

Safety Regulation Group



CAA Paper 2006/05

The Completeness and Accuracy of Birdstrike Reporting in the UK

Based on a report prepared for CAA by David Nicholls, Risk Management Consultants, Abingdon UK

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Executive Summary

In 2004, the CAA's Research and Strategic Analysis section commissioned RM Consultants Ltd (RHC) and Central Science Laboratory (CSL) to carry out an assessment of the completeness and accuracy of the reporting of birdstrikes in the UK. The primary objectives were to establish whether any action is required to improve reporting and to identify where any such action should be targeted.

The assessment gathered information from quantitative analyses of the birdstrike data contained in the CAA's birdstrike database and the CAA's Mandatory Occurrence Reporting Scheme (MORS) database over the period 1990 to 2005. This period encompassed the legal change made to birdstrike reporting and efforts by the CAA to increase Industry awareness of birdstrike issues. Therefore, the quantitative analyses were complemented by structured interviews with a sample of aircraft operators and licensed aerodrome operators.

The assessment makes a number of recommendations to improve the completeness and accuracy of reporting of birdstrikes, including improved communication and the sharing of information within Industry; improvements to the reporting system; clarification of the objectives of the reporting system and the interpretation of reports; and the obligations on Industry.

This Paper, based on the assessment conducted by RMC in conjunction with CSL, is published in accordance with the CAA action included in the CAA Safety Plan 2006/07.

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Report **The Completeness and Accuracy of Birdstrike Reporting in the UK**

1 Introduction

1.1 Study initiation

Birdstrikes continue to cause a potential hazard to aircraft. A recent change to UK legislation has resulted in the mandatory reporting of birdstrikes and the CAA determined that it was appropriate at that point to assess the level of birdstrike reporting. The CAA's Research and Strategic Analysis Section commissioned RM Consultants Ltd (RMC) and Central Science Laboratory (CSL) to carry out the assessment.

This Paper, based on the assessment conducted by RMC and CSL, is published in accordance with the CAA action included in the CAA Safety Plan 2006/07.

1.2 Background

The initiation of this assessment, in January 2004, coincided with new legislation [1, 2] requiring pilots to report *all* birdstrikes in UK airspace to the CAA. Before this date, it had been mandatory to report only those strikes in which damage to aircraft was sustained, which had in some CAA references and guidance been defined in more limiting terms, only requiring reporting of birdstrikes causing 'significant' damage or damage that 'might affect flight safety'. The CAA was therefore aware that reporting levels may have been deteriorating and the intent of the new mandate was to assure a proper and more accurate level of reporting.

1.3 Objective and scope of the assessment

The objective of the assessment was to assess the completeness and accuracy of reporting of birdstrikes in the UK and to identify where improvements could be made to enhance the level of reporting. It concentrates on the period prior to the mandating of reporting (1990 – 2003) and the two years (2004 – 2005) after reporting was made mandatory.

The assessment was principally concerned with birdstrikes that occur with commercial air transport at licensed aerodromes, although other sectors of aviation (General Aviation, business etc.) were considered and some of the findings may be relevant to all.

1.4 Overview of methods

There were two main, complementary strands to the assessment method. The first strand was a quantitative analysis of the data from the CAA Mandatory Occurrence Reporting Scheme (MORS) database [3] and the CAA birdstrike database. This is described in Section 2.

To complement this, and capture industry experience and views, a qualitative review of the reporting process was carried out, based on structured interviews with a sample of aircraft operators and licensed aerodrome operators, as described in Section 3.

2 Quantitative analysis of strike data

2.1 Data sources

The main sources of data were the CAA Mandatory Occurrence Reporting Scheme (MORS) database as described in CAP 382 [3] and the CAA birdstrike database. The general criterion for an event to qualify as an MOR is that it endangered or potentially endangered an aircraft. For a birdstrike to qualify as an MOR, the specific test stated is that it caused 'significant damage or loss or malfunction of any essential service'.

The CAA birdstrike database, on the other hand, is intended to record data on all birdstrike incidents, regardless of whether they endangered or potentially endangered an aircraft. Prior to January 2004 operators were required to report only those strikes that caused damage, although in practice some non-damaging strikes were also being reported. The mandate, however, required pilots to report all strikes occurring in UK airspace. The CAA database contains many more records than the number of birdstrikes recorded in the MORS database. Any birdstrike recorded in the MORS database should also be in the CAA birdstrike database.

2.2 The value of quantitative analysis

Quantitative analyses were performed on the CAA birdstrike database and on records of birdstrike MORs. The three main indicators considered were the rate of reports per movement, the ratio of serious to non-serious incidents and the variations in reporting rates between aerodromes and air operators. The analyses and their findings are summarised in sections 2.3 to 2.5 respectively. Further detail is provided in Appendix A.

The CAA birdstrike database contains records of many thousands of strikes, and fields for recording up to forty parameters associated with each incident. Hence, there was a very large quantity of data available for analysis. However, a birdstrike is a relatively clearly defined type of incident, and the parameters recorded are primarily of a factual nature (e.g. time of day, height and speed of aircraft, part of aircraft damaged, bird species). Analytical results therefore need to be interpreted with caution, and the complementary, qualitative information from operator interviews (Section 3) is of equal importance.

