to movements of juvenile Griffon vultures from Europe wintering in higher numbers in West Africa where they might encounter Rüppell's vultures. Individuals from this species may have established in Europe following Griffon vultures during their migration north (Gutierrez, 2003). One adult was observed in southern Portugal between 1999 and 2007 at a Griffon vulture breeding colony. At least two mixed pairs (Rüppell-Griffon) have also been observed displaying breeding behaviour in 2019-2020 in two Griffon vulture colonies located near Cadiz and Malaga. The success of these mixed breeding events was never confirmed, and no conspecific mating has never been observed in Europe yet. Further monitoring and research are needed to better understand how Rüppell's vulture colonize the Iberian Peninsula (several individuals have been captured in Morocco and tagged with GPS transmitters in 2021), the frequency of hybridization with Griffon vultures and its implications in terms of conservation.



Figure 8. Estimated short-term trends (2017-present) in the breeding population of Rüppell's Vultures *Gyps ruepellii* across Europe and nations adjacent to the Mediterranean Sea.

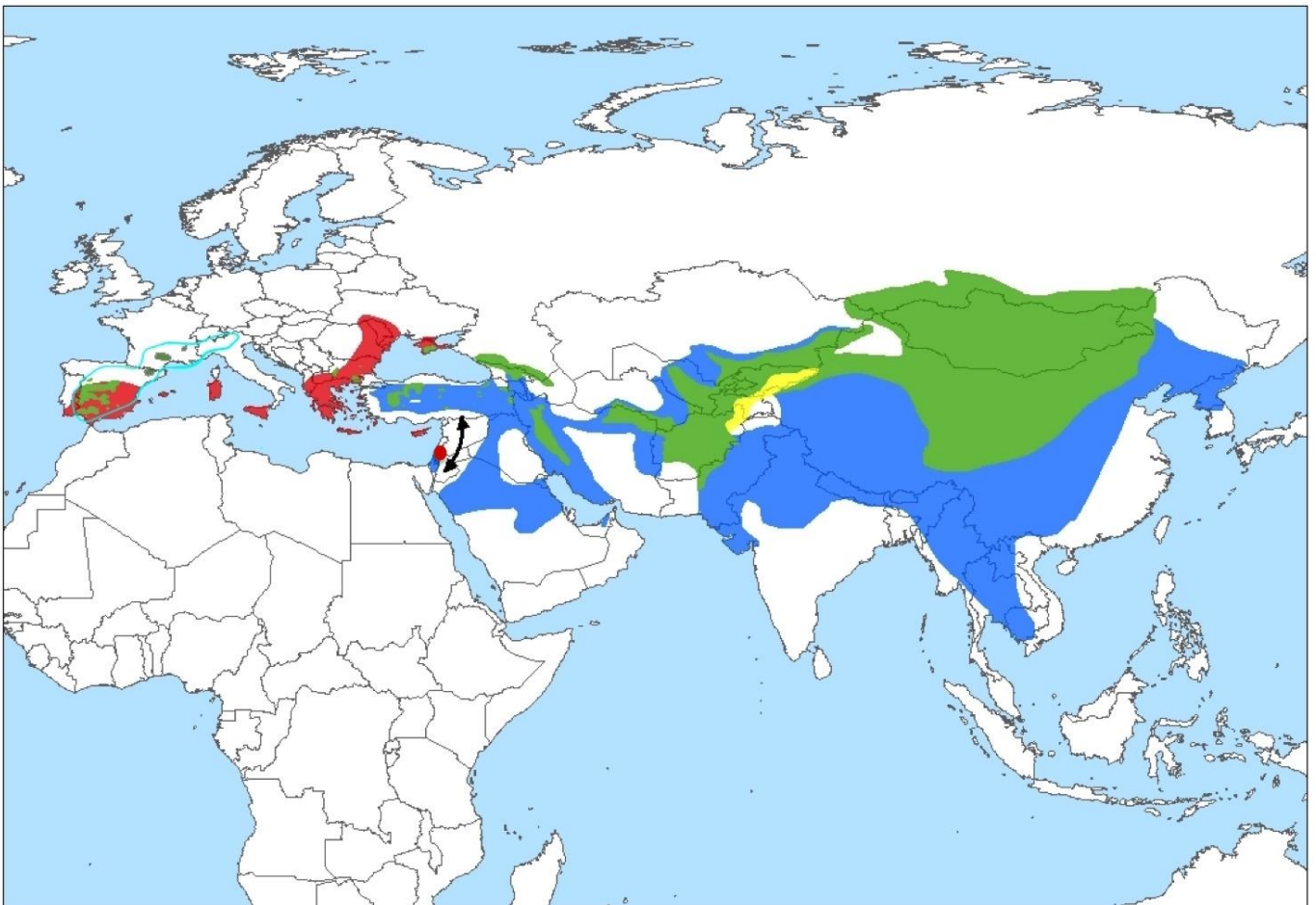
2.5. The Cinereous vulture *Aegypius monachus*

