DO INVESTIGATIONS CONTRIBUTE TO WILDLIFE STRIKE PREVENTION?

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Introduction

The hazard of wildlife strikes to aircraft has been, and still is, underestimated by aviation investigation agencies. The Author has superficially examined some final reports of investigations drawing the conclusion that the common element was the lack of specific recommendations aimed at prevention. Therefore, it was necessary to analyze a sufficiently large number of final reports to be able to draw considerations of general nature.

Method followed and information sources

It was decided to limit the search to the period between 2000 and 2022, Some events, including some significant wildlife strikes, were not taken into consideration as investigations are still ongoing at the date of December 2022.
Therefore, 70 accident or incidents caused by wildlife strikes, which were followed by a technical inquiry, were found on the web. The 70 reports were then divided into categories and the percentages of each category were recorded. The investigations included only civil aircraft, with the exclusion of helicopters, both for commercial transport and for general aviation.

Appendix A reports the list of accidents or serious incidents analyzed in this research.
Appendix B also contains the types of recommendations released.

The sources of information used were the following:
- The rich, though not exhaustive, database of the website www.aviation-safety.net;
- The information collected on the website www.avherald.com;
- The database contained in the site www.birdstrike.it which largely incorporates and integrates the information contained in the two websites above;
- The NTSB website, www.ntsb.gov ;

- Other investigation board websites belonging to the States that conducted the inquiries.

The seventy cases researched do not represent the entirety of the events investigated which occurred in the indicated period. It is presumable that some countries conducted investigations but did not have their own public websites. Their final reports are confined exclusively to the governmental agency to which they report and thus are prevented from a widespread dissemination.

The aeronautical investigation and the safety recommendations

Annex 13 to the Chicago Convention (ICAO) regulates in detail the cases in which an aeronautical investigation is required and the procedures for carrying it out. The obligation to carry out an inquiry is also mentioned in the Article 26 of the Convention, which imposes it on the member States on whose territory the accident occurred.
Safety Recommendations can be issued at any time during the investigation in urgent cases. They can also be part of the final investigation report "when appropriate". The recommendations are addressed to the State that conducted the investigation (as well as to all other States possibly involved). The State is then required to ensure that the recommendations have an actual follow-up. When a final report does not contain any recommendations, it means that the State does not deem it appropriate or that the cause that led to the accident/ incident cannot be eliminated, mitigated or otherwise managed. This interpretation seems to be of absolute importance in explaining the policy of some States towards the wildlife strike hazard or, to be more precise, the degree of expertise of the investigation boards, as will be explained later.

Results - Quantitative and qualitative analysis of the final reports

Thus, 70 final reports of technical investigations were examined.
37 of these did not contain any recommendations, while 33 completed their work with recommendations of various kinds.
In percentage terms, therefore, 53% of wildlife strike investigations remained without any recommendations, while 47% contain recommendations.
The countries that conducted the 70 investigations are:
United States of America: 38
Australia: 3
India: 3
Great Britain: 3
Italy: 3

Argentina: 2
Ghana, Japan, Nigeria, Kenya, Denmark, R.D. Congo, Nepal, New Zealand, Canada, Holland, Germany, Ireland, Belgium, Bulgaria, Sudan, Russia, Spain, South Africa: 1 each.

The number of final reports from the USA that do not contain recommendations is unusual: 32 (out of 38).

Moving deeper into the analysis of the inquiries followed by recommendations (33), it emerges that:
16 (49%) enter specifically into the merits of prevention against impacts, together with recommendations of different nature.
4 (12%) deal exclusively with problems relating to the mitigation of the damage or to technical shortcomings that have limited the investigation itself.
5 (15%) deal with collateral problems, such as organizational issues, flight crew training, regulatory changes or other.
In 8 cases (24%) no recommendations were issued because during the investigation the interested parties had already adopted preventive measures which evidently satisfied the investigators. Or specific recommendations were issued by other bodies (for example, in one case, the AOPA, Aircraft Owners and Pilots Association).
As a result, only 24 (34,3%), out of a total of 70 investigations, dealt specifically with the prevention of wildlife strikes, issuing recommendations on the subject or causing initiatives from third parties.
Incidentally, during the analysis of the various reports some questionable cases of "complacency" emerged, and even of explicit refusal to issue recommendations.