2.3 Reports per movement

Figure 1 shows how the number of reports to the CAA birdstrike database has changed over time. The analysis is presented in terms of reports per Air Transport Movement (ATM) to factor out the increase in birdstrikes that might be expected simply because of the increased number of flights over the assessment period.

There were noticeable fluctuations year-on-year. Statistical analysis (see Appendix A) suggests that these were not due to purely random variation and changes had occurred. For example, there was a marked increase in reports in 2004 and 2005, following the mandate.

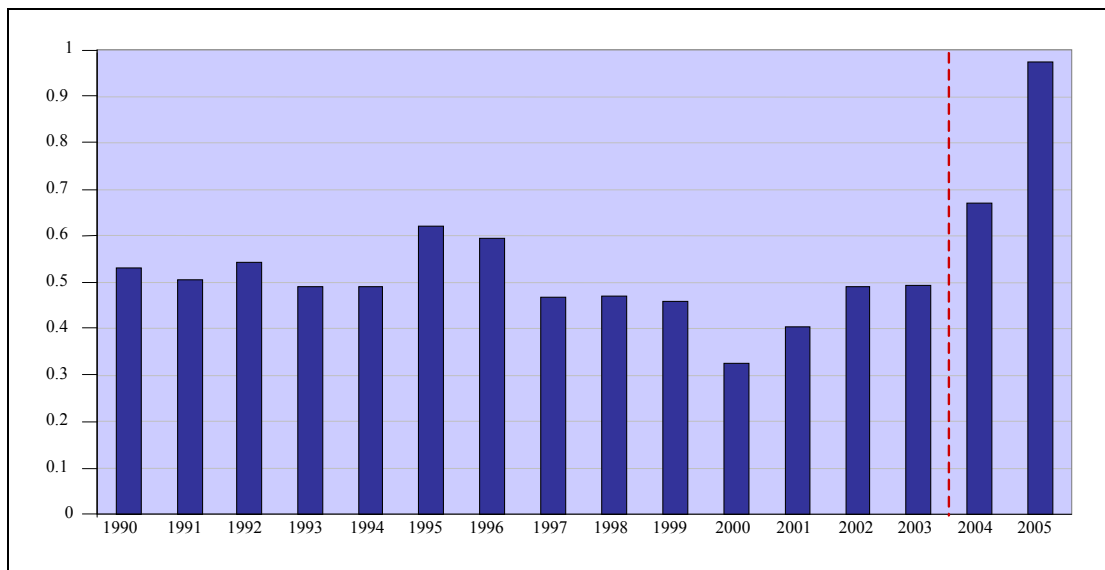


Figure 1 CAA database reports (1990 – 2005) per 1000 ATMs

Note: the red dashed line indicates the start of the mandate.

2.4 Ratio of 'non-serious' to 'serious' reports

The variations in the reports per ATM suggest that real factors have been affecting the actual rate of strikes and/or the proportion that are reported. It was not possible to discern conclusively how much of this variation could be explained by changes in the completeness of reporting, but an indication could be obtained from the ratio of 'non-serious' to 'serious' reports.

In general, individuals are more inclined to report serious incidents than those they perceive as having little immediate safety significance, and organisations tend to have more rigorous procedures for ensuring that serious incident reports are collected, analysed and passed on as necessary. In industries with a well-developed safety culture and safety management systems, such as aviation, the reporting rate of serious incidents should always be high, but the reporting of non-serious incidents may be more sensitive to changes in reporting culture. The number of serious incident reports should therefore provide a relatively stable benchmark, more faithfully reflecting the actual incident rate against which to judge the reporting of non-serious incidents. The higher the ratio of non-serious to serious reports, the better the reporting culture is likely to be. Hence this ratio can be an indicator of the completeness of reporting.

In the assessment, MORs were taken as 'serious' incidents and CAA database incidents (except those that are also MORs) were taken as 'non-serious' incidents. This split was chosen because data for these two categories were readily obtainable, and the distinction between them is well defined. It is apparent from Figure 2 that, in the period prior to the mandate, the rate of reporting 'non-serious' incidents was declining markedly relative to the reporting rate for 'serious' ones but that it recovered after the mandate took effect.