IUCN Red List Category: Near Threatened

Total Population: 16,800-22,800 mature individuals

Population Trends: Decreasing

Range: Asia, Europe



Legend

Native (breeding)
 Possibly extinct or extirpated
 Extinct or extirpated
 Native (resident)
 Native (non-breeding)

Figure 9. Distribution map of the Cinereous Vulture *Aegypius monachus* (extracted from Botha et al. 2017).

Key findings, gaps of knowledge and area of concern

Cinereous Vulture populations continue to increase in France and Portugal with 16 and 5-15 additional breeding pairs recorded respectively since the last update in 2018 (Table 4; Figure 10). The population is stable in Greece where the only breeding colony is located in Dadia Forest National Park (31 breeding pairs estimated in 2020, Zakkak et al. 2021). No new global data are available for Spain since the last census conducted in 2017 but yearly monitoring of local populations showed that the Spanish breeding population has continued to grow in several areas. For example, in 2020, striking increases in the number of breeding pairs were recorded in the two most important breeding colonies in Europe located in Extremadura (+ 51% in Sierra de San Pedro and + 24% in the Monfragüe National Park since 2016, VCF 2020). After 50-year absence, around 20 breeding pairs have been recorded in 2022 in the Sierra de la Demanda near Burgos where a reintroduction project led by GREFA started 5 years ago (GREFA, 2022).

In addition, the reintroduction project of this species that was launched in Bulgaria in 2018 resulted in the recent formation of six breeding pairs and the successful breeding of one pair in 2021. For the first time in twenty-eight years, a young Cinereous Vulture fledged in this country last 1 October 2021. This event marks the return of the Cinereous Vulture in the Balkans, although continuous conservation efforts are still needed to restore this species across the Balkan Peninsula (the juvenile was poisoned a few months later).

New population estimates are not available for Turkey but local experts recently highlighted an overall declining population trend with low breeding success and high mortality rates in a population closely monitored (Cihangir Kirazli & Ilker Ozbahar, pers.comm).

Human-related mortality remains present across the European distribution range of the Cinereous Vulture, but remain particularly prevalent across the Balkans, needing particular attention. For example, since their release in 2018, 2 young Cinereous Vultures released in Bulgaria were shot and four others were recently found poisoned (VCF, 2022).

Table 4: Table showing previous, current minimum estimates and productivity of the breeding population of Cinereous Vultures *Aegypius monachus* across Europe and nations adjacent to the Mediterranean Sea. See list of contributors in the Appendix.

