Egyptian Vulture (*Neophron percnopterus*), Cinereous Vulture (*Aegypius monachus*), Bearded Vulture (*Gypaetus barbatus*), Griffon Vulture (*Gyps fulvus*) - France



Egyptian Vulture
Photo: Kousik Nandy



Cinereous Vulture
Photo: Juan Lacruz



Bearded Vulture
Photo: Noel Reynolds



Griffon Vulture
Photo: Luc Viatour

	Egyptian Vulture	**Cinereous Vulture**	**Bearded Vulture**	**Griffon Vulture**
Conservation status	IUCN Global: Endangered IUCN EU27: Vulnerable EU27: Threatened	IUCN Global: Near threatened IUCN EU27: Least concern EU27: Secure	IUCN Global: Near threatened IUCN EU27: Vulnerable EU27: Threatened	IUCN Global: Least concern IUCN EU27: Least concern EU27: Secure
Protection status	BD: Annex I CMS: Appendix I Bern Convention: Annex II	BD: Annex I CMS: Appendix II Bern Convention: Annex II	BD: Annex I CMS: Appendix II Bern Convention: Annex II	BD: Annex I CMS: Appendix I and II Bern Convention: Annex II
Breeding population (2008-12)	EU27: 1,400 – 1,700 pairs FR: 82 – 93 pairs	EU27: 2,100 – 2,200 pairs FR: 24 – 24 pairs	EU27: 170 – 180 pairs FR: 47 pairs	EU27: 31,500 – 33,200 pairs FR: 1,100 – 1,100 pairs
MS reported increases	FR	ES, FR, PT	AT, ES, FR, IT	BG, ES, FR, IT, PT
Other MS	BG, ES, GR, IT, PT	BG, GR	GR	CY, GR

Summary: In the 19th and 20th centuries, the population of all four species of vultures declined drastically in France, as a result of intentional persecution and accidental poisoning as a consequence of the use of synthetic pesticides after World War II. Other causes included food shortages due notably to the abandonment of extensive livestock farming and transhumance, and habitat loss and fragmentation. The most common threats now are electrocution and collision with power lines and wind turbines. Recovery has occurred as a result of research into the key threats followed up by the development of European and national action plans (for all four species) that have been implemented through collaboration between authorities, NGOs, livestock farmers, electricity providers and hunters, including through a number of LIFE Nature projects. Key measures to reduce mortality rates have included modification of electricity structures and experimentation with lead-free ammunition. Supplementary feeding, habitat management and the protection of nesting birds from human disturbances has increased breeding productivity. Targeted reintroduction measures have re-established populations in isolated areas and helped to address the need to increase genetic variability.

Background

Status and EU occurrence

Vultures are undergoing a global crisis: populations have collapsed in Asia and Africa; only in Europe is the trend more positive, with the populations of Cinereous, Bearded and Griffon Vultures increasing. In the EU, recovery is evident in western Europe (in particular France, Portugal and Spain) and is also starting in the Balkans (Tavares 2017 pers comm; CMS Raptors MOU, 2017).

The **Egyptian Vulture** is found in Europe, Asia and Africa. It has a global population of 12,000-38,000 mature individuals (BirdLife International, 2018a). The world population is considered endangered (IUCN Red List) due to rapid declines in some places: in India, it has declined by more than 90% in the last 10 years (with population trends closely corresponding to those of *Gyps* vultures known to reflect diclofenac use in that region), and there are also severe long-term declines in west Africa and Europe; European populations having declined by 50-79% over the last three generations (BirdLife International, 2018a; CMS Raptors MOU, 2017).

In the EU27, it was reported as having a breeding population over 2008-12 of 1,400-1,700 pairs (EEA/ETC-BD, undated a). Although the population has shown a long-term decline, it has been stable in the short term. According to Member States' Birds Directive reporting data, the species' has increased over the short and long term in France and the Spanish Canary Islands, is stable over the short term but has decreased over the long term in Spain, and has decreased over the short and long term in Portugal, Italy, Bulgaria and Greece (see Annex 1). The largest European population is in Spain (1,452 – 1,556 pairs) (CMS Raptors MOU, 2017). In France, there were 88 pairs in 2017, with a stable trend around 80 pairs (Orabi pers comm, 2017).

The **Cinereous Vulture** (also known as the Black Vulture) has an estimated population of 7,800-10,500 pairs globally, with about 2,300-2,500 pairs in Europe (Birdlife International, 2018b). It is considered to be near threatened due to its moderately small population that appears to be suffering an ongoing decline in its Asiatic strongholds. In contrast, the European population has been increasing, possibly by >30% between 1990 and 2000, and from 1,330-1,874 in 1993-1996 to 1,995-2,852 in 2000-2010 (Birdlife International, 2018b; Barov and Derhé, 2011).

In the EU27, it was reported as having a breeding population over 2008-12 of 2,100-2,200 pairs (EEA/ETC-BD undated, b). The breeding population trend in the EU27 is increasing over the short and long term. According to Member States' Birds Directive reporting data the species' EU breeding population has increased over the short and long term in France, Greece, Portugal and Spain, and has decreased over the long term in Bulgaria (see Annex I). The largest population occurs in Spain with 2,089 pairs (BirdLife International, 2015; CMS Raptors MOU, 2017). In France, the reintroduced population reached 44 pairs in 2017 (Orabi pers comm, 2017).