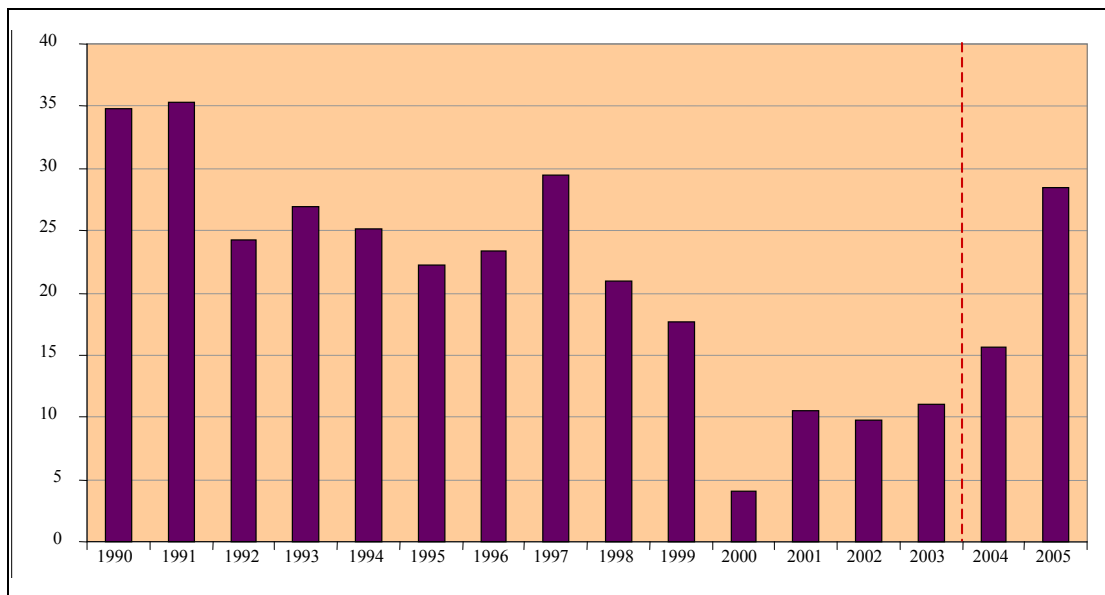


Figure 2 Ratio of 'non-serious' to 'serious' reports, 1990 - 2005

Although there are various reasons why the actual ratio of serious to non-serious incidents may have changed, it has not been possible to postulate any factor other than a change in reporting rates that could explain such a marked decline prior to 2004. The analysis therefore suggests that the reporting culture was worsening in the period prior to the mandate, and that the mandate reversed this trend.

3 Reporting rates of different groups within the industry

Figure 3 compares reporting to the CAA database from aircraft operators and from aerodromes over the period prior to the mandate. It shows a marked decline in the reports from aircraft operators up to the year 2000, recovering slightly thereafter and more sharply when the mandate came into effect in 2004. No credible mechanism could be identified that could have so substantially changed the *actual* number of birdstrikes that air operators could be expected to report, so the implication is that there have been major changes in the completeness of reporting by aircraft operators.

The indications from CAA experience and interviews were that the fall prior to the mandate is most likely to reflect problems at the 'secondary' reporting level – i.e. from airlines' internal safety departments to the CAA – rather than in the 'primary' reporting rate from pilots to their safety departments. Some airlines, for example, had difficulties associated with the implementation of electronic reporting systems.

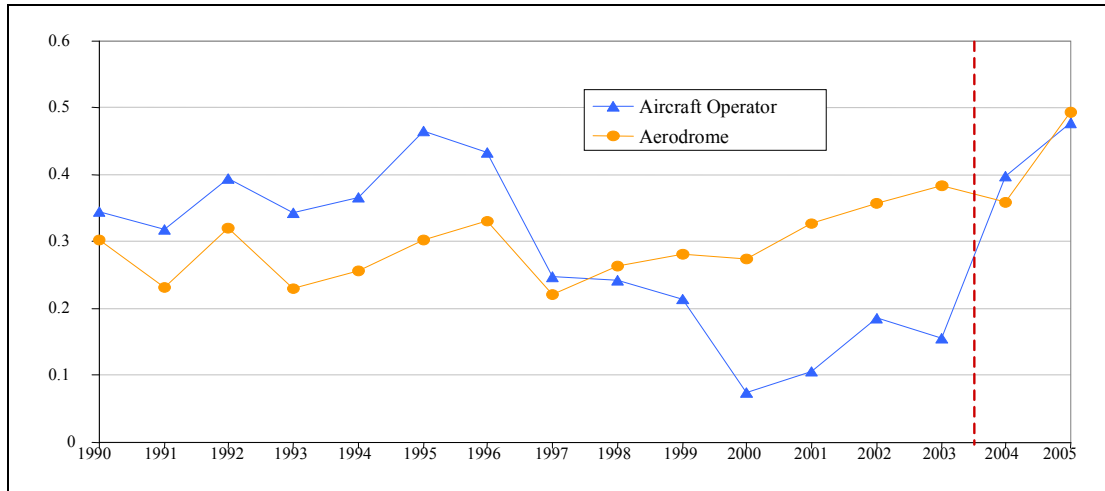


Figure 3 Who Reports: number of reports per 1000 ATMs

4 Review of the reporting process

4.1 Introduction

The birdstrike reporting process was reviewed to identify actual or potential areas of weakness and opportunities for improvement. The intended process for the capture and flow of information was determined from the relevant regulations and guidance. The practical working of the process was assessed in discussions with CAA staff and in the operator interviews, in which actual procedures, reasons for non-reporting, and obstacles to good information flow were identified and discussed.

It was apparent that the intended lines of communication are quite long and complex. In general, the chain could be broken by the failure of any one link. Audits of operators' reporting processes are therefore an essential safeguard to identify such failures and enable operators to maintain or improve their processes.

Continued efforts and reminders to operators are needed to ensure that the improvement in reporting that has followed the mandate is sustained, especially with the emergence of new airlines and new routes. Awareness of the importance of reporting birdstrikes could otherwise tend to be overtaken by other, albeit equally important, issues.