Country	Species	Status	Breeding pairs: previous estimate	Year of previous estimate	Breeding pairs: current estimate	Year of current estimate	Trend over last 10 years:	Short-term trend since last assessment (2017)	Productivity: current estimate
Bulgaria	<i>Aegypius monachus</i>	Breeding	0	2018	1	2021	Extinct	Small increase	1 (2021)
France	<i>Aegypius monachus</i>	Breeding	37	2018	53	2020	Small increase	Moderate increase	0.458 (2020)
Greece	<i>Aegypius monachus</i>	Breeding	35	2018	31	2020	Stable	Stable	0.613 (2020)
Portugal	<i>Aegypius monachus</i>	Breeding	25	2018	30-40	2021	Large increase	Moderate increase	0.7 (2021)
Spain	<i>Aegypius monachus</i>	Breeding	2544	2018	NA	no new data	Moderate increase	Moderate Increase	NA
Turkey	<i>Aegypius monachus</i>	Breeding	80	2013	NA	no new data	Decline	NA	NA
Total			2721		<u>2739-2749*</u>				

*Current estimated total is calculated by summing the current available estimates and the previous estimates when no current estimate is available (indicated as NA).

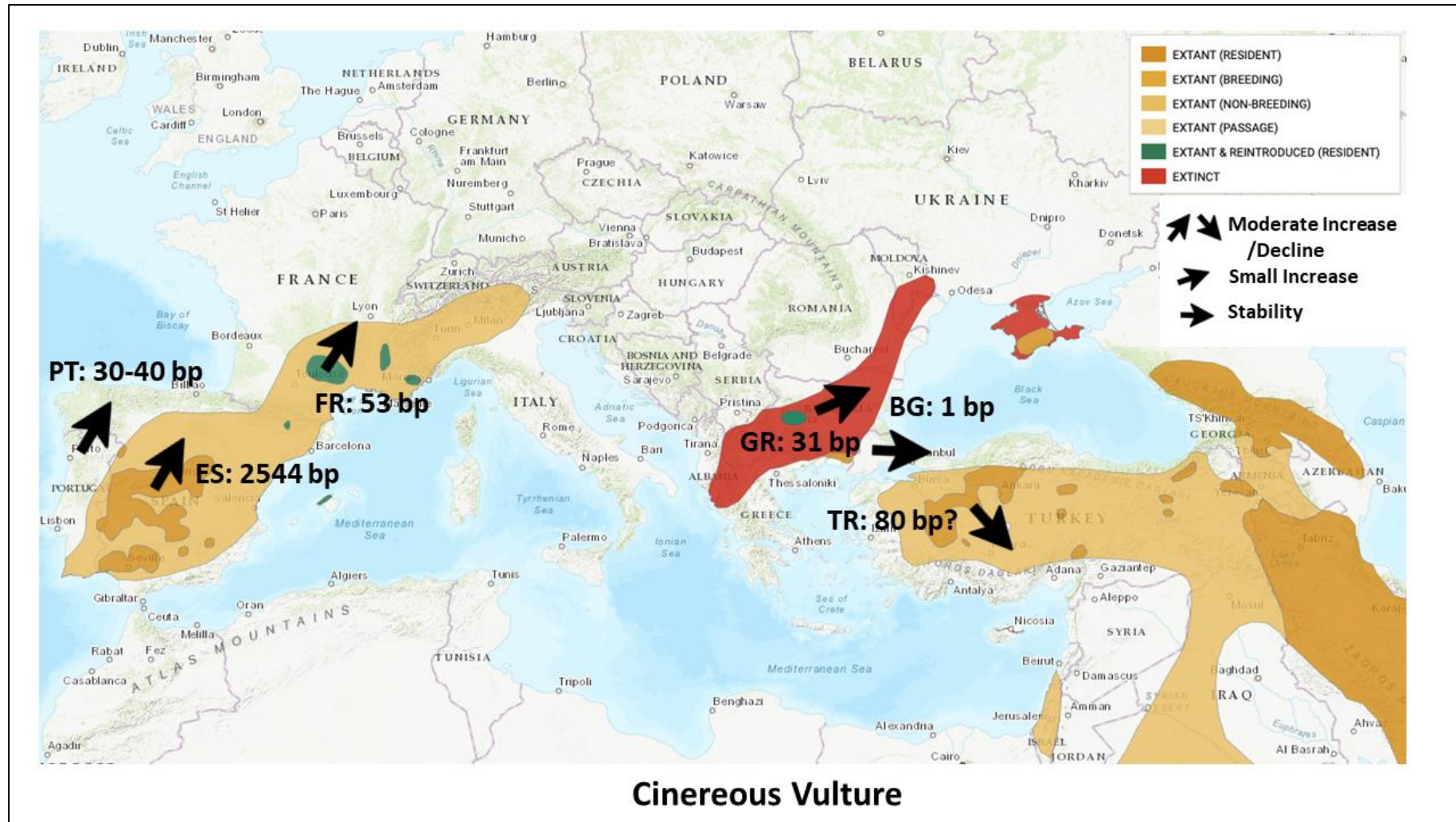


Figure 10. Estimated short-term trends (2017-present) in the breeding population of Cinereous Vultures *Aegypius monachus* across Europe and nations adjacent to the Mediterranean Sea. Refer to Table 4 above.

3. Conclusions and future work.

Overall, the Griffon, Bearded and Cinereous vultures hold a favourable conservation status in core areas of Western Europe since the last population assessment. Egyptian vulture populations have recovered in numerous areas, although this positive dynamic seems to have stalled in certain areas.

These positive results are linked to coordinated conservation efforts (including legal protection and increased food availability) and reintroduction projects that have helped restore these core vulture populations throughout the European continent. As a consequence, the Bearded and Egyptian Vultures have been downlisted by Birdlife International to lower threat categories in 2021, to Near Threatened and Endangered respectively.

Positive dynamics have also been observed in populations of Eastern Europe. The return of the Cinereous Vulture as a breeding species in Bulgaria is a good example of such recent progresses. However, the illegal use of poison remains a major threat to vultures in the Balkan countries. Several reintroduced Cinereous Vultures were killed recently by indirect poisoning (poison baits targeting carnivores). Recent research has also shown that the current stability of Egyptian Vulture populations observed in the Balkans depend closely on intensive conservation actions. Low annual survival probability due to poisoning, electrocution and direct persecution increases extinction risk of these populations at medium-term (Oppel et al. 2021). Such results highlight the vulnerability of vulture populations in Eastern Europe and the importance of implementing national anti-poisoning road maps, as is currently done by the VCF in six countries from the Balkan Peninsula under the BalkanDetox LIFE project.

