

# **TECHNICAL REPORT**

## **ULM-A-009/2023**

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### **Accident on 11 June 2023 involving a VOL-9 SKY RANGER aircraft, registration EC-FR3, in the municipality of Majadahonda (Madrid, Spain)**

Please note that this report is not presented in its final layout and therefore it could include minor errors or need type corrections, but not related to its content. The final layout with its NIPO included (Identification Number for Official Publications) will substitute the present report when available.



## **NOTICE**

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission regarding the circumstances of the accident that is the object of the investigation, its probable causes, and its consequences.

In accordance with the provisions in Article 5.4.1 of Annexe 13 of the International Civil Aviation Convention; and with Articles 5.5 of Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010; Article 15 of Law 21/2003 on Air Safety; and Articles 1, 4 and 21.2 of RD 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent their recurrence. The investigation is not intended to attribute any blame or liability, nor to prejudge any decisions that may be taken by the judicial authorities. Therefore, and according to the laws specified above, the investigation was carried out using procedures not necessarily subject to the guarantees and rights by which evidence should be governed in a judicial process.

Consequently, the use of this report for any purpose other than the prevention of future accidents may lead to erroneous conclusions or interpretations.

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## ABBREVIATIONS

° ‘ “	Degrees, minutes, seconds
°	Sexagesimal degrees
AESA	Spain's National Aviation Safety Agency
CCAA	Autonomous Communities
CIAIAC	Civil Aviation Accident and Incident Investigation Commission
CSIC	Spanish National Research Council
EASA	European Aviation Safety Agency
ENAIRE	Public business entity providing air traffic control services
ft	Feet
GTSO	AESA's Working Group on Operational Safety in the Airport Environment
h	Hour
kg	Kilogram
m	Metre
m <sup>2</sup>	Metres squared
mm	Millimetres
MAF	Multi-axis fixed-wing rating.
MHz	Megahertz
N	North
W	West
s	Second
SEO	Spanish Ornithological Society
TULM	Ultralight aircraft pilot license
ZEC	Special Conservation Areas
ZEPA	Special Bird Protection Areas

# TECHNICAL REPORT

## ULM-A-009/2023

**Owner and Operator:** Private

**Aircraft:** VOL-9 SKY RANGER registration number EC-FR3

**Date and time of the incident:** 11 June 2023, 10:40 (local time<sup>1</sup>).

**Site of the accident:** Municipality of Majadahonda (Madrid)

**Persons on board:** One (1). Crew

**Phase of flight:** Cruise

**Flight rules:** VFR

**Type of flight:** General Aviation - Private.

**Date of approval:**

## SYNOPSIS

### Summary:

The VOL-9 SKY RANGER aircraft, on registration EC-FR3, took off from runway 14 at Villanueva del Pardillo Aerodrome (Madrid) for a local flight, with the pilot as the only occupant on board.

After flying two aerodrome circuits to practise landings and take-offs, it commenced a local flight, initially heading south towards the Brunete area and then turning east.

While flying at an altitude of 2,900 ft and heading northwards over the municipality of Majadahonda (Madrid), it was struck by a vulture, which first hit the propeller, breaking one of the three blades, and then the front right-hand side of the airframe.

The impact deformed the windscreen and caused the upper part of the cockpit to detach.

The pilot stopped the engine and turned the aircraft to his left until he located suitable terrain, where he landed on a heading of approximately 40°.

During touchdown, the landing gear wheel fork buckled back on itself, and the wheel embedded in the ground.

The pilot was unharmed and was able to exit the aircraft without assistance.

The investigation has concluded that the off-airfield landing occurred due to an impact with a Griffon Vulture, which damaged the propeller and forced the pilot to make an emergency landing.

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<sup>1</sup> Unless otherwise indicated, the report refers to local time. UTC can be calculated by subtracting two units.

## 1. FACTUAL INFORMATION

### 1.1. Overview of the accident

The VOL-9 SKY RANGER ultralight aircraft, on registration EC-FR3, took off at approximately 10:10 h from runway 14 at Villanueva del Pardillo Aerodrome (Madrid) for a local flight, with the pilot as the only occupant on board.

According to the information provided by the pilot,<sup>2</sup> once in the air, he flew two aerodrome circuits and headed south to the Brunete area (Madrid).

Shortly before reaching this location, he turned east and returned northbound towards the airfield, intending to join the circuit for runway 14, with said runway to the left.

While flying at approximately 2,900 ft and heading north, the aircraft was struck by a bird which, according to the pilot, appeared suddenly from the right and broke one of the three propeller blades. It also damaged the right side of the windscreen, deforming its frame and causing the top of the cockpit to detach.