The **Bearded Vulture** (also known as the Lammergeier) occurs in Europe, eastward to China and in Africa – mostly eastern and southern Africa; and has a world population of 2,000 – 10,000 individuals (Birdlife International, 2018c; CMS Raptors MOU, 2017). It has undergone a moderately rapid population decline over the past three generations and therefore its global threat status changed from Least Concern to Near Threatened in 2014. In Europe, as a result of hunting, the Bearded Vulture disappeared from most mountain ranges around the Mediterranean in the 20th century (LPO Missions Rapaces, undated a). According to the Vulture Conservation Foundation (undated a), in the Alpine region the last living specimen was shot in 1913; however, the last observations in the French Alps took place around 1920-1930 (Orabi pers comm, 2017). In Europe, the breeding population is now estimated to number 590-749 pairs: the species occurs in the Pyrenees (the largest population occurs in the Spanish Pyrenees) and it has been successfully reintroduced in the Alps (Austria, France, Italy and Switzerland) and Andalusia, Spain, whilst the remaining two island populations, on Crete and Corsica, are both stable but very small and therefore subject to a high risk of extinction (Vulture Conservation Foundation, undated a; CMS Raptors MOU, 2017).

In the EU27, according to official reporting by Member States the Bearded Vulture had a breeding population of 170-180 pairs over the 2008-2012 period (EEA/ETC-BD, undated c); but according to more recent information this number now reaches 250-270 (Orabi pers comm, 2017). The breeding population in the EU27 has increased over the short and long term. According to Member States' Birds Directive reporting data the species' EU breeding population has increased over the short term and long term in Austria, France and Spain and over the short term in Italy. It has been stable over the short term and has decreased over the long term in Greece (see Annex I). The largest population is in Spain with 117 breeding pairs in 2012 (BirdLife International, 2017b). In France, there were 64 pairs in 2017: 44 in the French Pyrenees, 15 in the French Alps and 5 in Corsica (Orabi pers comm, 2017).

The **Griffon Vulture** has the largest population of the four species of vultures, which is estimated at 80,000 – 120,000 individuals globally, and it appears to be increasing (CMS Raptors MOU, 2017). It declined markedly throughout the 19th and 20th centuries in much of Europe, North Africa and the Middle East. It has, however, now increased in some areas, notably in the EU as a result of reintroduction and conservation programmes (BirdLife International, 2018d; Vulture Conservation Foundation, undated c; Orabi pers comm, 2017; CMS Raptors MOU, 2017); it has been successfully reintroduced to France, Italy and central Bulgaria (CMS Raptors, 2017).

In the EU27, its 2008-2012 breeding population was reported as being 31,500-33,200 pairs (EEA/ETC-BD, undated d). The breeding population trend in the EU27 has been increasing over the short and long term, with increases over the short and long term in Bulgaria, Spain, France, Italy, Portugal and Greece, whilst it has been stable over the short term and decreased over the long term in Cyprus (see Annex I). The largest population is in Spain, which holds an estimated 24,609 pairs (CMS Raptors MOU, 2017). In France, the population was estimated at 2,000 in 2016 (CMS Raptors MOU, 2017), with other sources indicating 1,800 pairs in 2017 (Orabi pers comm, 2017).

Ecological requirements

The **Egyptian Vulture** is found in unvegetated or sparsely vegetated land ecosystems (EEA/ETC-BD, undated a). It is an opportunist species as it feeds mainly on the carrion of large animals, but also small mammals, young birds, fish, eggs, insects and even rotten fruit. Nests are generally built in rocky areas, often on cliffs, crags and rocky outcrops (BirdLife International, 2018a). The Egyptian Vulture is the only one of the four species found in France that migrates to Africa in winter (Vulture Conservation Foundation, undated b).

The **Cinereous Vulture** is found in woodland and forest and unvegetated or sparsely vegetated land ecosystems. It inhabits forested areas in hills and mountains at 300–1,500 m in Europe, i.e. in lowland areas as well as mountainous areas (EEA/ETC-BD, undated b) and the nest is normally built in trees. It feeds mainly on carrion from medium-sized or large mammal carcasses; live prey (sick or injured animals) is rarely taken (BirdLife International, 2018b).

The **Bearded Vulture** occurs in bare or sparsely vegetated remote, mountainous areas with precipitous terrain, usually above 1,000 m (BirdLife International, 2018c; CMS Raptors MOU, 2017). It feeds on carrion, and in particular on bones (bleached carcass bones make up to 70% to 90% of its diet), soft tissue and skin, and does not generally hunt live prey, although it may occasionally feed on live mammals and birds (BirdLife International, 2018c; Vulture Conservation Foundation, undated a; CMS Raptors MOU, 2017).

The **Griffon Vulture** is found in a variety of unvegetated or sparsely vegetated areas, from mountains to semi-desert (BirdLife International, 2018d). It breeds in colonies of up to 100 pairs on large cliffs, walls of ravines and precipices, and feeds almost exclusively on carrion of medium-sized and large domestic and wild animals. The species normally forages in groups (Vulture Conservation Foundation, undated c; CMS Raptors MOU, 2017).

Pressures and threats

According to the Member State Article 12 reports and published research, there are common threats to the four species of vultures; the main threats currently result from accidental and deliberate poisoning, habitat change (for example, deforestation for the Cinereous Vulture), human disturbance, food shortage (notably following declines in extensive livestock farming and transhumance), collisions with and electrocution from power lines and poles. Other pressures include collisions with wind turbines, as well as infectious diseases. Infectious diseases may impact vultures directly (when they suffer from such diseases) or indirectly. In the latter case, an example is brucellosis, a bacterial disease that affects Ibex (*Capra ibex*) in an area in the Alps: the slaughter of Ibex may result in food shortage or potential disturbance of the species (Weeger pers comm, 2017).