Vultures are also particularly vulnerable to ingesting lead in areas with intensive hunting throughout Europe and are good indicators of the risk of poisoning from lead ammunition. For example, Bassi et al. (2021) showed that, in south central Europe, 44% of the samples collected on raptor carcasses (n=252 carcasses of 4 raptor species, i.e., golden eagle, bearded vulture, griffon vulture and cinereous vulture) had

lead concentrations above background thresholds in at least one tissue and 26.2% had values indicating clinical poisoning. Tissue lead concentrations and incidence of clinical and sub-clinical poisoning were higher in golden eagles and griffon vultures than in bearded and cinereous vultures, likely due to different feeding habits. Recent research has also shown that lead poisoning is able to reduce Griffon vulture population size in Europe by 12.1% (Green et al. 2022). Promotion and enforcement of the transition to lead-free ammunition is therefore a priority for vulture conservation in Europe.

Continued and additional monitoring is necessary to monitor closely the recovery of vulture population or sudden changes in trends following the emergence of new threats (or the re-emergence of old threats e.g. increased human-vulture conflicts linked to interactions with livestock and amplified by social media, Lambertucci et al. 2021). This is crucial to monitor the effectiveness of conservation actions implemented to restore populations of European vulture species.

Further monitoring and research should focus on the establishment of the Critically Endangered Ruppell's Vulture in southern Europe. Increased attention is also urgently needed on the monitoring of vulture populations in North Africa and Turkey as a first step to develop efficient conservation actions.

Annexes

Appendix A. Names and affiliations of all contributors for each country and each vulture species, references to reports used and references to LIFE projects associated to monitoring and data acquisition of national vulture population estimates.

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4. References

Bassi, E., Facoetti, R., Ferloni, M., Pastorino, A., Bianchi, A., Fedrizzi, G., Bertoletti, I. and Andreotti, A., 2021. Lead contamination in tissues of large avian scavengers in south-central Europe. *Science of The Total Environment*, 778, p.146130.