The pilot stopped the engine, kept control of the aircraft and checked that the control surfaces were unaffected. According to his account, he couldn't see a suitable field for an emergency landing ahead, so he turned to his left in search of a safer place to land.

He eventually landed parallel to the furrows in a ploughed fallow field, covering a distance of approximately 60 m from touchdown until the aircraft came to a stop.

The pilot was unharmed and was able to exit the aircraft without assistance.

The vulture and the top part of the cockpit that had detached were located 670 m north of the aircraft, on either side of a forest road.



**Figure 1 Final position of the aircraft in relation to the aerodrome and the vulture**

### 1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				
Unharmed	1		1	
TOTAL	1		1	

<sup>2</sup>The route described by the pilot is consistent with some of the positions recorded by the primary RADAR, which was provided by ENAIRE.

### 1.3. Damage to the aircraft

The aircraft sustained significant damage.

### 1.4. Other damages

The bird that struck the aircraft was a Griffon Vulture, which died and underwent a necropsy at the Wild Animal Recovery Centre belonging to the Flora and Fauna Division of the Department of the Environment of the Community of Madrid, which determined that it was an adult specimen.

### 1.5. Information about the personnel

The 51-year-old pilot had held a TULM ultralight private pilot licence since 19 November 2014. He had a multi-axis fixed-wing rating (MAF).

The TULM licence and the corresponding Class 2 medical certificate were in force.

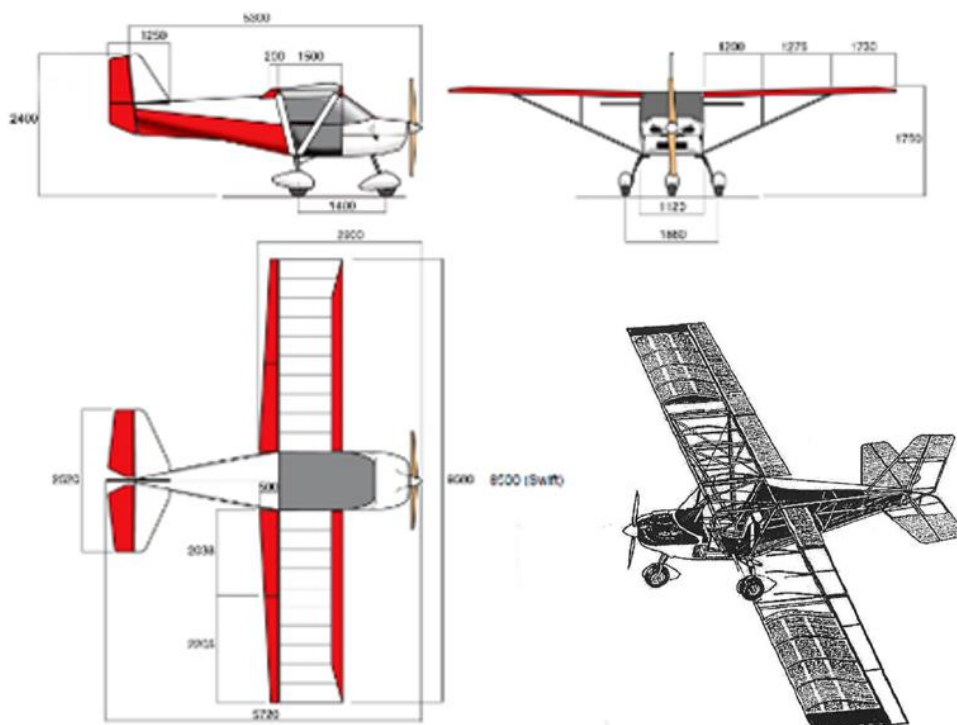
He had 196:05 h of experience, all of which were on type.

### 1.6. Information about the aircraft

The VL-9 SKY RANGER ultralight aircraft is an amateur-built, two-seater monoplane with a braced high wing that forms a positive dihedral of 1°.

Its metallic structure is Chromo-Molybdenum steel and 6061 T6 aluminium alloy, with a Dacron covering<sup>3</sup>.

It has a wingspan of 9.500 m, a length of 5.723 m, a maximum height of 2.400 m and a trapezoidal wing area of 13.74 m<sup>2</sup> with a 1.65 m root chord, a 1.35 m tip chord, a 7.29 m aspect ratio and a 0.81 m aspect ratio.



**Figure 2 Views of the aircraft**

<sup>3</sup> Dacron or polythene terephthalate is a synthetic fibre used to make fabrics for clothing and coverings.

The tricycle-type landing gear has one nose wheel and two main wheels that are attached to the structure on the underside of the fuselage, independently of each other. It has a wheel track of 1.860 m and a wheelbase of 1.400 m.

