

WP/20

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A Desirable Harmonization of ICAO Documentation on Bird Hazards

Presented by H. Dahl, Directorate of Civil Aviation, Denmark

Summary

Problems raised by the presence of birds at airports are not new. According to the annual report of the ICAO Council 1983 the ICAO Bird Strike Information System (IBIS) received 3,159 reports on bird strikes from 37 states concerning strikes occurring in 94 states during 1983. The vast majority of strikes occurred at or near aerodromes and were nearly equally divided between approaches and departures. 49 per cent of the strikes occurred at or below 30 m (100 feet) above ground and 62 per cent at or below 150 m (500 feet). 2 per cent of the strikes resulted in substantial damage to the aircraft and 8 per cent in minor damage.

According to an analysis made by BSCE Analysis Working Group and covering strikes reported from operators from Belgium, Czechoslovakia, Denmark, Ireland, Finland, France, Germany, the Netherlands, Sweden, and the UK, 1,291 bird strikes occurred in these countries being the equivalent of 4.6 per 10,000 movements. Gulls (*Larus spp*) were involved in nearly half of the incidents. The major effect was damage to 61 engines. During the year bird strikes were estimated to have cost European airlines at least 3 million US dollars in engineering repair.

Solutions can only emerge from international agreement on implementation of scaring methods at airports.

The aim of this documentation is to

- evaluate the decision criteria
- list the co-ordinated actions to reduce significantly the risk of bird strikes (see Part 1)
- materialize these actions by introducing specific changes in ICAO Standards and Recommended Practices and related documents (see Part 2)

PART 1

(The General Situation and An Evaluation of the Risk)

A - DEFINING AERODROMES AS REGARDS BIRD STRIKE RISK

The evaluation of risk is derived from the bird strike statistics provided by States in accordance with the ICAO circular.

However, serious reservations should be put on a direct evaluation of risk based on the raw data for the following reasons:

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1) The system for collecting and analysing raw data is not based on standard grounds.

- (a) It was discovered, after such a system was implemented in Europe, that data provided by States participating in the system, varied very much according to the help yielded by the crews, landing fields used by each carrier, and the organization collecting the various data to be incorporated in a standardized bird strike report form.

However, it was evident, when a comparison was made only between incidents recorded on different aerodromes of the same country that rates (number of strikes divided by number of movements for a given type of aircraft) could effectively be compared.

Direct comparison, however, between different countries is sometimes leading to inadequate conclusions because of differences in the data collecting systems used in different countries.

- (b) Bird presence at airports is governed by environmental factors, such as weather, biological conditions, etc. Hence, some aerodromes are more attractive than others. Migrations also introduce a change hardly controllable because of their temporary status. Consequently, the statistical comparison can only be made between areas, having a comparable bird activity.

- (c) Large birds are more likely to be identified and reported after strikes than smaller birds.

Behaviour of birds is influenced by:

- (a) Species: Some are more frequently involved or reported involved in strikes than others. Gulls are involved in nearly half of the incidents reported in Europe and for North America.
- (b) Age: Immature birds seem to be more frequently involved in strikes than older ones.

(c) Acquaintance with air traffic: Migrations, when introducing during a short period thousands of young birds, increase temporarily the monthly number of recorded bird strikes.

- 3) Airports are attracting birds according to their surrounding attractants and their traffic.
- 4) Aircraft characteristics: From the available data there does not appear to be any close correlation between the strike rate and the aeroplane type in terms of take-off and landing speed. It is, however, widely acknowledged that there is a distinct correlation between the strike rate and the aircraft size, and there are different opinions as to the correlation between the engine type and the strike rate.

B - EVALUATION OF BIRD STRIKE DATA DISPLAY

- 1) The phase of the flight more frequently observed in bird strikes is either take-off or landing when the aircraft is less than 300 m above the ground level.

Consequently, the area of potential danger is not restricted to the airport boundaries.

- 2) The number of bird strikes increases with the traffic, but often the bird strike rate is reduced when the traffic increases. However, the number of strikes causing damage to aircraft seems to remain constant, but the number of engine damages increases significantly.
- 3) Most of the strikes happen on the front part of the aircraft (radome, nose, windshield) according to the European civil bird strikes (between 1976 and 1980 46 per cent).
- 4) Recorded strikes show that species more frequently involved vary from one airport to another.