Botha, A.J., Andevski, J., Bowden, C.G.R., Gudka, M., Safford, R.J., Tavares, J., Williams, N.P., 2017. Multi-species Action Plan to Conserve African-Eurasian Vultures, ed. C.o.t.C.o.M.S.o.W. Animals. Coordinating Unit of the CMS Raptors MOU, Abu Dhabi, United Arab Emirates.

Buechley, E.R., Santangeli, A., Girardello, M., Neate-Clegg, M.H.C., Oleyar, D., McClure, C.J.W., Şekercioğlu, Ç.H., 2019. Global raptor research and conservation priorities: Tropical raptors fall prey to knowledge gaps. *Diversity and Distributions*, 25(6): 856-869.

Cortés-Avizanda, A & Tavecchia, G. New arrivals: natural colonization of an island by a large vertebrate. 2021. *Frontiers in Ecology and the Environment* 19 (7), 419-419.

El Khamlichi, R. 2020. Le Vautour de Rüppell (*Gyps rueppelli*), un migrateur régulier au Maroc en voie de sédentarisation dans la Péninsule Ibérique. *Go-South Bulletin* 17: 156-160.

- Del Moral, J. C. (Eds.) 2017. El buitre negro en España, población reproductora en 2017 y método de censo. SEO/BirdLife. Madrid.
- Del Moral, J. C. y Molina, B. (Eds.) 2018a. El alimoche común en España, población reproductora en 2018 y método de censo. SEO/BirdLife. Madrid.
- Del Moral, J. C. y Molina, B. (Eds.) 2018b. El buitre leonado en España, población reproductora en 2018 y método de censo. SEO/BirdLife. Madrid.
- Dobrev, D., Tsiakiris, R., Skartsi, T., Dobrev, V., Arkumarev, V., Stara, K. et al. 2021. Long-term size and range changes of the Griffon Vulture *Gyps fulvus* population in the Balkans: a review. Bird Conservation International. FirstView: 1-16 <https://doi.org/10.1017/S0959270921000198>.
- Garrido, J.R., A. Camiña, M.A. Guinda, M. Egea, N. Mouati, A. Godino, J.L. Paz. 2005. Absence of the Eurasian griffon (*Gyps fulvus*) in northern Morocco.
- Garrido, J.R., Numa, C., Barrios, V., et al. 2021. The conservation status and distribution of the breeding birds of prey of North Africa. IUCN: Gland, Switzerland. xvi + 102pp.
- Green, R.E., Pain, D.J., and O. Krone. 2022. The impact of lead poisoning from ammunition sources on raptor populations in Europe. Science of The Total Environment, Volume 823, 154017.
- Grupo de Rehabilitación de la Fauna Autóctona y su Hábitat (GREFA). Blog post from 21st of April 2022. 'Un nuevo grupo de buitres negros llega a la Sierra de la Demanda. Accessed on 5 May 2022. <https://rb.gy/uzmywk>.
- Gutiérrez, R. 2003. Occurrence of Rüppell's Griffon Vulture in Europe. Dutch Birding 25: 289-303.
- International Bearded Vulture Monitoring (IBM)-Technical Update. August 2021.
- Kobierzycki, E. Bilan 2021 du suivi de la population du Vautour percnoptère dans les Pyrénées et en France. Plan National d'actions Vautour percnoptère.
- Lambertucci, S.A., A. Margalida, K.L. Speziale, A. Amar, F. Ballejo, et al. Presumed killers? Vultures, stakeholders, misperceptions, and fake news. 2021. Conserv. Sci. Pract., 3, Article e415.
- Margalida, A., Jiménez, J., Martínez, J.M., Sesé, J.A., Llamas, A., Garcia, D., Razin, M., Colomer, M.A. & Arroyo, B. 2020. An assessment of population size and demographic drivers of the Bearded Vulture using integrated population models. Ecol. Monogr. 90: e01414.