It was powered by a 100 HP ROTAX 912 ULS engine and a three-bladed DUC WINDSPOON - R propeller with a diameter of 1,727 mm, a mass of 4.26 kg, and which rotated clockwise when viewed from the pilot's position.

The registration of the model involved in the accident was EC-FR3. It was manufactured in 2008 with serial number SKR0803871, and it had a special restricted certificate of airworthiness issued on 22 April 2009.

It had a ballistic parachute attached to the structure, mounted behind the pilot.

### **1.7 Meteorological information**

There were no limiting meteorological conditions for the flight

### **1.8. Aids to navigation**

Not applicable in this incident.

### **1.9. Communications**

N/A

### **1.10. Information about the aerodrome**

Villanueva del Pardillo (Madrid) Aerodrome is located 3 km northwest of the municipality of the same name and 30 km northwest of the capital.

"It is a non-controlled aerodrome that uses the frequency 130.125 MHz for air-to-air communications. Its reference point coordinates are 40° 30' 56.40" N - 03°59' 26.58" W, its elevation is 680 m (2,231 ft), and it has a 400 m long asphalt runway designated 14 - 32."

The circuit to runway 14 is to the north-northeast of the runway, while the circuit to runway 32 is to the south-southwest of the runway.

### **1.11. Flight recorders**

The aircraft was not carrying flight recorders because it was not a regulatory requirement.

### **1.12. Aircraft wreckage and impact information**

The aircraft was found at 40° 29' 45.7" N - 3° 55' 47.0" W in a ploughed fallow field 5,200 m west of the Villanueva del Pardillo Aerodrome.

One of the propeller blades was in a downward position, resting on the ground, with a partial break one-third of the way down. The second blade had been severed two-thirds of the way down, the longest piece having broken off in flight and disappeared after the impact with the vulture. The third blade was undamaged.

The nose wheel fork was bent backwards, and the wheel was slightly embedded in the ground.

The aircraft had been hit on the right side of the engine housing, where traces of the vulture's blood were present. The impact deformed the fairing and, as a result, partially broke the plastic windscreen, although it remained in its frame.



The upper part of the cockpit had detached and was found next to a road, very close to the vulture, at 40° 30' 09.2" N - 3° 55' 37.0" W



**Figure 3 Final position of the aircraft, the vulture and the**

**1.13. Medical and pathological information <sup>roof</sup>**

The pilot was unharmed.

**1.14. Fire**

No fire broke out.

**1.15. Survival aspects**

The pilot's safety belt was fastened and functioned correctly.

The aircraft had a ballistic parachute, which was not used and was secured after landing to prevent accidental deployment.

**1.16. Tests and research**

The Griffon Vulture (*Gyps fulvus*) is a carrion-eating bird, with adult specimens typically ranging from 95 cm to 110 cm in length with a wingspan between 230 cm and 265 cm. Their weight varies from 9 kg for females to 6 kg for males.

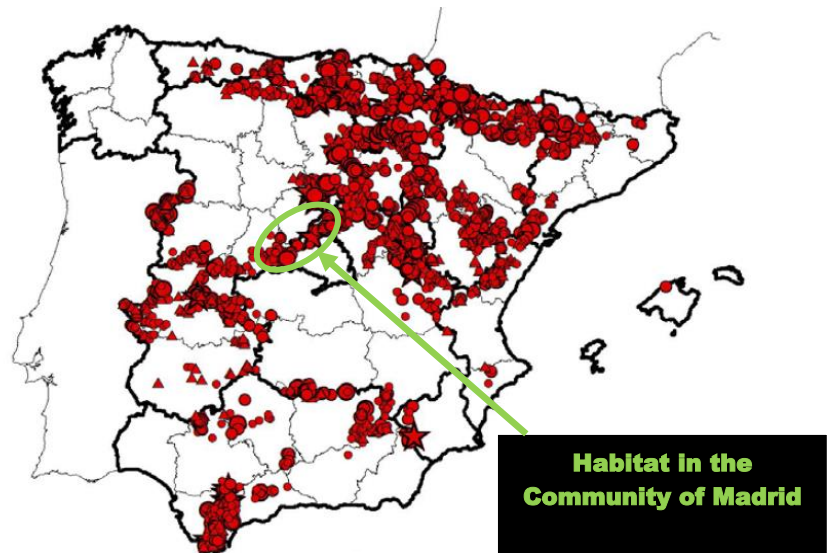
The species is quite widely distributed around the world, with populations in southern Europe and northwest Africa and different subspecies. The specimens that inhabit the Iberian Peninsula belong to the *fulvus* subspecies.