Veterinary pharmaceuticals are also a serious concern, in particular non-steroidal anti-inflammatory drugs (NSAID, such as diclofenac, which has caused the near-extinction of several *Gyps* vultures in India) (CMS Raptors MOU, 2017). One case of suspected poisoning of a Griffon Vulture caused by flunixin (a nonsteroidal anti-inflammatory drug), was recorded in 2012 in Spain. Furthermore, the approval of diclofenac for veterinary use in Spain, as well as in some other European countries, could potentially cause significant effect on populations of Griffon Vultures; the only safe alternative to diclofenac identified thus far is meloxicam (CMS Raptors MOU, 2017; Tavares pers comm, 2017).

A 7-year programme in the French Pyrenean Mountains analysed the causes of death of 170 avian scavengers (including 8 Bearded Vultures, 120 Griffon Vultures and 8 Egyptian Vultures). Although the mortality events were often multifactorial, Berny (2015) showed that poisoning was the most common cause of death (24.1%), followed by trauma/fall (12%), bacterial diseases and starvation (8%) and electrocution (6%). Illicit use of banned

pesticides was identified as a common cause of poisoning (53% of all poisoning cases) and lead poisoning was also identified as a significant toxicant issue (17% of all poisoning cases) (Berny et al, 2015).

A source of poisoning is the use of pesticides in agriculture, and contamination by the ingestion of poisoned dead animals; vultures notably suffer from illegal poisoning from the ingestion of contaminated animals such as Red Fox (*Vulpes vulpes*) and Grey Wolf (*Canis lupus*)(BirdLife International, 2018b). Feeding on carcasses poisoned by baits targeting mammalian predators (in the case of human-animal conflicts) is thought to be the most significant cause of declines in the Egyptian Vulture and Bearded Vulture in Europe, and is also a major threat for Cinereous Vultures and Griffon Vultures. In some parts of Spain, Bearded Vultures are believed to be at risk from organophosphate exposure when feeding on the carcasses of livestock that were given anti-parasitic treatment prior to death (CMS Raptors MOU, 2017).

Lead in the environment can be either natural or result from human actions. Lead poisoning can result from various sources, such as bio-mobilisation of diffuse lead in the environment (in relation e.g. to road traffic) (Roche, 2015), but also the use of lead ammunition in hunting activities, shots or bullet fragments being ingested by scavengers when they feed on hunter-killed animal carcasses and discarded guts (Fisher et al, 2006; Hernández and Margalida, 2009). Although there are few studies on Old World vultures, there is substantial evidence of the negative impact of lead poisoning on the recovery of the California Condor (*Gymnogyps californianus*) (CMS Raptors MOU, 2017). In critical cases, lead poisoning can result in death, but it can often result in sub-lethal level poisoning that can cause secondary effects (such as reduced mobility or increased risk of collision). Lead poisoning may be the most significant threat to Bearded Vultures in Europe (CMS Raptors MOU, 2017), and is one the main threats that could limit recovery or expansion of vultures (Tavares, pers comm, 2017). Under LIFE GypHelp, there is an ongoing study to characterise the sources of lead found in the environment and in birds (Roche pers comm, 2017).

The threat that poisoning represents may be underestimated as there is a lack of data sharing regarding the results of toxicological analyses, depending on who carries out the analyses (Veille Vigilance Poison coordinated by LPO, monitoring by national parks, or the Sagir network of the French National Office of Hunting and Wildlife – ONCFS) (Orabi pers comm; 2017; Latruberce, 2017; Tavares pers comm, 2017). In addition, there is a fear of an upsurge in poisoning related to the geographical spreading of the Grey Wolf (Orabi pers comm, 2017; Latruberce, 2017; Weeger pers comm, 2017).

Another threat is food shortage induced by major changes in habitat (with a decrease of food availability) and sanitary legislation limiting the abandonment of dead animals in the field (Lieury et al, 2015). Mortality from collisions with increasing numbers of wind turbines is also a potential hazard to raptor populations (Bellebaum, 2013).

Human activities also have an effect on vulture behaviour and breeding success, although there is regional variation. Arroyo and Razin (2006) found that human activities influenced Bearded Vulture behaviour in the French Pyrenees (primarily through a decrease in nest attendance). This effect varied with the type of activities and the distance to the nest. Very noisy activities (e.g. infrastructure works, motorbikes, forestry or military activities and helicopters) and hunting most frequently provoked absence from the nest. Arroyo and Razin also found that the probability of breeding failure increased with the frequency of human activities, especially very noisy activities.

Another threat is a lack of interconnectedness between populations, and hence a lack of genetic mixing for isolated populations or for small populations (notably Bearded Vultures in Corsica, where only 5 pairs are left) (LPO Missions Rapaces, undated a; Orabi pers comm, 2017). A reduction in genetic diversity could influence breeding success and the long term survival of the populations; this also applies to re-introduced populations (CMS Raptors MOU, 2017).

Finally, negative perceptions from the public may also impair conservation measures. For instance, in the French Pyrenees there are potential conflicts between livestock farming and wildlife, including Grey Wolf, Brown Bear (*Ursus arctos*) and Griffon Vulture (Orabi pers comm, 2017; Latruberce, 2017).