In one case, the investigating agency itself claims that "*In the opinion of…., it is difficult for an airport operator to mitigate the risk of birdstrikes under such conditions, as it is unrealistic to expect a complete control of or warning capability against birds residing at unspecific locations away from the airport*."

In another, the investigation ended with satisfaction of the measures in place at the airport, despite a bird ingestion into an engine and further with the same aircraft being readmitted to service without a thorough inspection of the engine itself: *" .....airport is providing an effective bird management program that is keeping the risk of bird strikes as low as reasonably practicable"*

In the case of an investigation concluded 17 years after the event, the board concludes that *"the inadequacy of the measures and the activity to prevent wildlife in the maneuvering area"* was ascertained but at the same time they did not deem it necessary to issue any recommendation.

Discussion

Wildlife strikes represent a risk to passengers, crews or persons and properties on the ground. Wildlife strikes also create the possibility of substantial financial damage even in case of minor events (aircraft grounding, inspections, maintenance, passenger re-protection and so on).
See Appendixes A & B, attached, for examples of hazards encountered and their results.

Once the causes and contributing factors have been ascertained, recommendations should be forwarded to the State authority which can mandate mitigate to reduce the risk of the wildlife hazard.
The strength of a recommendation rather than its legal value lies in its significance of moral suasion, deterrence and above all prevention. Recommendations can be rejected by the State to which it is directed but the State is required to justify its decision to reject. Certainly, a rejection would represent a very dangerous precedent in the hands of a Court, should a similar event occur again without anything being done to prevent it.
The Author has thoroughly examined some judicial decisions following trials for damage compensation (sometimes being part in them as a consultant) which certainly would have been heavily influenced by a previous not applied recommendation issued by an investigation board.
It is therefore logical to affirm that safety recommendations constitute a valid contribution to the prevention of accidents in general and, in our case, those caused by wildlife strikes.
In the light of the above, an investigation limited to the causes of events (e.g. *"the rejected take-off was originated by a bird ingestion into the engine which caused it to shut down"*) cannot be considered a safety recommendation or mitigation in any manner.
In general, the investigation should follow the fundamental international rules (standards) established by ICAO. The State in which the event occurred should set up an organization for hazard assessment and collecting data of impacts and wildlife presence at airports and their vicinities. Furthermore, measures should be taken to minimize the possibility of impacts and finally that the wildlife attractive factors around airports are mitigated (Annex 14 ICAO §9.4).
ICAO has also published a specific document on risk management, the DOC 9137 Part 3, Wildlife Hazard Management (WHM). This document is only a recommended practice and not a standard, i.e. it explains “how to do what”, and can be ignored or not considered (as sometimes happens). However, its technical value is basic for those developing mitigation for prevention of future accidents/incidents.
There also may be a national legislation, which may apply in certain member States. In the European Union this takes mainly the form of “European Regulations”. These have a superior force with regard to the national laws and are largely in compliance with the aforementioned ICAO Standards.

There are also various internal rules of a lower rank like circulars of the member State's regulatory agencies.
Finally, there is a sort of *syllabus*, issued in 2006 by the International Bird Strike Committee (IBSC), which summarizes the basic requirements of prevention in 9 points. It is a guideline only but exerts a certain influence in the courtrooms, if only as a rule of conduct or best practice.

In summary, the aeronautical investigation should shed light on the application of the ICAO standards (Annex 14 and possibly Doc 9137) and then at least on some of the following points, where applicable:
- Given that the vast majority of wildlife strike events occur at airports or in the immediate vicinity, is there an airport habitat management program in place?
- Is there a wildlife control service, continuous or not, depending on the airport traffic?
- Is the equipment of the bird control staff adequate, according to the state of the art?
- Is there a service for identifying and quantifying the wildlife present in the airport area or in the immediate vicinity?
- Is there a local or national identification service to identify the species involved in the impacts? Is it in use?
- What kind of information has been given to flight crew and air traffic control personnel on the presence of wildlife and in what forms? Were they effective?
- What training has been given to flight crew and air traffic control personnel on the wildlife strike hazard?