In Spain, it is found in most mountain ranges, but the bulk of the population is primarily concentrated in Aragón and Castilla y León, as well as in Andalucía, Navarra, Castilla-La Mancha and Extremadura.

Younger specimens habitually make significant dispersive and erratic movements throughout the Iberian Peninsula and even cross into North Africa.

In the European Red List of Birds 2021, drawn up by the International Union for Conservation of Nature<sup>4</sup>, the European breeding population is estimated to be between 69,600 and 89,400 mature birds, with an increasing trend.

In Spain, the Griffon Vulture population stands at more than 31,000 pairs, with the majority of birds concentrated in Aragón and Castilla y León.



**Figure 5 Habitat of the Griffon Vulture in Spain**

In the Community of Madrid, their habitat is located in the northwest of the region.

### **1.17. Organisational and management information**

According to the information published by Spain's National Aviation Safety Agency (AESA), it participates in several forums dealing with bird-related aviation safety issues.

The Airport Operational Safety Division participates in and coordinates working groups that specifically deal with risk prevention in the field of bird strikes.

This working group is organised around the Airport Safety Working Group (GTSOA), which constitutes a permanent forum for the analysis and discussion of matters related to the safe operation of aerodromes, with the aim of taking a preventive approach to airport safety.

#### **National Aviation and Wildlife Forum**

AESA periodically organises the National Aviation and Wildlife Forum, with the primary objective of fostering relations and coordination between all the agents involved in minimising the risk that wildlife poses to aviation. The forum met in 2017, 2020 and 2023.

One of the agreements reached at these meetings was that the sector would jointly commit to developing the National Aviation and Wildlife Programme, which aims to establish a strategy to ensure aviation development is compatible with care for the environment and, in particular, birds, with safety as the main priority.

The programme is intended to produce dedicated Working Groups to analyse specific problems that require in-depth consideration. These groups will comprise multidisciplinary teams made up of technicians from AESA, specialist associations, local representatives, and others involved in specific issues affecting operational safety.

<sup>4</sup> Founded in 1964, the organisation has evolved into the world's most comprehensive source of information on the global extinction risk status of animals, fungi and plants.

## 1.18. Additional information

### 1.18.1. Regulations

Law 33/2015, amending Law 42/2007 on natural heritage and biodiversity, states the following:

Article 37. Declaration and management of Protected Natural Spaces, in section 1,

The Autonomous Communities are responsible for declaring and determining the management strategy for the Protected Natural Spaces in their geographical area.

Article 44. Special Bird Protection Areas

The areas of national land, the marine environment, the exclusive economic zone and the continental shelf that are most suitable in number and surface area for the conservation of the bird species included in Annex IV of the Law and for the migratory birds regularly present in Spain, shall be declared as ZEPA<sup>5</sup>. As such, these areas will be subject to special conservation measures to prevent disturbances and protect their habitat, with the aim of ensuring the survival and reproduction of these species. In the case of migratory species that regularly reach Spanish territory and marine waters under Spanish sovereignty or jurisdiction, the need to protect their breeding, feeding, moulting, wintering and resting areas will be taken into account, with particular importance being given to wetlands, especially those of international importance.

Article 45. Declaration of Special Areas of Conservation and Special Bird Protection Areas,

The General State Administration and the Autonomous Communities, following a public notification procedure, shall declare the ZEC<sup>6</sup> and ZEPA, within the scope of their respective competences.

These declarations shall be published in the respective Official Gazettes, including information on their geographical boundaries and the habitats and species for which each one is declared. They shall also be reported to the Ministry of Agriculture, Food and the Environment for the purpose of their forwarding to the European Commission, in accordance with the provisions of Article 10 of Law 30/1992, of 26 November 1992, on the Legal Framework for the Public Administrations and Administrative Procedure.

For its part, Royal Decree 139/2011, concerning the List of Wild Species Under Special Protection and the Spanish Catalogue of Endangered Species, includes the Griffon Vulture as an endangered species in its annex. It also laid down the basic rules regarding the cases in which and the conditions under which the use of animal by-products not intended for human consumption may be used to feed certain species of wild fauna, including the Griffon Vulture, and defined the competent bodies, authorities or administrative units of the autonomous communities and the cities of Ceuta and Melilla as the competent bodies authorised to grant permits for feeding troughs for wild animals.

This condition implies the effects, prohibitions, conservation guarantees and exceptions established in Part III, Chapter I, articles 56 to 61 of Law 42/2007.