- Office Francais de la Biodiversite (OFB). 2020. Résultats du recensement de la population de Vautour fauve dans les Pyrénées francaises en 2019. Communiqué de presse du 24 Novembre 2020. Accessed on 15 October 2021. shorturl.at/uEJ34.
- Oppel, S., Victoria Saravia, Anastasios Bounas, Volen Arkumarev, Elzbieta Kret, Vladimir Dobrev, Dobromir Dobrev, Panagiotis Kordopatis, Theodora Skartsi, Metodija Veleviski, Nenad Petrovski, Taulant Bino, Mirjan Topi, Ivaylo Klisurov, Stoycho Stoychev, Stoyan C. Nikolov. Population reinforcement and demographic changes needed to stabilise the population of a migratory vulture. 2021a. *Journal of Applied Ecology*, 58: 2711-2721.
- Oppel, S., Arkumarev, V., Bakari, S., Dobrev, V., Saravia-Mullin, V., Adefolu, S., Sözüer, L. A., Apeverga, P. T., Arslan, Ş., Barshep, Y., Bino, T., Bounas, A., Çetin, T., Dayyoub, M., Dobrev, D., Duro, K., El-Moghrabi, L., ElSafoury, H., Endris, A., ... Nikolov, S. C. 2021b. Major threats to a migratory raptor vary geographically along the eastern Mediterranean flyway. *Biological Conservation*, 262, 109277.
- Santangeli, A., Girardello, M., Buechley, E., Botha, A., Minin, E.D., Moilanen, A., 2019. Priority areas for conservation of Old World vultures. *Conservation Biology*, 27(9): 2293-2310.
- Slotta-Bachmayr, L., R. Bögel and Camina Cardenal A. 2005. The Eurasian Griffon Vulture (*Gyps fulvus*) in Europe and the Mediterranean. EGVWG, Salzburg, Austria, 100 pp.
- Vulture Conservation Foundation (VCF). Blog post from the 26th December 2020. 'Overview of Cinereous Vulture conservation in 2020'. Accessed on 23th April 2022. shorturl.at/tEIR6.
- Vulture Conservation Foundation (VCF). Blog post from the 15th March 2022. 'Years of reintroduction efforts compromised: Four Cinereous Vultures illegally poisoned in Bulgaria'. Accessed on 6th April 2022. <https://rb.gy/17ox6q>.
- Zakkak S., P. Babakas, A. Chalivelentzios & I. Tziampazis. 2021. Annual report of the scientific monitoring of species and habitat types of conservation concern - 2020.

Appendix A.

Country	Species	Contributors and their affiliations or reports used for populations estimates.	LIFE projects associated to national monitoring programs
Algeria	Griffon Vulture	Garrido López, J.R., Benmammar Hasnaoui, H., Fellous-Djardini, A., Cuzin, F., Essetti, I., Noaman, M., Onrubia, A., Radi, M., Riad, A. & Saheb, M. Griffon Vulture, <i>Gyps fulvus</i> , pp 68-70. In: Garrido, J.R., Numa, C., Barrios, V., et al. 2021. The conservation status and distribution of the breeding birds of prey of North Africa. IUCN: Gland, Switzerland. xvi + 102pp.	
Andorra	Bearded Vulture	Alex Llopis-VCF	
	Griffon Vulture		
Albania	Egyptian Vulture	Stoyan Nikolov-Bulgarian Society for the Society of Birds/Birdlife Bulgaria	Egyptian Vulture New LIFE (LIFE16 NAT/BG/000874)
Austria	Bearded Vulture	IBM-Technical Update 2021	
Bulgaria	Egyptian Vulture	Stoyan Nikolov-Bulgarian Society for the Society of Birds/Birdlife Bulgaria	Egyptian Vulture New LIFE (LIFE16 NAT/BG/000874)
	Griffon Vulture	Hristo Peshev-Fund for Wild Fauna and Flora (FWFF); Dobromir Dobrev- Bulgarian Society for the Society of Birds/Birdlife Bulgaria	
	Cinereous Vulture	Simeon Marin-Green Balkans	
Croatia	Griffon Vulture	Nera Fabijanic-Association BIOM/BirdLife Croatia	
Cyprus	Griffon Vulture	Christina Ieronymidou-BirdLife Cyprus; Theodosia Theodorou-BirdLife Cyprus	LIFE with Vultures (LIFE18 NAT/CY/001018)
France	Egyptian Vulture	Erick Kobierzycki	
	Bearded Vulture	IBM-Technical Update 2021 (Alps) and Alex Llopis-VCF (Pyrenees)	
	Griffon Vulture	Renaud Nadal-LPO Grands Causses	