A number of specific areas were identified in which weaknesses most commonly occur, and these are summarised in Sections 4.2 to 4.5, together with suggested measures for improvement. Further detail of the interviews, analysis and findings are provided in Appendix B.

4.2 Information exchange between stakeholders

There are major variations in the extent to which birdstrike reports are shared between stakeholders: pilots, Air Traffic Services (ATS), aircraft operators, aerodromes, and engineering maintenance organisations. There are also variations in the extent to which warnings about current bird activity are passed between Bird Control Unit (BCU) staff, pilots and ATS. The most frequent concern mentioned was that information given by BCUs to ATS had not been passed on to pilots. While recognising that there are genuine site-specific differences that may justify some variation, there are opportunities to improve. Another concern is that BCUs do not always receive copies of all birdstrike reports relevant to the aerodrome. These reports should form part of a continuous assessment of the birdstrike risk at the

aerodrome and the determination of corrective action and prevention measures, which should be disseminated amongst the aerodrome operations community at suitable committees or meetings or other means of communication. There is an ongoing need for publicity to remind stakeholders of their responsibilities and, possibly, a need for guidance to encourage best practice in sharing information (*Recommendation 1*).

A common observation from operators was that they would like more feedback from the CAA, to help them identify wider trends and to ensure that potential reporters see that the value of reporting is recognised by the CAA (*Recommendation 2*).

4.3 **Reporting to the CAA**

There has been some confusion in the industry regarding the differing criteria, procedures and addresses for reports to the CAA birdstrike database and to MORS. In part this confusion is related to the use of the word 'mandatory'. Although it is now mandatory to report all birdstrikes to the CAA only those satisfying the criteria for an MOR should be entered into the MORS database.

There is further potential for confusion in the structure of the CAA documentation. The Birdstrike Report Form (CA1282) itself gives the address of the CAA's Aerodrome Standards Department (ASD) but the form is also presented within the context of CAP 382 which, in its main text, states that birdstrike MORs should be sent (like most other MORs) to the Safety Investigation Data Department (SIDDD). It is also unclear whether, for a birdstrike that qualifies as an MOR, the reporter needs to submit reports to both the CAA birdstrike and MOR systems.

There does not appear to be a fundamental problem once the distinction has been realised and procedures for correct addressing (e.g. automatic e-mailing) put in place, and the two-way exchange of information between ASD and SIDDD provides a safeguard against reports being lost altogether. Mis-classifications and duplication can also be reconciled within the CAA; however, the efficiency of the process could be reduced and the opportunity for error increased. It would be preferable if form design and guidance could make the correct processes clearer (*Recommendation 3*).

Many operators use hard copies of the Form CA1282. Because the printed original is 2-sided, the second side is often omitted when the original is photocopied. Also, many reporters submit completed forms to the CAA by fax and it is a relatively common error to omit to fax the second side. In the longer term a move to electronic reporting should eliminate this particular error but, in the short term, any form re-design should make it clear that there are two sides (*Recommendation 4*).

The implementation of improvements to the reporting process is linked to the question of electronic reporting. While this could eliminate many potential errors and improve the efficiency of the process in many ways, a number of IT and other issues will have to be resolved first. In particular there are legal issues concerning Freedom of Information [4] and compatibility with European aviation incident reporting requirements under European Coordination Centre for Aviation Incident Reporting Systems (ECCAIRS). These will have to be addressed at a wider level than for birdstrike reporting alone (*Recommendation 5*).

4.4 **What to report**

The operators interviewed believed that the form CA1282 asks the right questions. However the 'pilot warned of birds' tick-box led to discussion and concern, mainly because it might be seen as a question about blame attribution and liability. Also it was unclear what should be taken to constitute a 'warning'. For example, interviewees varied in their interpretations of a warning (is it a permanent entry in the

'Air Pilot' or other publication, or only a specific message from the ATS?). Although some safety-beneficial information might be gathered from this field (such as monitoring BCU or ATS effectiveness in passing on warnings) it does not seem to be used, and the detrimental effects were generally considered to outweigh any benefits. It is therefore suggested that the 'pilot warned of birds' tick-box should be deleted from future versions of the form (*Recommendation 6*). Reporters would still be able to comment on warnings given/not given in the 'Remarks' box if they wished.

There are variations in the extent to which 'near misses' are reported, and the legislation and various guidance publications are not entirely consistent in their wording. While there will always be an element of judgment in deciding whether to report in some cases, the principles should be clear and there is a need to promote a clearer understanding of the reporting criteria (*Recommendation 7*). One view could be that there must have been some safety-related or potentially safety-related effect. Thus, rejected take-offs and pilot-initiated go-arounds caused by bird activity should be reported, even when no bird was actually struck. Mere sightings of birds, or delayed take-off awaiting bird clearance, should not be reported.

It would also be helpful to adapt the CAA birdstrike database to allow near misses to be clearly distinguished from actual strikes (*Recommendation 8*). Currently, this can be inferred from the 'number of birds struck' field, but when this is left blank, as often happens, it is unclear whether the reporter meant that they did not know how many birds were struck, that no birds were struck, or simply that they omitted to complete this field.