The answers to the above questions, which should be part of every thorough investigation, would shed light on the state of prevention measures in place prior to a birdstrike event. Safety recommendations and mitigation should follow to ensure that an adequate and reasonable safety "background" is restored.
There are also triggering factors of the accident/incident itself - namely the last link in the chain - or the last hole in the cheese according to the famous Reason's theory (1).
Among air accident experts there is a tendency not to emphasize this "last link in the chain", as this would lead to unloading the entire responsibility for the harmful event on the human error (*rectius:* factor).
But since the only objective of an aeronautical investigation is to prevent future accidents and not to assign responsibility, there is no reason not to examine it thoroughly.

The aeronautical investigation should therefore ask the following question, and provide for an adequate answer: "*How and why did a certain number of animals find themselves on the same trajectory of an aircraft? And could this fact have been foreseen and/or prevented*?"

It's a simple question, but at the same time the answers can be complex. An analysis of the final reports shows that alongside clear cases, such as a herd of wild boars passed through holes in the airport fence, there are others, such as the impact with migratory birds at high altitude which require more accurate analyses.
While wildlife activity may appear random to the layman, experience demonstrates that there is a degree of predictability in wildlife activity. Additionally, wildlife is usually observable either by trained operators or by technical devices such as radar. The question is: what does the observer do with the information he observes? Does he have proper protocols in place and the tools to implement them?

Let us therefore examine whether and how the 16 final reports (out of 33) with their recommendations somehow took care of prevention.
As a first consideration, it must be noted that no final report entirely satisfies the expectations set out above, partly because the upstream background part may have been omitted or partly because the circumstances and causes of the impact have not been fully clarified or partly also because some actors on the scene were not involved in the investigation.
Through the list of final reports, provided in Appendix A, the reader can form his own opinion on this point.

The recommendations released vary from a generic minimum (Ex. …*should intensify coordination with stakeholders concerning Bird and Wildlife Hazard Management)* or ("*Etablir un program de lutte contre le risque aviaire aux aéroports*"), to something more detailed but still generic (*Eg. "Increase surveillance at aerodromes known to be prone to wildlife activity and ensure proper follow up action. The same may be harmonized with the process of aerodrome license/renewal").*

One investigation calls on the ICAO Doc 9137 and states something more specific and concrete ("*ICAO Doc 9137 gives clarification of vegetation management, data collection and training. Various passive and active management techniques for Wildlife Hazard management may be implemented...")*.

Still with regard to Doc 9137 this recommendation stands out, issued by an African board ("*Since the draft copy of ..... bird/wildlife hazard management program only covered an area 8km from ARP instead of up to 13km as specified by ICAO Doc. 9137 Part 3 section 4.7.2 it is recommended that: ....revise WHP section 2.10 to cover areas off-airport up to 13km radius on ARP to include major bird attractant sites such as ....slaughterhouse and the damping site*.").

Finally there are those who enter directly into the core of the problem ("*Should improve the habitat management program -including reduction or elimination of trees, shrubs and other plants which provide food, shelter or roosting sites for birds; Should enhance its aerodrome grass management appropriate to the prevalent species and the degree of risk that they pose should liaise with local*

inhabitants to limit the attraction of birds to fields (in the vicinity of the airport); Should install specialized ground-based radar equipment used for tactical detection of large flocking birds; Should adopt and extend Runway End Safety Area to conform to ICAO standards; Should include the information about the ravine at the end of RWY… into the AIP and send it as Notice To Airmen (NOTAM)".

It is significant that these precise recommendations have once again been issued by an African investigation board following an accident that occurred at an airport on a small island in the Atlantic with at most twenty movements a day.