Drivers of improvements: actors, actions and their implementation approaches

Organisers, partners, supporters and other stakeholders

The first conservation measures, and in particular reintroduction programmes, were implemented in 1981 (Griffon Vulture) at the initiative of naturalists (Orabi pers comm, 2017). Since the 1990s and 2000s, the government has been implementing conservation measures, in collaboration with several organisations,

including LPO, the Vulture Conservation Foundation, Asters, national and regional parks and local authorities. Engagement with other relevant stakeholders, including livestock farmers, hunters and private landowners, as well as the electricity supply sector has been important. The French Army has also been involved.

Contributions / relevance of strategic plans (e.g. species action plans)

An important element of the conservation of the Egyptian Vulture, Cinereous Vulture, Bearded Vulture and Griffon Vulture has been the development of conservation plans, which notably reviewed the evidence of the threats to the species and identified a comprehensive set of conservation measures. This included European action plans for the Egyptian Vulture (Iñigo et al, 2008), Griffon Vulture (Slotta-Bachmayr et al, 2004), Cinereous Vulture (Heredia, undated) and Bearded Vulture (Heredia and Heredia, undated). The latter two are being reviewed under the LIFE EuroSAP project and are expected to be adopted in 2018 (Andevski and Tavares, 2017; Izquierdo, 2017). Furthermore, there are national plans for France. These plans, in particular the national plans, played an important role in coordinating actions and obtaining funding for them:

- Egyptian Vulture: 2015-2024 national action plan (Constantin et al, undated), which follows a 5-year national action (2002-2007) (LPO Mission Rapaces, undated c);
- Cinereous Vulture: 2011-2016 national action plan, which is the second action plan (the 2004-2008 plan was extended until the adoption of the second one) (LPO Mission Rapaces, undated b);
- Bearded Vulture: 2010-2020 national action plan, which is the second action plan. The creation of a continuum between the Alps and the Pyrenees is the flagship action of the current plan (LPO Mission Rapaces, undated a);
- Griffon Vulture: 2017-2026 national action plan 'Griffon Vultures and livestock farming', which aims notably at maintaining mutually beneficial relations between the Griffon Vulture and livestock farming (Poudré et al, 2017).

In addition, a Multi-species Action Plan for African-Eurasian Vultures (Vulture MsAP) was adopted on 24 October 2017 under the Convention on the Conservation of Migratory Species of Wild Animals (CMS); the MsAP covers 15 vulture species, including the Egyptian, Bearded, Cinereous and Griffon Vultures, which are now up-listed to Appendix 1 of the Convention.

Measures taken and their effectiveness

The measures taken by the Member States for the conservation of the vulture species are listed below.

Application of conservation measures for vultures for 2008-2012 in France

Species	Measure	Type	Ranking	Inside / outside N2k	Broad evaluation
Cinereous Vulture	2.0 - Other agriculture-related measures	Legal Administrative	High	Both	Enhance
Griffon Vulture	2.0 - Other agriculture-related measures	Legal Administrative	High	Both	Enhance
Egyptian Vulture	3.2 - Adapt forest management	Contractual One Off	High	Both	Enhance
Bearded Vulture	3.2 - Adapt forest management	Contractual	High	Both	Enhance
Egyptian Vulture	6.0 - Other spatial measures	Contractual	High	Both	Enhance
Bearded Vulture	6.0 - Other spatial measures	Contractual	High	Inside	Enhance
Egyptian Vulture	6.1 - Establish protected areas/sites	Legal	High	Both	Enhance
Cinereous Vulture	6.1 - Establish protected areas/sites	Legal Administrative	High	Both	Enhance
Bearded Vulture	6.1 - Establish protected areas/sites	Legal	High	Inside	Enhance
Griffon Vulture	6.1 - Establish protected areas/sites	Legal	High	Both	Enhance

Species	Measure	Type	Ranking	Inside / outside N2k	Broad evaluation
Egyptian Vulture	6.5 - Adaptation/ abolition of military land use	Administrative One Off	Medium	Both	Not Evaluated
Egyptian Vulture	7.4 - Specific single species or species group management measures	Contractual One Off	High	Both	Enhance
Cinereous Vulture	7.4 - Specific single species or species group management measures	Recurrent	High	Both	Enhance
Bearded Vulture	7.4 - Specific single species or species group management measures	Contractual	High	Both	Enhance
Egyptian Vulture	8.2 - Specific management of traffic and energy transport systems	Contractual One Off	High	Both	Enhance
Cinereous Vulture	8.2 - Specific management of traffic and energy transport systems	Contractual	High	Both	Enhance
Bearded Vulture	8.2 - Specific management of traffic and energy transport systems	Contractual	High	Both	Enhance
Griffon Vulture	8.2 - Specific management of traffic and energy transport systems	One Off	High	Both	Enhance
Egyptian Vulture	9.1 - Regulating/Management exploitation of natural resources on land	Administrative	Medium	Both	Not Evaluated

Source: France's Article 12 report at https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp

Reintroduction programmes have been put in place for all four species of vultures and have proved key to ensuring the recolonisation of certain areas by vultures. In the Grands Causses region, Griffon Vultures and Cinereous Vultures have been successfully reintroduced since the 1980s, which also indirectly helped the spontaneous return of the Egyptian Vulture to the area. In June 2012, a project was launched to reintroduce the Bearded Vulture to the Grands Causses, which will make it one of the most complete sites for large raptors (LPO Missions Rapaces, undated a). The Griffon Vulture benefitted from five reintroduction programmes from 1981 to 2006 (Gorges de la Jonte, Gorges de la Vis (Hérault *département*), Baronnies, Vercors, Gorges du Verdon) (Orabi pers comm, 2017). Three such programmes were implemented for the Cinereous Vulture (Grands Causses, Drôme, Verdon); the current existing populations all result from these reintroduction operations (LPO Missions Rapaces, undated b). Awareness-raising actions have proven to be key to ensuring the success of reintroduction measures, which depends on their acceptability to the local human population (Arte, 2017). Thanks to reintroduction programmes, there are currently 15 pairs of Bearded Vultures in the French Alps; and five in Corsica; such a programme is ongoing in Corsica and was implemented as an emergency measure to limit the risk of extinction of the island population (with only five pairs) and preserve its genetic heritage (Orabi pers comm, 2017). There has been no reintroduction of Bearded Vultures in the Haute-Savoie since 2006, as it was not considered necessary anymore (Weeger pers comm, 2017).