As indicated above, almost half of the reported bird strikes in Europe are caused by gulls, but in other parts of the world birds of prey are most frequently involved in damage according to the bird strike reports. It has, however, to be taken into account that larger birds are easier to find and easier to identify than smaller ones, cf. A, 1. c).

C - CONCLUSION

It appears that

- 1) Particular studies should be aimed at determining the presence of birds, appearing either frequently or occasionally on the aerodromes and in their vicinity.
- 2) The bird strike collecting system should be oriented towards indications, allowing improvements of bird control methods. A method to evaluate the cost of such strikes should also, if possible, be developed.

Various methods that could emerge from the preceeding conclusions will gain their full efficiency only if they are developed by an international organization and included in Recommendations adopted and implemented by States.

The above indicates that aerodromes are the first place where a general action should be contemplated. Such actions, however, could not be uniform as the problems seem to be individual for each place. It is, however, possible to regroup some of these actions and in doing so, to introduce general recommendations in the relevant ICAO documents, and then make sure that they are implemented.

It would seem desirable if bird strikes could be statistically analysed to indicate certain categories into which aerodromes could be grouped according to their rate of strikes per 10,000 movements. However, a direct comparison is only possible within the same State as the reporting standards vary from State to State. Common trends of different reporting systems may indicate the real situation. The measure to be taken should be selected with regard to the relevant bird species as some measures have almost no effect on some species. Action on airports could be more differentiated if a direct exchange of bird strike reports between the countries is organized in order to assess the problems and re-act directly on the problems.

As the scaring methods are specially developed for given species of birds, each airport situation should be carefully analysed. For that purpose there is a need for a good reporting system, frequent surveys of the aerodromes and proper implementation of the measures agreed.

PART 2

(Suggested Amendments to Existing ICAO Documents)

A - AERODROMES ARE CONCERNED WITH

1. Annex 14 (8th edition including amendment no. 37, applicable 24/11/1983).

This Annex regroups all the problems related to aerodromes and contains in Chapter 9 a special section dealing with bird hazard reduction.

It could be argued that also other chapters or appendices could contain regulations regarding bird hazards, such as Chapter 2 - Aerodrome Data (Section 2.9 - Section 2.12), Chapter 4 (Section 4.3 or 4.4), Attachment A (Section 17 - Level of Protection), and Limited Index of Significant Subjects.

It is, however, considered preferable that the information on bird problems should not be found in several sections in the Annex. The above chapters should only contain a note, pointing to the bird problem and referring to Chapter 9.5 where a reference to the bird hazard reduction problem is found.

The following text of paragraph 9.5.1 is suggested:

9.5.1 RECOMMENDATION

The bird strike hazard at aerodromes shall be assessed by:

- (a) Bird strike reporting procedures that enable reports from pilots, air traffic control staff, aerodrome and maintenance personnel, etc. to be collated and examined.
- (b) Appropriate aerodrome personnel to report on aerodrome and local area bird species, attractants (particularly garbage dumps), flight lines, diurnal and seasonal activity.

The inclusion of the following paragraphs is suggested:

9.5.2 RECOMMENDATION

The bird hazard at an aerodrome should be assessed by an ecological study that includes identification of bird species living at or near an airport, their flight routines, and seasonal activity.

9.5.3 RECOMMENDATION

Garbage dumps, sewage farms, lakes, etc. of a certain size on an aerodrome or within a distance specified by the State from a runway or an approach or departure route from that runway should be assessed and if hazardous be removed.

NOTE: The specified distance may correspond either to the point where aircraft approaching or departing the runway are more than 300 m above the runway elevation or based on the point where the 30° glide path passes through 300 m or to a radius from an aerodrome reference point.

9.5.4 RECOMMENDATION

Where a bird strike hazard exists, a properly equipped and trained organization should be established for the implementation of aerodrome bird control measures.

2. Airport Services Manual - Part III (Doc 9137 AN-898)

This manual is still too general. Recent experiences indicated that problems differ greatly between regions, some being more frequented by birds of prey, whereas others are heavily visited by gulls. This, in return, influences the methods to scare these birds. Chapter 7 should be amended to reflect the recent work carried out by BSCE and taking into account for the European region the manual (2nd edition January 1982), prepared by BSCE and adopted by ECAC in 1983.