On the same level a mention is deserved by the report of a European agency further to a serious incident (double bird ingestion at take-off and emergency return). The agency recommends that the CAA "*prevent the formation of stagnant water or cover the surfaces of the drainage basins with nets or plastic balls"; "assign exclusive tasks to the bird control and removal service"; "urge the crews to give timely information to the TWR on the presence of birds"* and finally *"use a risk matrix instead of the old standard of the number of impacts/10,000 mvt."*

In another case, however, it remains inexplicable how, 17 years after the event, the same agency ended an accident investigation that caused two deaths with the statements: *"Contributory factors: (omissis) The inadequacy of the measures and the activity to disperse the birds in the maneuvering area. In the light of the evidence collected and the analyzes carried out, it is not deemed necessary issuing safety recommendations"*.
Probably, but it is only a hypothesis, in the first investigation the agency hired an external expert while in the second such contribution must have been lacking (2).
As can be seen, the quality and completeness of recommendations appears extremely varied but does not reach the necessary level of effectiveness.

A few words should be spent trying to explain the 32 final reports of the US investigation board (out of 37) that do not contain recommendations. It is quite obvious that there may be cases in which it is not possible to recommend anything because the wildlife strike event (bird in these cases) occurred outside of any possible prevention (en route, or for unforeseeable circumstance etc...). It is in fact a common belief that the bird strike hazard can be limited but can never be completely eliminated unlike the successfully mitigation of other natural hazards to aviation such as wind shear, icing, volcanic ash.
However, by analyzing in depth the final reports of the 32 events, it appears that in several cases it would have been appropriate to issue some recommendations.
Some authoritative American experts argue that this circumstance is due to a number of factors:

- a) the lack of knowledge of the hazard by pilots and airlines together with its underestimation by the US authorities;
- b) insufficient training received by the investigators;
- c) insufficient involvement of regulatory bodies;
- d) fear of an increase in costs to change the existing status quo.

Paradoxically the Air Force and the Navy of the United States have their own efficient policy on wildlife strikes, have their own properly trained investigators and are particularly attentive and aware.

Conclusions

Every aeronautical accident or incident contains a lesson to be learned quickly. It is essential that the investigation ends within a reasonable time, contains the appropriate recommendations, and is widely disseminated to all participants in the aviation industry: pilots, ATC (3), airport operators, and above all regulators and industry managers.

Reports released seventeen years after the accident are simply not acceptable, nor are those that remain in the drawers of some aviation bureaucracy.

If, as Capt. Andrea Bomben claims in his recent book "Wildlife Strike", airline pilots have only a vague idea of the hazard and ignore the possible strategies for limiting the damage, one has the well-founded feeling that for aeronautical investigators the issue may be even more serious and widespread.

In addition to noting the limited number of final reports containing recommendations what is worrying is their content which is often generic, vague or which takes into consideration topics that may be relevant but not for prevention. Thus, final reports, which enter directly into the heart of the problem, are to be considered exceptions to the rule.

Additionally, there is a widespread belief that wildlife strikes are an “Act of God” and therefore unpreventable. Competent mitigation recommendations can help obviate this careless belief and approach wildlife strikes like other natural hazards to aviation. We have successfully mitigated ground and inflight icing, windshear, volcanic ash, why not wildlife?

One of the features that should be improved is therefore the professional training of the investigators (4) or at least the inquiry commissions’ enlargement in order to include external experts.

Just for an example, in all the seventy final reports there is not a single mention regarding the soil inside the airport and whether there was an attractive vegetation for some species of birds or mammals, a matter which agronomists and ornithologists know well.

The Author initially believed that specific recommendations on wildlife strikes prevention were very rare and exceptional. Instead, as seen, at least 34,3% of the inquiries produced recommendations or prompted factual reactions and initiatives from third parties.

This does not mean at all that the balance sheet is positive and reassuring, far from it.

Through the recommendations legislative and organizational changes can be obtained, as well as resource investments and the involvement of those who even don't know, or don't want to know, to be part of the solution.
Without recommendations, instead, things will remain exactly as they are.