Other conservation measures that have been taken include supplementary feeding programmes, through the creation of feeding plots. Supplementary feeding is one of the most common techniques used to alleviate food shortage and quality. Good cooperation with stakeholders, in particular farmers, cattle breeders, landowners, villages and local authorities, has proven very important (LIFE projects, see Annex II). This notably required a change in the legislation to allow natural rendering of dead livestock to benefit vultures. Livestock farmers are also incentivised to set up feeding places as they then benefit from a reduction of their rendering levy (Orabi pers comm, 2017). Feeding stations for Egyptian Vulture have been found to improve their survival rates and stabilise their demography (Lieury et al, 2015).

The different vultures have different preferences for carrion features (including scattering, prey species and quantities). Research showed that using medium-size ungulates (i.e. sheep and goats) presented as small, abundant and scattered pieces favours the consumption of the resource by the most endangered species (Moreno-Opo et al, 2015). The use of numerous small supplementary feeding stations, rather than 'vulture restaurants', does not substantially disrupt the natural foraging behaviour of vultures, and this strategy has been implemented in France (Fluhr et al, 2017; Orabi pers comm, 2017).

Other important conservation measures aim to limit disturbances of breeding sites. This includes nest surveillance (which has improved breeding success), forbidding photography close to the nest, awareness-raising campaigns conducted with hunters and livestock farmers, educational kits for children, and agreements with climbers and paragliders (see certain LIFE projects, Annex 2). In the latter case, the agreements are a result of a real dialogue with the users to determine the best approach; nest surveillance plays an important role as it allows users to provide 'real time' information on which zones to avoid (Weeger pers comm, 2017; LIFE GypHelp, Annex 2). In certain areas, acceptation and appropriation of the species by the local population is also an important element of success; in some areas of the Alps, the Bearded Vulture has become an iconic animal (Weeger pers comm, 2017).

Finally, the retrofitting of power lines, as well as the installation of visual devices (on power lines and on ski-lift cables) have proven important to reduce mortality (see e.g. LIFE Gypconnect and Life GypHelp, in Annex 2). Electricity suppliers (transporters and distributors) are involved in the mitigation of risks caused by their power lines on birds in general (including but not limiting themselves to vultures). RTE, the French electricity transporter, but also Enedis, one of the electricity distributors, have long mapped and continue to map dangerous areas for birds in terms of their electricity network and are active in reducing the existing risks (Lesigne pers comm, 2017; Orabi pers comm, 2017). RTE has thus developed a specific spherical marker to equip power lines in mid-mountain ranges (i.e. where vultures, and in particular the Bearded Vulture, may be more impacted), as existing bird markers were not technically adapted to mid-mountain power lines (due to the snow, the degree of slope, etc.); this new spherical marker also has a longer lifespan and thus requires less maintenance (Lesigne pers comm, 2017). An important focus of the LIFE GypHelp project is on electrocution and collision; within this project, expertise is provided to RTE and Enedis in order to map problematic areas and prioritise those on which to intervene, notably to equip them with visualisation devices (Weeger pers comm, 2017). In the French Pyrenees, RTE and LPO entered into an agreement in 2005 to ensure better protection of the Bearded Vulture, according to which RTE refrains from maintaining or equipping their power lines (which requires the use of helicopters) during the breeding period – based on observation of nests by LPO - to avoid nest desertion (Lesigne pers comm, 2017; Orabi pers comm, 2017). Retrofitting of dangerous power lines is a precondition to the release of birds in reintroduction programmes (e.g. in the Baronnies as part of LIFE Gypconnect) (Orabi pers comm, 2017). Equipping ski lifts and cables with visualisation devices is also an important measure and is implemented through specific agreements with ski resorts (Weeger pers comm, 2017). The action of visualisation of ski lift cables carried out within LIFE GypHelp calls upon a group of Alpine partners (national parks, Asters, hunters and the Observatory of Mountain Galliformes) in order to invent and develop adapted devices, produce them industrially and offer them to ski resort managers at an attractive price to equip dangerous ski lifts (Roche pers comm, 2017). In the French Pyrenees, an agreement has also been entered into with the Army to limit the level of flight of fighter jets and helicopters; this also to the benefit of the Army as it reduces the risk of bird collisions (Orabi pers comm, 2017).

The combination of some or all of these measures has ensured success of a number of projects. For instance, a LIFE project that targeted the Egyptian Vulture had a noticeable impact: the number of pairs in the area covered by the project (in South-east France) doubled from 8 to 16 from 2002 to 2007, and the bird returned to the Ardeche region after 10 years of absence. In addition, the network of feeding stations has been extended beyond the project's perimeter. Furthermore, it led to the designation and extension of five SPAs, covering important breeding areas (LIFE Perc, see Annex 2). Through LIFE Gypaete (see Annex 2), three new Natura 2000 sites were designated and a further site was extended; the reintroduction programme in the Alps, carried out in collaboration with neighbouring countries, proved successful as the project achieved an increase in the number of breeding pairs across the French Alps from 6 to 13.