Bibliography could also be reviewed periodically to include the most relevant reference material, and could be divided, if necessary, in relation to the various chapters of this manual.

3. Airport Planning Manual - Part II (Doc 9184 AN-902)

When planning new airports or extensions of airports, there is a need to consider the bird problem.

In Section 3.2 this manual refers to bird hazards (para. 3.2.7) in relation to the species of trees to be used for noise reduction. However, it is known that the acoustical protection brought about by a wooded area is only effective for sound waves propagating along the ground and not against sound propagating towards the ground. Besides, these trees are offering shelter to bird colonies.

In other sections bird problem should be mentioned:

In Section 1.2. The control of crops around airports in order to make them unattractive to birds should appear and there is for instance no reference neither to the necessity to forbid nor close down garbage dumps under flight paths. These dumps often constitute a type of pollution (smoke) which reduces slant visibility in some areas and allows birds to feed, and thus creating a permanent hazard area.

In Section 2.2 which deals with one aspect of the problem and relates only to noise.

B - AERONAUTICAL INFORMATION SERVICES ARE CONCERNED WITH

1. Annex 15

Chapters dealing with bird hazards are Chapters 4, 5, and 7 respectively.

Chapter 4:

This chapter is the most important because paragraph 4.1.1 recommends publication of specific information on existing maps or development of specific maps.

It will be desirable to

- (a) define symbol(s) selected to represent birds or areas where birds are frequently seen,
- (b) identify and select criteria (format, scale, data to be included) to be used on specific maps.

Chapter 5:

In paragraph 1.1.1, item h) an inaccurate reference is made to the nature of an existing danger.

Such messages should especially be issued during migration periods and be identified by a particular prefix (for instance BIRDTAM), allowing, because of their temporary nature, an easy identification and use. The content of this message should be arranged to specify the following information: time and phase of observation, flight direction, speed, height, and, when possible, species involved.

Chapter 7:

Paragraph 7.1.2, subpara. e), item 5) should be amended to read:

- 2) presence of any other temporary hazard (particularly those created by birds).

2. Aeronautical Information Manual (Doc 8126)

2.1 Appendix G, Notes AGA-0 Aerodromes (Appendix 1.2.0)

Section 9 provides an inaccurate description of required information. A new subparagraph e) could be added as follows:

- e) areas where garbage dumps, sewage forms, lakes, etc. are located less than x km from aerodromes.
(x could be defined where the 3rd glide path passes through 300 m, cf. REC 9.5.3 on page 5)

2.2 Explaining Comments RAC-6

An attempt to standardize migration maps could be contemplated.

Conclusion

It is then necessary to review ICAO documentation. The principle for such a revision could be derived from conclusions shown by bird strike report analyses published regularly by organizations participating in these analyses. Amongst them Bird Strike Committee Europe has published a series of reports.

Without seeking to single out a specific area, one must admit that such a system has been efficiently run in Europe for a period long enough to allow for valid conclusions.

The conclusions indicate that a serious effort has to be made on or near airports to enhance the safety of aircraft operations.

They also show that the number of strikes, where an engine is involved, gives rise to concern. Action to improve their resistance cannot be taken without considerable cost retrospectively for existing engines, therefore improvement in the aerodrome environment becomes the major option.

They also invite to increase the methods of investigation in order to obtain efficient equipment having a permanent and immediate effect.

Only a co-ordinated, permanent and well-aimed action could improve safety without creating an ecological vacuum.

DOCUMENTS USED

1. Study of Bird Strikes on Canadian Airports.
(T. Smith, K. Iwanycky - Transport Canada, December 1979)
2. Analysis of Bird Strikes Reported by European Airlines
1976-1980
(J. Thorpe 1984).
3. Bird Strikes to Transport Jet Engines (J. Thorpe 1977).
4. Statistical Survey of Collisions with bird/aircraft in France
during the years 1979 - 1980.
5. FAA Assessment of dual engine bird ingestion hazards to large
high by-pass turbo for powered transport aircraft.
(D.I. Cheney, J.E. Tigue, M.J. Harrison - August 1981).
6. ICAO Publications - Montréal.

GRAPH
Annual Strike Rate