Footnotes:

1) In an ideal world each defensive layer would be intact. In reality, however, they are more like slices of Swiss cheese, having many holes—though unlike in the cheese, these holes are continually opening, shutting, and shifting their location. The presence of holes in anyone "slice" does not normally cause a bad outcome. Usually, this can happen only when the holes in many layers momentarily line up to permit a trajectory of accident opportunity—bringing hazards into damaging contact with victims (Reason J. Human error: models and management).

2) This hypothesis will however be discussed in the conclusions. At the moment it is only useful to point out that the wildlife strike is typically an "aviation" problem and in this context, it must be dealt with, while even today there is who consider it mostly from an ornithological point of view. This category of specialists, in fact, represents the majority of those who deal with the problem in various forms. The Author believes that their scientific contribution is essential for a correct factual analysis and for finding adequate solutions but cannot be exclusive and preponderant.

3) On the role of ATC in the prevention against wildlife strikes, the opinion of the Author has been expressed in the article "The role of air traffic control in the prevention of impacts with wildlife at airports. The ICAO regulation and its local applications" downloadable by the link:
http://www.birdstrike.it/birdstrike/file/images/file/201409_IL%20RUOLO%20DEL%20CONTROLLO%20DEL%20TRAFFICO%20AEREO2.pdf

4) Aeronautical investigators are often pilots or former pilots. Their lack of expertise in the field of wildlife strikes is therefore the same of all pilots. The root is the underestimation of the problem by entire categories, which has considerable consequences on flight safety.

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Appendix A: List of final reports with links to download the original document.

Appendix B: List of events with the type of recommendations issued.

Literature cited:

- CONVENTION ON INTERNATIONAL CIVIL AVIATION, Chicago 1944
- Annex 13 to the Convention
- Annex 14 to the Convention
- ICAO DOC 9137 part 3
- REASON J. *Human error: models and management*, 2000
- BOMBEN, A. *Wildlife strike, a guide for airline pilots*, IBN 2022

APPENDIX A

In the search on the website of NTSB please use the aircraft registration marks

25 May 2000 C310 **N30RA**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
3 May 2001 Be1900 NF **VH-IMH**
https://aviation-safety.net/database/record.php?id=20010503-0
18 Oct 2001 SA226 **LV-WNC**
https://jst.gob.ar/files/2510142.pdf
9 Mar 2002 CL600 **N622BR**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
8 May 2002 Be400 **N400GJ**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
24 Dec 2002 SA 227 AC **OY-BPH**
http://www.aaib.gov.uk/cms_resources.cfm?file=/dft_avsafety_pdf_029044.pdf
1 Aug 2003 DHC8 **N409QX**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
1 Jun 2003 Lear 45 **I-ERJC**
https://ansv.it/wp-content/uploads/2020/07/Relazione-I-ERJC-2.pdf
11 Aug 2003 Boeing 737 **LV-ZXP**
https://www.jiaac.gob.ar/files/2363773.pdf
12 Nov 2003 Lear 24 N77JL
https://reports.aviation-safety.net/2003/20031112-0_LJ24_N77JL.pdf
10 Sep 2004 SA227 AC **ZS-OLS**
https://caasanwebsitestorage.blob.core.windows.net/accident-report-archive/7858.pdf

24 Nov 2004 Boeing 737 **PH-BTC**
http://www.fomento.gob.es/NR/rdonlyres/0E5E853B-DE65-4617-B614-A1F76847DC92/28916/2004_070_A_ENG1.pdf
1 Sep 2005 Falcon 20 **N821AA**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search