Funding sources (current and long-term) and costs (one-off and ongoing)

The total costs of the required conservation measures are not known.

The LIFE Nature Programme has been absolutely instrumental to the recovery of the four species in France (and in Europe in general), in particular through the 12 projects listed in Annex 2 and carried out on the French territory. Together, these amount to a total budget of €23.6 million over the period 1993 – 2017 (four projects are still ongoing). However, some of the listed LIFE projects also targeted other species than vultures. In addition, some species of vultures were targeted more than others. Thus:

- LIFE projects targeting the Bearded Vulture represented a total budget of €14.8 million;
- LIFE projects targeting the Egyptian Vulture represented a total budget of €6.7 million; and
- Two LIFE projects targeting the Cinereous Vulture represented a total budget of €2.0 million.

Further, the four species of vultures benefitted (and continue to benefit) from measures targeting birds in general. For example, up to 2016, RTE (the French electricity transporter), had retrofitted 2,250 km of power lines and substations in 364 "hot spots" for a total of about €20 million. Every year, RTE invests between €300,000 and €600,000 to retrofit the existing network. To this must be added the costs of research and development of new spherical markers, for example, and studies to evaluate their efficacy (Lesigne pers comm, 2017).

The emergency neutralisation of a power line by Enedis in the Baronnies (as part of LIFE Gypconnect, see Annex 2) led to additional costs of €140,000 borne by the company (Orabi pers comm, 2017). The LIFE projects sometimes partially fund retrofitting, while others provide expertise but electricity providers RTE and Enedis bear their own human and equipment costs (Weeger pers comm, 2017). Further, in LIFE GypHelp some of the costs related to the lead-free ammunition experimentation were borne directly by the hunters, notably the purchase of ammunition (Roche pers comm, 2017).

Other funding sources may include other EU funds (e.g. the European Regional Development Fund, such as Feder POIA for the French Alps), national funding to implement the national action plans for the four species of vultures, and regional funding or local funding. As an illustration, the rebuilding of the only French breeding centre for the Bearded Vulture, hosted by Asters, was rendered possible through funding from Feder POIA, the national action plan for the Bearded Vulture, and the Region and the Département of Haute-Savoie (Weeger pers comm, 2017).

Finally, an important source of funding is the MAVA Foundation, which has funded five large projects in Europe (France, Portugal, Spain, Italy and the Balkans) on (i) the illegal killing of birds, (ii) poisoning, (iii) electrocution and collision, (iv) diclofenac, and (v) vulture population monitoring data, for about €7 million (Tavares pers comm, 2017).

Future actions

The conservation of the four vulture species remains dependent on the continuation of conservation measures, especially in order for their positive trends to continue. Addressing threats from electrocution and collision requires cooperation with electricity providers: the retrofitting of power lines, and installation of visualisation devices should be further developed; electricity transporter RTE and electricity distributor Enedis have established specific programmes and timelines for the retrofitting of power lines (Lesigne pers comm, 2017; Orabi pers comm, 2017; Weeger pers comm, 2017). Research needs to continue to find a solution to equip cables for transporting explosives (catex), which are used for the preventive triggering of avalanches (Weeger pers comm, 2017). Wind turbines also pose an increasing threat and therefore need to be placed away from key areas for the four species, although in the case of the Egyptian Vulture there is no guarantee that its migration route will not vary (Kikuchi, 2008; Latruberce, 2017). However, the French State have developed an incentive policy in favour of wind power, thus creating a potential conflict between the promotion of national action plans for raptors on the one hand, and the promotion of wind power on the other hand (Orabi pers comm, 2017).

The potential risk of lead poisoning should be considered in future reintroduction programmes (Hernández and Margalida, 2009). The Vulture MsAP recommends that existing CMS Resolution 11.15 on the phasing out of the use of lead ammunition by hunters be fully implemented (CMS Raptors MOU, 2017). The hunting community is studying the question with the involvement of the French and European federations (Roche pers comm, 2017).

In the framework of LIFE Gypconnect and LIFE GypHelp (see Annex 2), there are ongoing experiments to test lead-free ammunition with hunters. Under LIFE Gypconnect, out of the over 1,300 hunters who volunteered, 51 were equipped with the lead-free ammunition (developed within the project with a ballistic expert); the trial is said to be proceeding well (Orabi pers comm, 2017). Preliminary results of the LIFE GypHelp trial launched at the end of 2016, also with the involvement of a ballistic expert, are satisfactory (Weeger pers comm, 2017), although preliminary feedback suggests that at certain calibres, lead-free ammunitions have a less lethal impact raising an ethical question as well as a hunting quota-related issue (Roche pers comm, 2017).

The conservation of the species also requires genetic mixing, which is particularly problematic for isolated populations, such as the Bearded Vulture in Corsica where an emergency reintroduction programme was launched in 2015. In the Alps, individuals of the Bearded Vulture population are thought to be genetically quite close; a genetic study is ongoing and aims to improve the genetic variability of the species (Weeger pers comm, 2017). Further, LIFE Gypconnect (see Annex 2) aims at reconnecting the Bearded Vulture populations of the Alps and the Pyrenees, to favour genetic mixing and to (re)create a European meta-population; it is notably based on reintroduction programmes in the Drôme and Massif Central regions to promote exchanges between the Alps and the Pyrenees populations (Orabi pers comm, 2017).