In addition, the aforementioned law, in PART III. Biodiversity Conservation. CHAPTER I. In situ conservation of wild native biodiversity, includes in Article 58. Exceptions, in section 1.d) that the prohibitions established in this chapter (Articles 52. Alteration of the boundaries of protected areas and 54. *Conservation guarantee for wild native species*) may, subject to prior administrative authorisation by the Autonomous Community, be revoked if there is no other satisfactory solution and without

<sup>5</sup> Acronym in Spanish for Special Bird Protection Area (*Zona de Especial Protección de Aves*).

<sup>6</sup> Acronym in Spanish for Special Area of Conservation (*Zona de Especial Conservación*)

prejudice to the maintenance of the populations concerned in a favourable conservation status in their natural range, when one of the following circumstances applies: in the case of birds, to prevent accidents related to air safety.

Article 6 of Law 2/1991, of 14 February, on the Protection and Regulation of Wild Fauna and Flora in the Community of Madrid, creates the Regional Catalogue of Endangered Species of Wild Fauna and Flora, which includes the species protected by the National Catalogue of Endangered Species, as well as the species, subspecies and populations of wild fauna and flora of the Community of Madrid requiring specific measures to be implemented by the Administration to protect them effectively

Furthermore, Decree 18/1992 of the Autonomous Community of Madrid approved the Regional Catalogue of Endangered Species of Fauna and Flora, which is attached as a single annex and also includes the Griffon Vulture.

**1.18.2. CIAIAC investigations related to bird strikes**

Since the year 2000 (inclusive), the CIAIAC has investigated a total of twenty-six (26) events related to aircraft bird strikes, which account for 1.68% of the one thousand five hundred and thirty-nine (1,539) total events investigated in that period. Of these, three hundred and sixty-five (365) occurred in ultralight aviation, and the remaining one thousand one hundred and seventy-four (1,174) involved other aviation types.

Of the 26 investigated, four (4) occurred in ultralight aviation, accounting for 15.38% of the total number of bird strike incidents.

Bird strike incidents account for 1.68% of incidents in ultralight aviation and 1.87% in all other types of aviation.

A summary of the total number of events investigated can be seen in the table below:

<b>EVENT</b>	<b>DATE</b>	<b>AIRCRAFT</b>	<b>SPECIES</b>	<b>PROVINCE</b>	<b>ALTITUDE (ft)</b>	<b>OCCUPANCY (DECEASED)</b>	<b>RESULTS</b>
IN-003/2000	26/02/2000	PIPER PA28	Griffon Vulture	Navarre.	3500	4	Landed
A-023/2001	20/04/2001	PIPER PA-23	Seagulls	Mallorca	Take-off	4	Landed
IN-076/2002	08/11/2002	AIRBUS 340	Unknown	Salamanca	Take-off	10	Landed
A-050/2004	30/07/2004	G-102 ASTIR CS	Griffon Vulture	Segovia	1800	1	Accident
IN-018/2005	25/05/2005	BONANZA	Stork	Cádiz	2000	3	Landed
IN-027/2005	26/06/2005	CESSNA C-172 N	Black Vulture	Seville	1000	1	Landed
IN-029/2009	11/11/2009	SOCATA TB-20	Black Vulture	Madrid	3500	2	Landed
A-038/2011	02/10/2011	SCHEMPP-HIRTH	Griffon Vulture	Huesca	7200	2 (2)	Accident
ULM A-009/2013	04/08/2013	Evektor EV-97	Griffon Vulture	Navarre.	Unknown	2 (2)	Accident
A-001/2016	16/01/2016	SOCATA TB-20	Griffon Vulture	Cuenca	1950	4 (4)	Accident
A-010/2016	30/03/2016	CESSNA 172R	Griffon Vulture	Madrid	7590	3 (3)	Accident
A-016/2016	19/05/2016	ROBIN DR-400-180	Griffon Vulture	Navarre.	3500	3 (3)	Accident
A-023/2016	07/07/2016	GLASER DIRKS DG-300 ELAN	Griffon Vulture	Huesca	2300	1	Landed
A-018/2017	15/08/2017	PIPER PA-36-375	Stork	Cádiz	2300	1 (1)	Accident
A-010/2018	27/03/2018	AIRBUS 319	Seagull	Murcia	Take-off	130	Take-off aborted
A-018/2018	15/05/2018	PIPER PA-36-375	Griffon Vulture	Segovia	1800	1 (1)	Landed
IN-019/2018	13/05/2018	PIPER PA-36-375	Griffon Vulture	Valencia	4500	2	Landed
A-016/2019	10/04/2019	PIPER PA-36-375	Griffon Vulture	Huesca	Take-off	2	Landed