9 May 2005 Sabreliner 80 **N972NR**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
7 Jul 2007 B 767 **N834MH**
https://ansv.it/wp-content/uploads/2021/08/N834MH.pdf
29 Jul 2007 AN 12 **RA93912**
https://mak-iac.org/upload/iblock/866/ra-93912_ofinf.pdf
23 Oct 2007 PA 44 **N327ND**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
8 Nov 2007 AN12TB **ST-JUA**
https://aviation-safety.net/database/record.php?id=20071108-0
4 Mar 2008 Cessna 500 **N113SH** https://www.ntsb.gov/investigations/Pages/DFW08MA076.aspx
3 Aug 2008 A 320 **LZ-BHE**
http://www.mtitc.government.bg/upload/docs/Okon4ateleDoklad_LZBHE_public.pdf
10 Nov 2008 B737 **EI-DYG**
https://ansv.it/wp-content/uploads/2020/07/Relazione-EI-DYG.pdf
15 Jan 2009 A320 **N106US** https://www.ntsb.gov/investigations/Pages/DCA09MA026.aspx
25 May 2009 B747 **N704CK**
https://mobilit.belgium.be/sites/default/files/domain/Aviation/Veiligheid/Verslagen%20voorvallen/2008/AA-8-5.pdf
10 Oct 2009 B737 **G-OBMP** http://www.birdstrike.it/birdstrike/file/images/file/20110131_12935-REPORT_2011_002-0.PDF
18.2.2010 C208 **N892FE**
https://reports.aviation-safety.net/2010/20100218-0_C208_N892FE.pdf
6 Apr 2010 B737 **D-ABBT**
http://www.birdstrike.it/birdstrike/file/images/file/2013.02_D-ABBT.pdf
19 Jun 2010 B757 **G-FCLK**
https://www.gov.uk/aaib-reports/boeing-757-2y0-g-fclk-19-june-2010

6 Jun 2010 B 737 **CN-RMF**
https://aviation-safety.net/database/record.php?id=20100606-0
22 Sep 2010 Beech B100 **C-FISK**
http://www.tsb.gc.ca/eng/rapports-reports/aviation/2010/a10q0162/a10q0162.pdf
8 Nov 2010 Dash 8-400 **N422QX**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
15 Nov 2010 ERJ 175 **N604CZ**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
26 Sep 2011 B757 **N526UA**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
10 Nov 2011 A320 **N331NW**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
20 Jun 2012 A320 **ZK-OJQ**
https://www.taic.org.nz/inquiry/ao-2012-002
9 Aug 2012 Falcon 20 **G-FRAI**
https://assets.digital.cabinet-office.gov.uk/media/5422f4d5e5274a131700054f/Fan_Jet_Falcon_20E_G-FRAI_06-13.pdf
28 Sep 2012 Do 228 **9N-AHA** https://www.tourism.gov.np//files/publication_files/SitaAir9N-AHA-DO228Accident_Investigation_FinalReport_1514105864.pdf
17 Nov 2012 C550 Citation II **N6763L**
https:/ /reports.aviation-safety.net/2012/20121117-0_C550_N6763L.pdf
5 Dec 2012 CL600 **N411ZW**
https://reports.aviation-safety.net/2012/20121205-1_CRJ2_N411ZW.pdf
01 May 2013 A320 **9Q-CCA**
No more available online
12 Oct 2013 C525 **N368PK**
https://reports.aviation-safety.net/2013/20131012-1_C25A_N368PK.pdf
24 Nov 2013 Dash 8 **N808EX**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
22 Jan 2014 C500 **OY-JAI**
https://reports.aviation-safety.net/2014/20140122-0_C500_OY-JAI.pdf
28 May 2014 ERJ135 **N299SK**

https://reports.aviation-safety.net/2014/20140528-0_E135_N299SK.pdf

10 Aug 2014 Dash 8/100 **N815EX**

ricerca su https://data.ntsb.gov/carol-main-public/basic-search

06 Nov 2014 B737 **VT-SGK**

https://reports.aviation-safety.net/2014/20141106-0_B738_VT-SGK.pdf

12 Dec 2014 B737 **N7710A**

https://reports.aviation-safety.net/2014/20141212-2_B737_N7710A.pdf

04 Jan 2015 Fokker F5 **5Y-SIB**

https://reports.aviation-safety.net/2015/20150104-0_F50_5Y-SIB.pdf

09 Jan 2015 SAAB 340 **VH-OLM** https://www.atsb.gov.au/publications/investigation_reports/2015/aair/ao-2015-007

19 Mar 2015 ERJ 145 **N625AE**

ricerca su https://data.ntsb.gov/carol-main-public/basic-search

06 Nov 2015 C525 **N525DY**

https://reports.aviation-safety.net/2015/20151106-1_C525_N525DY.pdf

04 Dec 2015 DH 8 **VT-SUC**

https://www.dgca.gov.in/digigovportal/?dynamicPage=dynamicPdf/130613149&mainAccidentReports/500005/0/viewApplicationDtlsReq