According to Arroyo and Razin (2006) certain human activities should be largely avoided around the nests in order to reduce disturbance and maximise Bearded Vulture stability and productivity, such as through the establishment of a 'tranquillity' zone (with the prohibition of noisy activities within 2 km and all other activities within 500-700m of the nest).

The removal of harmful NSAIDs, such as diclofenac, from the environment (and the control of any illicit use) is also advocated (BirdLife International, 2018b; CMS Raptors MOU, 2017). It should be necessary for veterinary drugs such as NSAIDs to be tested for toxicity to scavengers in the environmental risk assessment performed within the drug marketing authorisation process (Tavares pers comm, 2017); such testing should however concern new substances as well as substances that are already on the market (CMS Raptors MOU, 2017).

Moreover, there is a need to maintain significant ungulate populations to promote and ensure the development of vulture populations. However, the implementation of certain national policies (for example, on tourism, agriculture, health) tends to reduce the populations of ungulates. Hunters have nevertheless worked since the 1950s to rebuild flocks of wild ungulates, which are just starting to reach appropriate levels (Roche pers comm, 2017).

Developing and furthering exchanges of experience on the conservation of the four species of vultures also appears to be very important. It has been done in past projects (cooperation between various countries or regions; feeding in experience of previous projects to ongoing projects) and has proven valuable.

In addition, further work should be done to ensure that the perpetrators of malicious and negligent acts affecting vultures are apprehended and held accountable, as investigations are sometimes closed without the perpetrators being prosecuted (Orabi pers comm, 2017; CMS Raptors MOU, 2017).

Further research on the sub-lethal effects of toxins is proposed (Orabi pers comm, 2017; CMS Raptors MOU, 2017).

Finally, there is a need for an effective national programme that identifies, analyses and combats poisoning (Tavares pers comm, 2017).

Achievements

Impacts on the target species

There is little doubt that the conservation measures taken to date have been the main cause of the recovery of the four species of vulture in France. They have stabilised and improved the conservation status of some previously endangered populations and enabled the recolonisation of some areas where the species had become locally extinct.

Other impacts (e.g. other habitats and species, ecosystem services, economic and social)

Conservation measures that targeted only one of the four species of vultures also had positive impacts on the other species (for example, the spontaneous return of the Egyptian Vulture in the Grands Causses). In addition, measures such as the retrofitting of power lines and installations of visualisation devices on ski-lift cables also benefit other bird species that are risk of collisions (e.g. other large birds of prey and waterbirds).

Finally, there are important economic benefits that result from the conservation of vultures, in particular in relation to eco-tourism and rendering dead livestock (Orabi pers comm, 2017).

Conclusions and lessons learnt

The key targeted conservation measures that led to the improvements

- A reliable understanding of the species ecology and the key factors that were causing their decline.
- The development of a species action plan with a coherent and coordinated programme of measures for each of the four species of vultures.
- The species were a focus of a great deal of conservation effort, involving national/regional and NGO conservation organisations, and engaged all relevant stakeholders (such as livestock farmers, landowners, hunters, leisure activity groups).

- Targeted reintroduction measures to reinforce critically small sub-populations or to ensure recolonisation by species that had become extinct, or to create a geographical continuum to favour genetic mixing of isolated populations.
- Protection of a large proportion of the species' key breeding sites in the Natura 2000 network and other protected areas (in particular SPAs).
- Concerted and carefully targeted efforts to reduce the key causes of adult mortality, in particular from electrocution and collision through the retrofitting of power lines.
- Development of a network of supplementary feeding stations.
- Habitat conservation measures, to increase the area of suitable habitat and breeding success rates.
- Limitation of human disturbance, to reduce breeding failure.

Conservation measures that have not been sufficiently effective

- No significant progress has been made on reducing the use of lead ammunition for hunting. However, several trials of lead-free ammunition are ongoing.

Factors that supported the conservation measures

- The availability of funding that could be specifically targeted towards the species conservation needs, in particular the LIFE Nature programme action grants.
- Wider programmes to reduce bird mortality from collisions and electrocution.
- Awareness-raising campaigns to change social attitudes towards birds of prey and involve sociologists to ensure they are well adapted to the targeted audience (Orabi pers comm, 2017).
- Exchange of good practices / experience between organisations involved in the conservation of vultures (at project, regional or international levels).

Factors that constrained conservation measures

- Infrastructure installations and development (such as power lines and wind farms).
- Habitat change and fragmentation (deforestation in the case of the Cinereous Vulture).
- Increasing nest disturbance from leisure activities or other activities.
- Natural diseases in the species prey population.
- The negative perception of vultures in some target audiences.
- Lack of data sharing / pooling regarding results of toxicological analyses of dead vultures by different organisations, and hence a risk of underestimation of certain causes of mortality.
- The risk of a resurgence of illegal poisoning (given the return of the Grey Wolf).

Quick wins that could be applied elsewhere for the species

- Development of awareness-raising campaigns.
- Further installation of visualisation devices on power posts/lines, ski lifts, wind turbines.

Examples of good practice, which could be applied to other species

- The development and implementation of coherent conservation measures targeted at the key factors affecting the species' population status at sufficient scale to have population level impacts.
- Engagement of all key stakeholders in the conservation of the species, including specific agreements with certain stakeholders.
- The development of awareness-raising campaigns, notably targeting children.