4.5 **Operators' Statistical Analyses**

While it is encouraging to see aircraft operators making use of their own data, there were two particular areas in which the pitfalls of statistical analysis were not always being recognised. First, while interviewees were aware of the pitfalls of drawing conclusions from a small sample with many confounding factors, some of the analyses they produce, especially as condensed into management summary reports, could easily be misinterpreted and any caveats may not be clearly evident. For example, random fluctuations in birdstrike numbers per month may be interpreted as trends. Second, most operators tended to concentrate on absolute numbers of birdstrikes, rather than birdstrike rates per movement. Absolute numbers can be valuable at the corporate level, in showing, for example, which aerodromes present the biggest risk to the fleet as a whole. But risk per movement is also important to, for example, identify aerodromes at which the adequacy of bird control needs to be questioned. Operators need to be reminded to consider the statistical validity carefully (*Recommendation 9*). Any guidance on these issues could also be helpful in relation to the analysis of other types of incident.

The implementation of the above would probably require a combination of updates to the design of form CA1282, publicity, additional guidance and changes to auditing practices. A key principle will be that the relevant information must reach those 'front-line' staff that are, most often, the reporters. To this end, the aim should be to make the form as self-explanatory as possible, whilst not overloading it with notes and guidance.

5 Recommendations

- 1 There is a continuing need for the CAA to remind aerodrome licensees and aircraft operators of their responsibilities to share information. This applies to warnings of bird activity as well as to reports of strikes that have occurred. Guidance to encourage best practice in sharing information (whilst being aware of the pitfalls of information overload) should also be considered.
- 2 Consideration should be given to the best ways of giving feedback on birdstrike reports, in order to help operators identify wider trends and to demonstrate the value of reporting.
- 3 The proper means and channels of reporting birdstrikes to CAA should be well publicised, clarifying in particular how the two systems (CAA birdstrike database and MORS) are related.
- 4 In any re-design of the Birdstrike Report Form (CA1282) it should be made more obvious that the hard copy version is printed on two sides, in order to reduce the likelihood of the second side being omitted when the original is photocopied or faxed.
- 5 Consideration should be given to the potential for electronic reporting. This could improve the efficiency and reliability of the process, although a number of information technology and legal issues would have to be resolved first.
- 6 The 'pilot warned of birds' tick-box on form CA1282 should be deleted.
- 7 Clearer guidance should be given on the criteria for reporting 'near misses'. Ideally, this should be given on form CA1282 itself, rather than in separate guidance.
- 8 Consideration should be given to adapting the CAA database to allow near misses to be clearly distinguished from actual strikes.
- 9 Aerodrome licensees and aircraft operators should be encouraged to consider carefully what level and type of statistical analyses may be feasible and helpful in interpreting their own birdstrike data. Any guidance on these issues could also be helpful in relation to the analysis of other types of incident.

6 References

- 1 *Air Navigation (General) (Amendment) (No. 2) Regulations 2003*. SI 2003 No 3286.
- 2 *Air Navigation (Amendment) (No. 2) Order 2003*. SI 2003 No. 2905.
- 3 *CAP 382. The Mandatory Occurrence Reporting Scheme*. CAA, 2003.
- 4 Freedom of Information Act 2000/ Freedom of Information (Scotland) Act 2002.
- 5 Hild J, 2003. *International Birdstrike Statistics for the Year 2000*. Bird and Aviation (Vogel und Luftverkehr) Vol 23, no 2. DAVVL.
- 6 Breuer M, 2003. *Birdstrike Statistics of German Civil Aviation from 2001 to 2002*. Bird and Aviation (Vogel und Luftverkehr) Vol 23, no 2. DAVVL.
- 7 Briot J & Giannone F, 2002. *Analyse des Risques Aviaires – Rapport Statistique 1998 –2000*. DGAC-STNA, Toulouse. Report Ref 152-jlb-fg-s.doc
- 8 Migliaccio G, 2004 Letter dated 18 Feb 2004 from Giuseppe Migliaccio, Director of Research and HF Department, ENAC, Rome, to Hazel Courteney, UK CAA.

7 Acknowledgments

This CAA Paper is based on a report prepared by RMC, with support from CSL in relation to bird strike ornithology and the practicalities of bird control. RMC would like to thank the many aerodrome and airline operators who gave their time to be interviewed. Industry input was a vital part of the assessment and was much appreciated.

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Appendix A Analysis of strike data

This Appendix gives details of the quantitative analysis of the birdstrike data described in Section 2 of the main text.

1 General analytical approach

Birdstrike data were analysed from 1990 up to 2005 (the last full year for which data was available). This choice of the assessment period is a subjective balance between, on the one hand, looking far enough back in time to obtain a large enough sample in statistical terms, and the fact that changes in aviation activity, technologies, operations and other factors mean that older data will not be representative of the current situation.

Birdstrike rates are known to exhibit marked annual cycles in response to seasonal factors affecting bird population, distribution and behaviour, and aircraft traffic levels. In order to average out the effects of these cycles, trend analyses over time are made by considering year-on-year variations rather than shorter timescales.