A-046/2019	21/08/2019	PIPER PA-36-375	Griffon Vulture	Huesca	2400	1	Landed
ULM-A-009/2019	19/05/2019	SALLEN MACH 15	Unknown	Canary Islands	144	1	Landed
ULM A-021/2022	19/07/2022	PIPISTREL SINUS 912	Griffon Vulture	Cuenca	8000	1	Landed
IN-009/2023	30/05/2023	REIMS AVIATION SA, F172H	Griffon Vulture	Guadalajara	Landing	3	Landed
ULM A-009/2023	11/06/2023	VOL-9 SKY RANGER	Griffon Vulture	Madrid	2900	1	Landed
A-012/2023	28/06/2023	LEONARDO AW135	Unknown	Badajoz	7500	2	Landed

Seven (29.16%) of the twenty-four bird strike incidents investigated resulted in an aircraft accident, leading to sixteen fatalities and one person escaping without injury.

In 15 of the incidents (62.5%), the bird was a Griffon Vulture.

As a result of the investigations above, three recommendations aimed at preventing bird strikes have been issued in relation to two of the accidents and one of the incidents listed.

They were issued in connection with the reports corresponding to investigations A-010/2016, A-016/2016 and A-046/2019, which are as follows:

In connection with A-010/2016

RECOMMENDATION 58/2016 It is recommended that ENAIRE update the bird activity chart and the migration route charts for larger bird species published in the AIP dated 26 December 2002, to reflect the current distribution of colonies of vultures and other birds that are suitable for inclusion in said chart, and their migratory routes.

This recommendation received a satisfactory response and is now closed, as the Spanish Aeronautical Information Publication (AIP) has been improved and updated with information on the presence of birds, which was traditionally included in ENR 5.6.- "Migrations and Concentrations of Birds". This section of the AIP is now called Bird Migration and Areas with Sensitive Fauna and contains three maps showing bird concentrations, including the concentrations of Griffon Vultures, with updated information.

In addition to the above, Spain's National Aviation Safety Agency, AESA, published a three-page leaflet with recommendations to prevent bird strikes and, in September 2017, another pamphlet entitled: "Bird strikes, a common risk with local specificities".

This pamphlet is, in part, a translation of an AOPA operational safety letter and also includes information published in the AIP and recommendations put forward by the Spanish Association of Light Aircraft Pilots (AEPAL) and the Association of Pilots and Aircraft Owners (AOPA) at the 1st National Aviation and Wildlife Forum held on 8 June 2017.

AESA also set up the National Aviation and Wildlife Programme, as established by the European Aviation Safety Agency (EASA) in Commission Regulation (EU) No 139/2014 of 12 February 2014, specifically in AMC1 ADR.OPS.B.020, which states the need for States to have a National Wildlife Strike Reduction Programme.

In connection with A-016/2016

RECOMMENDATION 05/2018 It is recommended that the Ministry of Agriculture and Fishing, Food and the Environment<sup>7</sup> boost and coordinate actions to minimise the excessive concentration and

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<sup>7</sup> The Ministry is now called the Ministry of Agriculture, Fisheries and Food, but responsibility for environmental matters now lies with the Sub-Directorate General for Biodiversity and the Natural Environment, which answers to the Ministry for the Ecological Transition

proliferation of Griffon Vulture (*Gyps fulvus*) colonies with the Autonomous Communities and for the whole of the Spanish territory affected.

This recommendation was closed following a response from the Ministry that was deemed UNSATISFACTORY, arguing that the existence of an excessive concentration and proliferation of griffon vulture colonies in the Spanish territory had not been scientifically proven, that it did not have the jurisdiction to carry out actions related to the management of wildlife populations, which was the responsibility of the Autonomous Communities, and that the resolution of these situations should not result in a reduction of the Griffon Vulture population in our country.

The Ministry also felt that the most effective option was to provide pilots with detailed information on the areas and times that pose the most significant risk and ensure the appropriate management of bird hotspots. Furthermore, it felt that it was important to encourage and, where possible, require that aircraft fly above 1,000 m of altitude because large gliding birds do not fly in that air space.

The CIAIAC Plenary considered the response to be unsatisfactory and informed the Ministry for the Ecological Transition accordingly, arguing that it could not say that it did not have jurisdiction, given that it was being asked to lead a process that would be executed by the Autonomous Communities, thus respecting their competences.

It also noted that the information obtained for the report had been provided by the Spanish Ornithological Society (SEO) and the Spanish National Research Council (CSIC - Doñana), two institutions that enjoy great prestige in the scientific world.

Furthermore, the Ministry was reminded by the CIAIAC that neighbouring countries with much lower Griffon Vulture populations were in compliance with European regulations but could demonstrate very different results in terms of their track records in air safety.