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Photographs

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Annex 1. Egyptian Vulture (Neophron percnopterus), Cinereous Vulture (Aegypius monachus), Bearded Vulture (Gypaetus barbatus) and Griffon Vulture (Gyps fulvus) conservation status at Member State and EU levels

Source: Member State Article 12 reports as compiled by ETC-BD on EIONET https://bd.eionet.europa.eu/article12/

Increasing	+	Stable	0	Unknown	x	Decreasing	-	Fluctuating	F	Uncertain	U

Egyptian Vulture

	Breeding population				Breeding range				Wintering population			
	Short-term		Long-term		Short-term		Long-term		Short-term		Long-term	
BG	2000-12	-	1980-2012	-	2000-12	-	1980-2012	-	2000-12	NA	1980-2012	NA
ES	1998-2011	0	1980-2012	-	2001-12	0	1980-2012	-				
ESIC	2001-12	+	1980-2012	+	2000-12	+	1980-2012	+				
FR	2000-12	+	1980-2012	+	2000-12	+	1985-2013	+				
GR												
IT	2000-12	-	1980-2012	-	2002-13	-	1983-2013	-				
PT	2001-12	-	1980-2012	-	2011-12	0	1980-2012	-				
EU overall		0		-								

Greece did not report for this species; however, surrogate data provided by the Hellenic Ornithological Society indicated a decreasing trend over the short and long term.

Cinereous Vulture

	Breeding population				Breeding range				Wintering population			
	Short-term		Long-term		Short-term		Long-term		Short-term		Long-term	
BG	2000-12	x	1980-2012	-	2000-12	0	1980-2012	0	2001-12		1984-2012	
ES	1998-2011	+	1980-2011	+	1998-2011	+	1980-2011	+				
FR	2000-12	+	1994-2012	+	2000-12	+	1996-2012	+				
GR												
PT	2003-12	+			2003-12	+						
EU overall		+		+								

Greece did not report for this species; however, surrogate data provided by the Hellenic Ornithological Society indicated an increasing trend over the short and long term.

Bearded Vulture

	Breeding population				Breeding range				Wintering population			
	Short-term		Long-term		Short-term		Long-term		Short-term		Long-term	
AT	2001-12	+	1980-2012	+	2001-12	+	1980-2012	+	2001-12		1984-2012	
ES	2001-12	+	1978-2012	+	2001-12	+	1980-2012	+				
FR	2000-12	+	1980-2012	+	2000-2012	0	1985-2013	+				
GR												
IT	1998-2012	+				0	2002-2013					
EU overall		+		+								

Greece did not report for this species; however, surrogate data provided by the Hellenic Ornithological Society indicated a stable trend over the short term and a decreasing trend over the long term.

Griffon Vulture

	Breeding population				Breeding range				Wintering population			
	Short-term		Long-term		Short-term		Long-term		Short-term		Long-term	
BG	2000-12	+	1980-2012	+	2000-12	+	1980-2012	+	2001-12		1984-2012	
CY	2001-12	0	1980-2012	-	2001-12	+	1980-2012	-				
ES	1999-2008	+	1979-2008	+	1999-2008	+	1980-2012	+				
FR	2000-12	+	1985-2013	+	2000-12	+	1985-2013	+				
GR												
IT	1999-2012	+	1983-2008	+	2002-13	+	1983-2013	+				
PT	2001-2012	+	1980-2012	+	2001-12	0	1980-2012	0				
EU overall		+		+								

Greece did not report for this species; however, surrogate data provided by the Hellenic Ornithological Society indicated an increasing trend over the short term and a decreasing trend over the long term.

Annex 2. LIFE Nature Projects in France that aimed to help conserve the Egyptian Vulture (Neophron percnopterus), the Cinereous Vulture (Aegypius monachus), the Bearded Vulture (Gypaetus barbatus) and the Griffon Vulture (Gyps fulvus)

Project Title	Project N°	MS	Type of Beneficiary
LIFE GYPCONNECT - Restoration of connections between the Alpine and Pyrenean populations of bearded vulture (*Gypaetus barbatus*)	LIFE14 NAT/FR/000050	FR	NGO-Foundation
LIFE GypHelp - Reduction of the human threats affecting the Bearded Vulture	LIFE13 NAT/FR/000093	FR	NGO-Foundation
LIFE des Alpilles - Gestion intégrée des habitats pour les oiseaux d'intérêt communautaire des Alpilles	LIFE12 NAT/FR/000107	FR	Park-Reserve authority
Life Défense Nature 2 MIL - Biodiversity restoration and conservation of remarkable military lands in southeast France	LIFE11 NAT/FR/000734	FR	Park-Reserve authority
VAUTOUR - Recovery plan for the Egyptian Vulture in South-Eastern France	LIFE03 NAT/F/000103	FR	NGO-Foundation
GYPAETE - International programme for the Bearded vulture in the Alps	LIFE03 NAT/F/000100	FR	NGO-Foundation
Gypaete barbu en Corse - Bearded Vulture conservation in Corsica	LIFE98 NAT/F/005197	FR	Park-Reserve authority
Gypaete/Alpes - Bearded Vulture conservation into the French Alps	LIFE98 NAT/F/005194	FR	NGO-Foundation
Gorges de la Jonte - Black Vulture and scavenger raptors in the Gorges de la Jonte	LIFE97 NAT/F/004120	FR	NGO-Foundation
First phase for a conservation programme for threatened species in the Pyrenees (French part)	LIFE93 NAT/F/011804	FR	National authority
First phase of a conservation programme for threatened vertebrates in the Pyrenees	LIFE93 NAT/F/011805	FR	
Grands Causses and Causses du Quercy	LIFE93 NAT/F/010300	FR	Development agency

Source: Life Programme database, projects with *Neophron percnopterus*, *Aegypius monachus*, *Gypaetus barbatus* and *Gyps fulvus* listed as a key word