	Cinereous Vulture	Renaud Nadal-LPO Grands Causses	
Greece	Egyptian Vulture	Elzbieta Kret-WWF Greece	Egyptian Vulture New LIFE (LIFE16 NAT/BG/000874
	Bearded Vulture	Stavros Xichourakis-University of Crete; Apostolis Kaltsis and Panos Kordopatis-Hellenic Ornithological Society (HOS)	
	Griffon Vulture	Elzbieta Kret-WWF Greece; Apostolis Kaltsis and Panos Kordopatis-Hellenic Ornithological Society (HOS)	LIFE Re-vulture LIFE14 NAT/NL/000901; BirdLife Greece-LIFE IP 4 NATURA project;
	Cinereous Vulture	Silvia Zakkak-Natural Environment and Climate Change Agency, Management Unit of Evros Delta and Dadia National Parks and Eastern Thrace Protected Areas.	
Israel	Egyptian Vulture	Ron Efrat-Ben Gurion University of the Neguev	
	Griffon Vulture	Ohad Hatzofe-Israel Nature and Parks	
Italy	Egyptian Vulture	Alessandro Andreotti-ISPRA, Area per l'Avifauna Migratrice	LIFE Egyptian Vulture; LIFE ConRaSi; LIFE Under Griffon Wings; LIFE Safe for Vultures
	Bearded Vulture	IBM-Technical Update 2021	
	Griffon Vulture	Fulvio Genero	
Morocco	Egyptian Vulture	Imad Cherkaoui-University of Ibn Tofail	
	Bearded Vulture		
	Griffon Vulture		
North Macedonia	Egyptian Vulture	Nenad Petrovski-Macedonian Ecological Society	Egyptian Vulture New LIFE (LIFE16 NAT/BG/000874
	Griffon Vulture		
Portugal	Egyptian Vulture	Rui Machado-Portuguese Society for the Study of Birds (SPEA); Hugo Sampaio-SPEA; Carlos Pacheco-	LIFE Rupis?
	Griffon Vulture		

	Cinereous Vulture	Eduardo Santos-Liga para a Proteccao da Naturaleza (LPN).	
Serbia	Griffon Vulture	Milos Radakovic-Institute for Nature Conservation of Serbia; Report from the Manager's "Reserve Uvac" and NGO Nature Keepers; Manager's "Srbijasume" PE report and Brastislav Grubac and NGO Jadovnik-oaza netaknute prirode; Natural Resources Center "NATURA" and Bratislav Grubac.	
Spain	Egyptian Vulture	Del Moral, J. C. y Molina, B. (Eds.) 2018a. El alimoche común en España, población reproductora en 2018 y método de censo. SEO/BirdLife. Madrid.	
	Bearded Vulture	Alex Llopis-VCF	
	Griffon Vulture	Del Moral, J. C. y Molina, B. (Eds.) 2018b. El buitre leonado en España, población reproductora en 2018 y método de censo. SEO/BirdLife. Madrid.	
	Cinereous Vulture	Del Moral, J. C. (Eds.) 2017. El buitre negro en España, población reproductora en 2017 y método de censo. SEO/BirdLife. Madrid.	
Switzerland	Bearded Vulture	IBM-Technical Update 2021	
Turkey	Egyptian Vulture	Ilker Ozbahar-Turkish Nature Research Society	
	Bearded Vulture		
	Griffon Vulture		
	Cinereous Vulture		