The assessment was required to consider birdstrikes to 'UK aviation'. This was taken to mean the strikes occurring in the UK or to UK-registered aircraft abroad. This is not an exact definition, since while the legislation makes it clear what incidents are to be reported and by whom, there are some differences between the reporting requirements under the MORS and for the CAA birdstrike database, and between reporting requirements and actual practice. For example, some reports are voluntarily submitted by military, private and foreign operators who are not actually required to do so by the legislation.

Aircraft traffic has been increasing, almost continuously, over the assessment period. It is instructive, for some assessment purposes, to factor out the increase in birdstrikes that might be expected simply because of the increased number of flights. This involves looking at incident rates per movement, rather than per year, and data on aircraft movements were therefore required. Movement data for the UK industry were gathered using various different categorisations and criteria, with varying degrees of completeness and reliability. Given the uncertainties, as noted above, around exactly what is meant by 'UK aviation' and who reports birdstrikes, it was not possible to define a single measure of movements that exactly matches the basis of birdstrike reporting. It was decided to use Air Transport Movements (ATMs) as the measure, since ATMs are one of the most reliable and complete measures. Also, the activities counted as ATMs (defined by the CAA Economic Regulation Group as 'landings or take-offs of aircraft engaged on the transport of passengers, cargo or mail on commercial terms') correspond reasonably closely to those of commercial operators who submit the majority of birdstrike reports. However, data presented 'per movement' should be interpreted as indicators only – they are useful in making comparisons and detecting changes over time, but are not reliable as absolute measures of risk level.

Birdstrike is in part a random process, depending on the co-occurrence of birds and aircraft in space and time, and some of the variation in year-on-year birdstrike rates will result from these random elements rather than from any changes in underlying controlling factors. To establish the extent to which random fluctuations might confound the interpretation of data, a statistical test was performed on the numbers of strikes in the CAA database, comparing the observed year-on-year variability with

that which would be expected from a purely random (Poisson) process. The results strongly indicated that real changes in underlying factors are more important than purely random variation.

By definition, data were only available for reported strikes. There was no independent benchmark of incident rates against which to judge the completeness of reporting. The CAA had approached the insurance industry some years ago with regard to assessing reporting in general, but their data had generally been less complete than the CAA's, as relatively few incidents result in a claim. To assess the completeness and accuracy of reporting therefore requires inference from rather subtle techniques of analysis, and the results are unlikely to be more than indications.

2 Ratio of non-serious to serious reports

In the period prior to the mandate, the reports of 'non-serious' incidents declined markedly relative to the reporting rate for 'serious' ones, but recovered after the mandate took effect (Figure 2). As stated in Section 2.4, it is believed that these large fluctuations reflect changes in the reporting culture rather than any actual changes in the relative numbers of serious and non-serious birdstrikes. The reasons for this are that we have not been able to postulate any factor other than a change in reporting rates that could explain such a marked difference. Factors that could affect the actual ratio of non-serious to serious strikes include: changes in aircraft technology, changes in the pattern of aircraft destinations and proportion of time flying at low level, and changes in the distribution or population of bird species. However, such various changes are likely to pull the ratio in different directions, and no one factor stood out as having changed so significantly over the assessment period. Also, there have been no changes over this period in the criteria for deciding whether a birdstrike should qualify as an MOR.

3 Comparison of reporting by air operators and aerodromes

Birdstrike reports in the CAA database are categorised as having been reported by:

- the aircraft operator (usually pilots or flight safety departments); or
- the aerodrome (usually BCU, airfield operations or ATS staff); or
- both the aircraft operator and the aerodrome.

To interpret the information on who reports birdstrikes, it is helpful to consider briefly the practicalities of who will be in a position to make a report (as outlined in the information flow diagram in Appendix B, Figure 1). Aircraft operator reports are most often triggered when flight crews notice a birdstrike. Aerodrome reports are initiated either when bird remains are found on the aerodrome, or when a pilot reports a birdstrike (usually by radio to ATS). Not all strikes are expected to be reported by both parties - in many cases the flight crew may not notice a birdstrike, but the aerodrome operator will find remains. Conversely, flight crew may notice a birdstrike, but not report it to the aerodrome, for example if it occurs away from the airport vicinity.

As noted in Section 2.5, there does not seem to be any evidence of a fall in the 'primary' reporting rate from pilots to their internal safety departments. On this topic, one air operator interviewed suggested that birdstrike reporting by flight crews is likely to be less sensitive to changes in safety culture than other types of incident, since no implication of blame is likely to be associated. The exception would be in cases where the pilot had been warned in advance of birds - but the CAA database indicates that this happens in only a few per cent of cases. On the other hand, there

may be a disincentive to reporting by aerodrome staff if the number of birdstrike reports is seen as an indicator of poor bird control by the aerodrome. A postulated factor for the fall in the proportion of aircraft operator reporting was that more rigorous engine and airframe certification requirements have led to aircraft being better able to withstand strikes without damage, such that birdstrikes which would formerly have entailed damage, and therefore required reporting, no longer do so. However, it is unlikely that this factor would account for any significant proportion of the apparent sudden fall in aircraft operator reports to the CAA database, given the long replacement times of aircraft fleets.

4 Comparison of UK with other ICAO States

The reporting situation in the UK has been compared with the worldwide (i.e. ICAO) picture and with that in a number of other European states for which information could be obtained.