19 Jun 2016 DHC3T **N104BM**

https://reports.aviation-safety.net/2016/20160619-1_DH3T_N104BM.pdf

5 Dec 2016 C550 **N75WL**

ricerca su https://data.ntsb.gov/carol-main-public/basic-search

15 Feb 2017 CRJ700 **N709PS**

ricerca su https://data.ntsb.gov/carol-main-public/basic-search

22 May 2017 C208B **N754KP**

ricerca su https://data.ntsb.gov/carol-main-public/basic-search

03 Jul 2017 A330 **9M-XXT** https://www.atsb.gov.au/publications/investigation_reports/2017/aair/ao-2017-070

21 Jun 2017 A320 **VT-GOS**

https://aviation-safety.net/reports/2017/20170621_A320_VT-GOS.pdf

29 JUL 2017 An74 **UR-CKC**

https://reports.aviation-safety.net/2017/20170729-0_AN74_UR-CKC.pdf

23 Jul 2018 C560 **N866VP**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search

01 Aug 2018 Be300 **N557AP**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
27 Mar 2019 B737 **N249WN**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
12 Jul 2019 C525 **N262BK**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
19 Oct 2019 DH8D **N402QX**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
21 Dec 2019 B737 **N7739A**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
14 Apr 2021 C525 **JA001T**
https://www.mlit.go.jp/jtsb/eng-air_report/JA001T.pdf
03 Sep 2021 B777 **PH-BVK**
https://aibghana.gov.gh/wp-content/uploads/2021/12/KLM-FINAL-REPORT-30.11.21-compressed-1.pdf
04 Sep 2021 C565 **N827JS**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
02 Oct 2021 A320 **N922NK**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
20 DEC 2021 C525 **N287CB**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search
15 Jul 2022 Raytheon 400a **N400MX**
ricerca su https://data.ntsb.gov/carol-main-public/basic-search

APPENDIX B

This appendix contains a summary table of the cases listed in APPENDIX A.
The document is useful for immediately identifying, for each individual event, whether recommendations have been issued and, if so, what nature they are. It should be noted that this classification is in any case merely indicative and refers to what is prevalent in the report, not excluding that it also may deal with something else.

Date	ACFT Reg. marks	ACFT type	State	Content of reccomendations				
				Wildlife	Damage mitigation/tech. shortcomings	Collateral aspects	Not released due to adoption of prevention measures	Not released
15.7.2022	N400MX	RAY400	USA					X
20.12.2021	N287CB	C525	USA					X
2.10.2021	N922NK	A320	USA					X
4.9.2021	N827JS	C560	USA					X
3.9.2021	PH-BVK	B777	GHANA	X				
14.4.2021	JA001T	C525	JAPAN				X	
21.12.2019	N7739A	B737	USA					X
19.10.2019	N402QX	DHC8	USA					X
12.7.2019	N262BK	C525	USA					X
27.3.2019	N249WN	B737	USA					X
1.8.2018	N557AP	BE300	USA					X
23.7.2018	N866VP	C560	USA					X
29.7.2017	UR-CKC	AN74	NIGERIA	X				
21.7.2017	VT-GOS	A320	INDIA			X		
3.7.2017	9M-XXT	A330	AUSTRALIA			X		