Lastly, the CIAIAC noted that comprehensive information on the influence of birds on flights was available in the AIP published by ENAIRE and in the three-page leaflet published by AESA on "Recommendations to prevent bird strikes", as well as in the EGAST leaflet "GA6 Bird Strikes", both published on the AESA website.

Despite these arguments, the Ministry did not take the above recommendation into consideration, and it has been filed as CLOSED UNSATISFACTORY.

#### In connection with A-046/2019

RECOMMENDATION 25/19: It is recommended that the Ministry for the Ecological Transition and the Demographic Challenge, aiming to prevent accidents related to air safety, apply the exceptions contemplated in Article 61.1.b) of Law 42/2007 of 13 December 2007 on Natural Heritage and Biodiversity to the population of Griffon Vultures (*Gyps fulvus*), thus rendering ineffective the prohibitions established in Chapter I.

It is currently filed with the status A6, OPEN, ACTION NOT ACCEPTABLE. This status signifies that no response to the recommendation has been received. Given the time that has elapsed and our internal procedures, it should have been closed and filed as unacceptable by now, but this has yet to be done.

#### **1.19. Special investigation techniques**

N/A

## 2. ANALYSIS

While investigating this event, an attempt was made to determine several aspects considered relevant to air safety.

Firstly, we studied the number of accidents and incidents caused by bird strikes in recent years in Spain, taking the year 2000 as a starting point because it was felt that the data from this period would be sufficient to try to determine whether the number should be considered alarming or, on the contrary, more of a token figure.

We also looked at whether the temporal distribution of the events was continuous and, if not, why this might be the case.

Secondly, we tried to identify any patterns in these types of incidents that could be used to provide some guidelines for pilots to improve safety, but no common characteristics were found.

Thirdly, we studied the current species protection regulations to see whether they contemplate other broader aspects, such as the coexistence of flying birds (mainly Griffon Vultures) with the aviation activity in that area.

We also attempted to determine whether the pilot's actions were appropriate, whether he had sufficient training and experience to deal with an event such as the one in which he was involved, and whether it would be possible to establish behavioural guidelines for an event of this type.

Finally, the recommendations issued by the CIAIAC were reviewed to see how they have influenced the improvement of safety so that they could be used to guide the issuance of any other recommendations that might help to improve the situation.

Since the year 2000 (inclusive), the CIAIAC has investigated a total of twenty-four (24) events related to aircraft bird strikes, which account for 1.60% of the one thousand five hundred and thirty-nine (1,539) total events investigated in that period. Of these, three hundred and sixty-five (365) occurred in ultralight aviation, and the remaining one thousand one hundred and seventy-four (1,174) involved other aviation types.

Of the twenty-four (24) investigated, four (4) occurred in ultralight aviation, accounting for 16.66% of the total number of bird strike incidents.

Bird strike incidents account for 1.68% of incidents in ultralight aviation and 1.87% in all other types of aviation.

As regards the first question, there have been 24 accidents in 22 years (including those that have occurred so far in 2023). This translates to approximately one case per year and 1.65% of the investigations carried out.

Bird strike incidents account for 1.68% of incidents in ultralight aviation and 1.87% in other types of aviation.

Based on this data, the problem does not initially appear to be alarming.

Unfortunately, however, the outcome of these 24 accidents and incidents was catastrophic, resulting in the deaths of 16 people, i.e. many of them involved fatalities, primarily when the strike occurred in cruise flight at a certain altitude, and it was impossible for the pilots to maintain control of the aircraft after impact.

This makes this type of accident worthy of special consideration.

But it should also be borne in mind that more than half of all the incidents took place in the later years of the period studied.

In fifteen (15) of the twenty-four (24) accidents, the bird involved was a Griffon Vulture, i.e. 62.50 % of the time.

These two circumstances are highly relevant because they can be attributed to a precise cause: the fact that the Griffon Vulture population in Spain has increased considerably in the last four decades.

It has grown continuously from approximately 2,000 pairs in 1978 to around 35,000 pairs today, putting the total number of birds at more than 90,000.

The increase in the population is undoubtedly due to the fact that feeding areas for scavenger birds have been set up all over the country.

As mentioned previously, in Portugal and southern France, the number of Griffon Vultures in habitats similar to those in Spain is much lower, with Spain accounting for 90% of all the specimens in Europe.

Not only has the population grown considerably, but their behavioural habits and even their habitats have changed, as food has become easier to obtain and is concentrated in specific areas.

This means that general and sports aviation flights in areas frequented by vultures have a relatively high probability of encountering Griffon Vultures.

The species flies in flocks, but pairs isolate themselves or move away from the flock during the mating and breeding season.