All contracting ICAO States should report strikes to the ICAO birdstrike database (IBIS). However, few actually do so. In 2000, for example, reports were received from less than a quarter of those countries [5]. Data from IBIS must therefore be treated with caution, and further investigation was not considered helpful to the present objectives.

It is more informative to compare the reported birdstrike rates between countries that might be expected to be similar to the UK in terms of having a well-developed system of aviation safety management, and similar habitats and climate. Very few data are published, and of those that are, even fewer are in a form that can be compared with the UK results. However, from the usable data, as shown in the table below, it appears that UK reported birdstrike rates are broadly similar to those for Germany, France and Italy.

Table 1 Comparison of Reported Strike Rates in European States

State	Strikes per 1000 per movement	% Serious strikes	Reference
UK	0.54 (average, 1990-2005)	5.6% (MORs)	This assessment
Germany	0.60 (average, 1998-2002, per civil movement)	28% ('damaging')	[6]
France	0.52 (average, 1990-2000, per commercial movement)	14% ('serious incidents')	[7]
Italy	0.53 – 1.94*	No data	[8]

* (No national statistics could be obtained; the range shown is for four individual airports.)

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Appendix B Review of the reporting process

This Appendix gives details of the quantitative analysis of the birdstrike data described in Section 3 of the main text.

The review of the reporting process was based upon analyses of the relevant regulations and guidance, discussions with CAA staff and structured interviews with operators. Section 1 outlines the interviews conducted. Section 2 presents and analyses a model of the information flows. Reporting to the CAA by operators is assessed in Section 3 and the exchange of information between other stakeholders in Section 4.

1 Interviews

A total of 39 staff, from eight airlines, ten aerodromes, one training school, and one maintenance organisation, was interviewed. All except one of the interviews was conducted face-to-face, the exception being a telephone interview. This number and range of interviewees was considered adequate for the present purpose, in that it was found that the findings had 'converged' towards the end of the interview programme – few new observations were being noted from the later interviews.

Each interview was structured using a prompt sheet, giving open-ended questions to help ensure that all aspects were covered.

2 Analysis of information flows

To help understand the reporting processes and ensure a systematic and comprehensive review, the main information flows were summarised in the form of a flow diagram (Figure 1). 'Strong' and 'weak' links are indicated to show where there is seen to be most opportunity to improve. This distinction is necessarily a very broad generalisation – the relative effectiveness of the various links will vary from aerodrome to aerodrome. The process has been divided into 'primary' reporting, from the individual pilot, controller, BCU member or other 'front-line' staff to their organisation's internal safety managers and reporting systems, and secondary reporting, from the organisation to the CAA.

Figure 1 hides some complexities, such as the arrangements for foreign-registered aircraft and the differing arrangements for reporting to the MOR database and the CAA birdstrike database.

It is apparent from Figure 1 that the intended lines of communication are quite long and complex. In general the chain can be broken by the failure of any one link. There is intended to be some redundancy and cross-checking in the system, for example in that airlines should copy completed birdstrike report forms (CA1282) to aerodromes, and vice versa, as well as sending them to the CAA, but it is rare for this to happen in practice.