Date	ACFT Reg. marks	ACFT type	State	Content of reccomendations				
				Wildlife	Damage mitigation/tech. shortcomings	Collateral aspects	Not released due to adoption of prevention measures	Not released
22.5.2017	N754KP	C208B	USA					X
15.2.2017	N709PS	CRJ700	USA					X
5.12.2016	N75WL	C550	USA					X
19.6.2016	N104BM	DHC3T	USA				X	
4.12.2015	VT-SUC	DHC8	INDIA	X				
6.11.2015	N525DY	C525	USA					X
19.3.2015	N625AE	ERJ145	USA					X
9.1.2015	VH-OLM	SAAB340	AUSTRALIA				X	
4.1.2015	5Y-SIB	F50	KENIA	X				
12.12.2014	N7710A	B737	USA					X
6.11.2014	VT-SGK	B737	INDIA	X				
10.8.2014	N815EX	DHC8	USA					X
28.5.2014	N299SK	ERJ135	USA					X
22.1.2014	OY-JAI	C500	DENMARK					X
24.11.2013	N808EX	DHC8	USA					X

Date	ACFT Reg. marks	ACFT type	State	Content of reccomendations				
				Wildlife	Damage mitigation/tech. shortcomings	Collateral aspects	Not released due to adoption of prevention measures	Not released
12.10.2013	N368PK	C525	USA					X
1.5.2013	9Q-CCA	A320	R.D. CONGO			X		
5.12.2012	N411ZW	CL600	USA					X
17.11.2012	N6763L	C550	USA				X	
28.9.2012	9N-AHA	DO228	NEPAL	X				
9.8.2012	G-FRAI	FALCON 20	UK		X			
20.6.2012	ZK-OJQ	A320	NEW ZEALAND		X			
10.11.2011	N331NW	A320	USA					X
26.09.2011	N526UA	B757	USA					X
15.11.2010	N604CZ	ERJ175	USA					X
8.11.2010	N422QX	DHC8	USA					X
22.09.2010	C-FISK	BE100	CANADA				X	
6.10.2010	CN-RMF	B737	HOLLAND	X				
19.6.2010	G-FCLK	B757	UK					X

Date	ACFT Reg. marks	ACTF type	State	Content of reccomendations				
				Wildlife	Damage mitigation/tech. shortcomings	Collateral aspects	Not released due to adoption of prevention measures	Not released
6.4.2010	D-ABBT	B737	GERMANY					X
18.2.2010	N892FE	C208	USA					X
10.10.2009	G-OBMP	B737	IRELAND				X	
25.5.2009	N704CK	B747	BELGIUM	X				
15.1.2009	N106US	A320	USA	X				
10.11.2008	EI-DYG	B737	ITALY			X		
3.8.2008	LZ-BHE	A320	BULGARIA	X				
4.3.2008	N113SH	C550	USA	X				
8.11.2007	ST-JUA	AN12TB	SUDAN		X			
23.10.2007	N327ND	PA44	USA				X	
29.7.2007	RA93912	AN12	RUSSIA	X				
7.7.2007	N834MH	B767	ITALY	X				
9.5.2005	N972NR	SABRE LINER 80	USA					X
9.1.2005	N821AA	FALCON 20	USA					X

Date	ACFT Reg. marks	ACFT type	State	Content of reccomendations				
				Wildlife	Damage mitigation/tech. shortcomings	Collateral aspects	Not released due to adoption of prevention measures	Not released
28.11.2004	PH-BTC	B737	SPAIN			X		
10.9.2004	ZS-OLS	SA227	SOUTH AFRICA					X
12.11.2003	N77JL	LEAR24	USA					X
11.8.2003	LV-ZXP	B737	ARGENTINA	X				
1.6.2003	I-ERJC	LEAR45	ITALY					X
8.1.2003	N409QX	DHC8	USA					X
24.12.2002	OY-BPH	SA227	UK		X			
8.5.2002	N400GJ	Be400	USA					X
9.3.2002	N622BR	CL600	USA	X				
18.10.2001	LV-WNC	SA226	ARGENTINA	X				
3.5.2001	VH-IMH	Be1900	AUSTRALIA				X	
25.5.2000	N30RA	C310	USA					X
70				**16**	**4**	**5**	**8**	**37**