The behaviour of pairs not flying in a flock is more erratic and unpredictable, and pilots need to be aware of this so that they can be as careful as possible if they see isolated birds, as the other member of the pair is likely to be close by.

If a vulture is spotted, the safest way to avoid an impact is to raise the front of the aircraft slightly, try to gain height and slow down the speed of the potential impact while being extremely vigilant to try and locate the second vulture of the pair, which may well be nearby.

Performing this type of evasive manoeuvre protects the aircraft's tail from a potential impact that could damage or even break off one of the rudders.

In the case in question, the pilot acted appropriately; he did not see the vulture and could not avoid the impact.

The first thing he did was to shut down the engine, thus preventing the aircraft from being destabilised by the vibrations produced by the spinning of the propeller, which had lost one of its blades.

He then began to look for a landing field. While doing so, he remained calm and did not descend rapidly towards the first field in front of him. Instead, he made a 180° turn while maintaining altitude until he found one that was as level as possible. He found a ploughed field and landed parallel to the furrows with a short roll-out so that the aircraft sustained minimum damage.

In terms of the current legislation, the regulations concerning Griffon Vultures are generally aimed at protecting the species and do not normally contemplate any aspect related to aviation, except for the aforementioned content of CHAPTER V, Article 58, section 1.d) of Organic Law 42/2007, which, as already mentioned, includes the prevention of accidents related to air safety among the exceptions to the prohibitions.



However, it appears that the provisions of this article are not being taken into account and that the authorities responsible for environmental management, sustainability, and the ecological transition are unaware of the existing threat to air safety caused by the large numbers of Griffon Vultures inhabiting areas that see significant general and sports aviation activity.

Proof of this is that Recommendation 05/2018, issued in relation to the investigation of accident A-016/2016, to the Ministry for the Ecological Transition, which is responsible for the environment, and more specifically to the Subdirector General for Biodiversity and the Natural Environment, recommending that it "*boost and coordinate actions to minimise the excessive concentration and proliferation of Griffon Vulture colonies with the Autonomous Communities and for the whole of the Spanish territory affected*" was not well received by the Ministry, and in the end no action was taken.

In its reply, the Ministry stated that in regard to the sites inhabited by high concentrations of birds, a better option would be to inform pilots about the areas at greater risk and the times at which the risk is highest. It also argued that it was important to encourage and even require aircraft to fly above 1,000 m in altitude, given that large gliding birds do not occupy that space.

The CIAIAC also pointed out to the Ministry that neighbouring countries with much lower Griffon Vulture populations were in compliance with European regulations but could demonstrate very different results in terms of their track records in air safety.

With regard to REC. 25/19, issued as a result of investigation A-046/2019, which recommends that in the interest of preventing accidents related to air safety, the Ministry for the Ecological Transition and the Demographic Challenge apply the exemptions provided in Article 61.1.b) of Law 42/2007 of 13 December 2007 on Natural Heritage and Biodiversity to the population of Griffon Vultures (*Gyps fulvus*), thus rendering ineffective the prohibitions established in Chapter I, they did not even reply. Therefore, given the time that has elapsed since it was issued and the fact that there is no expectation that they will reply, let alone take any action, it should have been closed and filed as unacceptable.

Given that actions remain pending from previous recommendations, no new recommendations are being issued to the Ministry for the Transition.

We have decided not to issue any further recommendations to the pilots' associations because they have already tried, by various means, to raise awareness among their members.

AESA published a three-page leaflet with recommendations to prevent bird strikes, which was based on an AOPA operational safety letter and included the information published in the AIP and the recommendations put forward by AEPAL and AOPA.

It also seems clear that both AESA and ENAIRE are very aware of the problem, as AESA published a three-page leaflet in 2017 with recommendations to prevent bird strikes, a further pamphlet on bird strikes, and set up the National Aviation and Wildlife Programme.

For its part, in response to a CIAIAC recommendation, ENAIRE added to the Aeronautical Information Publication (AIP), updating the information on migratory bird flights and areas with sensitive fauna, which now contains three bird concentration maps that include updated information for Griffon Vultures.

### **3. CONCLUSIONS**

#### **3.1. Findings**

- The impact with the griffon vulture could not have been avoided by the pilot.
- The pilot shut down the engine to eliminate the vibrations caused by the damage to the propeller.
- The choice of landing field was appropriate.
- The pilot was unharmed.
- The aircraft did not sustain major damage.

#### **3.2. Causes / Contributing factors**

The investigation has concluded that the off-airfield landing occurred due to an impact with a Griffon Vulture which damaged the propeller and forced the pilot to make an emergency landing.

#### **4. RECOMMENDATIONS**

None.