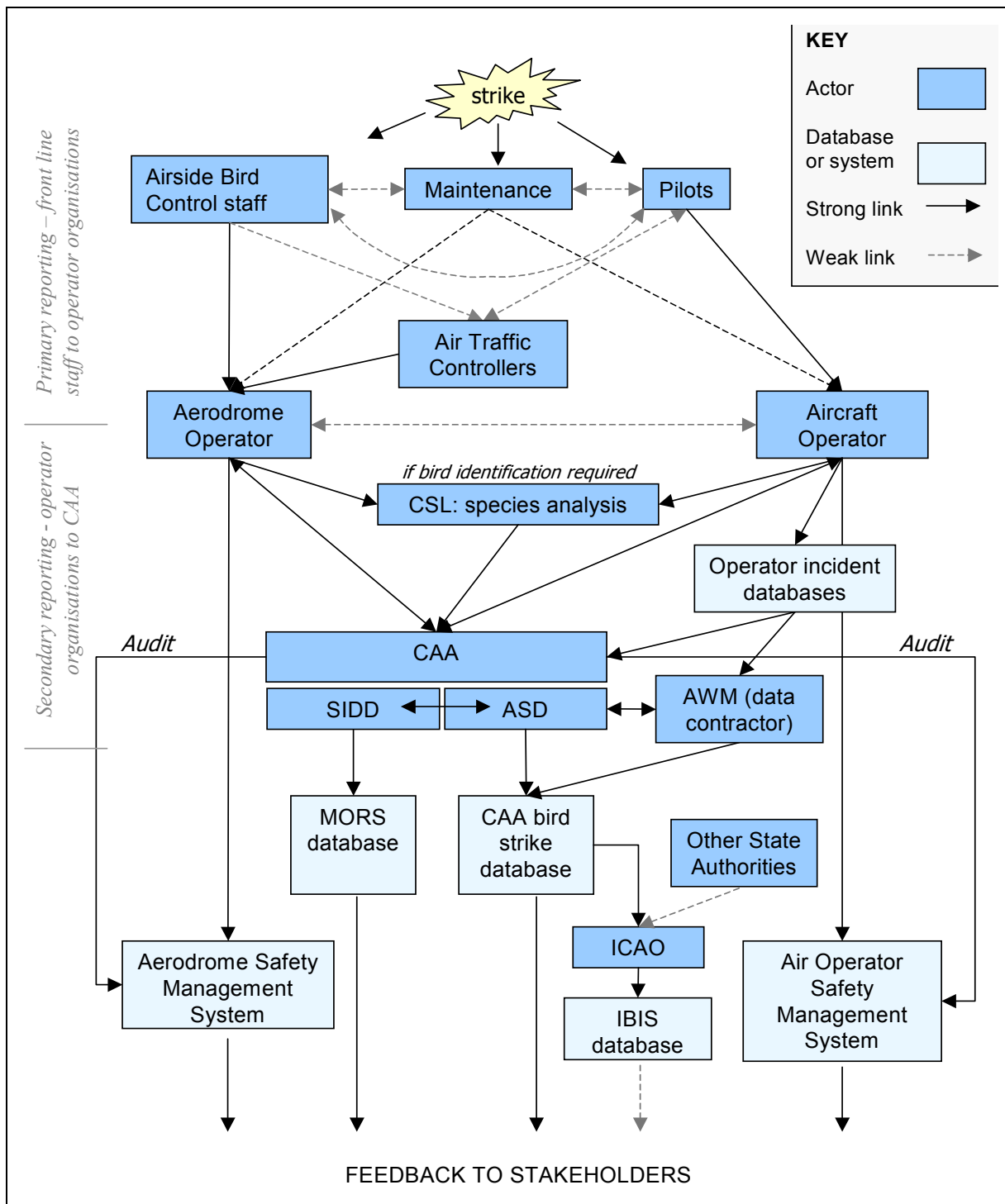


Figure 1 Lines of communication in birdstrike reporting (prior to June 2005)

3 Reporting to the CAA

In the past there have been problems in obtaining reports from some aircraft operators. Aerodrome operators very rarely file birdstrike MORs, as they do not usually know directly what the effect was on the aircraft. Amongst aircraft operators, the flight safety department usually takes the decision as to what should qualify as an MOR, although individual pilots may express their own views. Flight safety

departments (and the CAA) will sometimes upgrade a report to an MOR, but only exceptionally downgrade one. At whatever level the decision is taken, however, it is a subjective one, and the criteria that individuals use may vary and fluctuate.

These were ascribed to difficulties related to the introduction of electronic reporting and data management systems, but all the operators interviewed stated that they are reporting now to the CAA as required. Where form CA1282 had been assimilated into an operator's generic Air Safety Report (ASR) form, the data fields were substantially the same, although the differing data formats do lead to additional workload in transcribing information to the CAA database.

All interviewees stated that they do now submit MORs within the specified 96-hour limit (although one airline reporter had agreed an exception to this with the CAA, allowing them to submit their reports in larger batches).

There was evidence of some confusion over whether reports should be sent to the CAA birdstrike database or the MORS database. At the time of completing the interview work, the CAA's Aerodrome Standards Department (ASD) was receiving about 50 reports per year that should have been MORs, but had not been submitted as such. This may reflect a more fundamental misunderstanding of the criteria for an MOR rather than just the administrative issue of which part of CAA should receive the report. Conversely, one operator was still submitting *all* its birdstrike reports as MORs.

4 Exchange of information between stakeholders

The interviews revealed significant variations in the extent to which there is exchange of information amongst stakeholders. The most significant issues were as follows:

- Most pilots said that they would generally report strikes to the ATS, by radio, especially if they occurred on-aerodrome, but not all would do so.
- Some aircraft operators routinely copy their birdstrike reports to the aerodrome management, seeing such exchange as vital. Others do not – indeed one aircraft operator interviewee said that he had deliberately decided not to do so, as the resulting additional paperwork would tend to dilute the significance of more important messages. Several aerodrome operators commented that they would like better reporting from pilots – often they only found out about a birdstrike during a CAA audit, and this was too late to enable them to take any immediate actions or have an up to date awareness of particular problems.
- Some aerodrome operators, especially those with a dedicated BCU, are pro-active in chasing up the details of pilot reports, and find this very effective. Others did not – with attendant implications for their awareness of problems and the completeness of data.
- Wide variations were reported in the extent to which engineering organisations inform aircraft operators or aerodromes when they find damage or bird remains. Interviewees thought that the reporting rate would be related to whether maintenance is carried out by an in-house organisation or contracted out, and whether it occurs at a home base or a remote aerodrome, but we do not have sufficient evidence for any objective test of such hypotheses. In general the feeling was that there was potentially a lot more information available from maintenance organisations, although they very rarely report.

The fact that there are such variations in exchange between stakeholders suggests that there may be opportunities for improvement, or perhaps that guidance should be provided on what level and form of exchange is appropriate for different situations.

There was also an undercurrent of concern about how information might be used, especially amongst aerodromes – the fear being that high levels of birdstrike reports could be used against them and possibly, claims for liability.

Some interviewees commented that airline and aerodrome staff had insufficient opportunity to talk about birdstrikes together – communication, if any, tended to be dominated by commercial and ground handling issues.