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FIFTEEN YEARS OF DATA COLLECTION BY THE ICAO BIRD STRIKE INFORMATION SYSTEM (IBIS)

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Summary

This paper gives a brief summary of the ICAO's Bird Strike Information System. It discusses the IBIS reporting form, the change from a mainframe computer to a PC-based system and the reporting and processing of bird strikes. Also presented are some IBIS statistics, taken from the more than 62 000 bird strikes which have been reported to ICAO during the fifteen years that IBIS has been in operation.

Key Words: Statistics, ICAO, Civil Aviation, General Aviation, Reporting

1. Introduction

1.1 ICAO has been collecting bird strike data since 1965. However, it was not until 1979 that ICAO Contracting States were requested in ICAO State letter AN 4/9.1-79/179, dated 23 November 1979, to report all bird strikes to aircraft for input into a new data entry and retrieval system. The letter informed States that ICAO was developing new computer programmes for the storage and analysis of the data to be collected. To facilitate this data collection, an ICAO bird strike reporting form had been developed with the assistance of an advisory group of experts. Attachment A to the State letter contained the reporting form which was designed for direct reproduction by States in order to expedite its use and standardize the data collected. Guidance on the use of the reporting form was also contained in the State letter. Since the form's introduction, it has gained wide acceptance and is now used as the principle reporting medium by those States which report bird strikes to ICAO. Those States which do not use the ICAO Bird Strike Information System (IBIS) reporting form, report either in a hardcopy, tabular form or by computer diskette closely following the IBIS reporting format.

2. The IBIS computer system

2.1 The ICAO Bird Strike Information System has been in operation since 1980 and at the present time contains information on more than 62 000 bird strikes.

2.2 Until 1995, the IBIS system utilized a mainframe computer. With the proliferation of personal computers (PCs) and the continuing improvements in both the power and the software of PCs, it was decided to explore the possibility of moving IBIS from the existing, mainframe-based system to a PC-based system. The desirability of such a transition was established and development of the new system began in earnest in mid-1994. The PC-based system became operational for data entry at the end of 1995 and uses two personal computers for data entry and analysis, and a separate server for data storage. For the sake of compatibility, the PC-based system retains all of the data fields and the coded data, as developed for use on the previous system. At the present time, the existing IBIS output formats are being examined with a view to ascertaining their relevance and continued suitability for use with the new system.

3. Reporting and processing of bird strikes

3.1 Until the advent of the IBIS reporting form, a standardized bird strike reporting procedure did not exist. In fact, many different reporting forms were in use, and the data collected varied greatly. For the evaluation of bird strikes on an international level, it is especially important to have a standardized reporting form and all strikes that occur should be reported using this reporting form. By using a standard reporting form for all airports within a State, it is possible to collect the data necessary to develop programmes tailored to the specific needs of the State. Similarly, when several States within a region have co-ordinated data collection programmes and report to IBIS, ICAO is able to assess the severity of the bird strike threat within the region and assist States through seminars and workshops.

3.2 Since the data is reported to IBIS in numerous formats, on several different media and in five different languages, the fields found on the reporting form must be filled as completely and accurately as possible to avoid inconsistencies which would make comparative analyses of data difficult. States which report data in a significantly different format from that required by IBIS are urged to comply with the format of the IBIS reporting form, especially when key data fields are omitted. Key data fields are considered to be those fields which are essential for the storage and analysis of the data. Some examples of key fields are the date of the strike, aircraft registration, aircraft make and model and the

airport name. Omission of any data fields by a reporting State creates "a hole" in the data base, in effect weighting the data and lessening its accuracy.

3.3 To ensure the accuracy of all data contained within the IBIS data bases, numerous consistency checks are carried out during the data entry process. For instance, all aircraft registrations are verified for accuracy of aircraft make and model as well as engine make and model. Another example of these verifications is the phase of flight and height above ground level (AGL), which are verified against one another, so that an aircraft is not reported as being above ground level when it is on its landing roll.

4. **IBIS facts**

4.1 The phenomenon of bird strikes to aircraft is truly world-wide in scope. Since 1980, 108 ICAO Contracting States and territories have reported more than 62 000 bird strikes to IBIS. These bird strikes have occurred in 177 States and territories. Seven percent of the bird strikes reported to IBIS resulted in minor damage, while 3 percent resulted in serious damage to the aircraft. The exact cost of these bird strikes will never be known. However, damage to aircraft has been estimated to cost more than one hundred million dollars (US) per year in the United States alone. An analysis of 62 416 verified bird strike records currently in the IBIS data base revealed the following facts.

4.2 The vast majority of the strikes occurred on or near aerodromes, during landing operations and departures, most frequently during the take-off run and approach phases of flight. Of the strikes, 60 percent occurred at or below 30 m (100 ft) AGL, 11 percent above 30 m (100 ft) but below 150 m (500 ft) AGL. Of the remainder, 20 percent occurred above 150 m (500 ft) but below 457 m (1500 ft) with 9 percent occurring above 457 m (1500 ft) AGL. The disposition of bird strikes by AGL is shown in the attached Chart 1.

4.3 Of the bird strikes reported to ICAO, 33 603 included information on the bird type, which represents approximately 54 percent of the total number of strikes analysed. Gulls are the species most frequently reported to have been struck, with 10 379 cases reported. Perching birds accounted for 9 074 strikes, while eagles hawks, falcons etc. were reported in 4 875 cases. Plovers and lapwings were involved in 2 968 bird strikes; pigeons and doves were reported 1 973 times. A percentage distribution of bird strikes by bird type will be found in the attached Chart 2.

4.4 The following table shows the relationship between the type of bird and the severity of the damage caused in those strikes where both the bird type and damage were reported. It will be seen that eagles, hawks and falcons etc. are involved in a higher percentage of minor and serious damaging strikes when compared to the total of all bird strikes in which damage was reported. Perching birds were involved in the least percentage of damaging strikes.

Bird Type	Number of Strikes Reported	Strikes with Minor Damage	Minor as a % of Total	Strikes with Serious Damage	Serious as a % of Total
Gulls	10 379	675	7	408	4
Perching Birds	9 074	193	2	74	1
Eagles, Hawks etc	4 875	520	11	266	5
Plovers & Lapwings	2 968	151	5	106	4
Pigeons & Doves	1 973	138	7	122	6
Total of All Bird Strikes Reported	62 416	4 119	7	2 034	3

4.5 The highest incidence of damage per number of strikes occurred to aircraft engines, which were struck 10 957 times. This represents approximately 18 percent of the number of strikes under analysis. Engines were damaged 3 285 times, or in 5 percent of the total number of strikes. However, when engine strikes alone are considered, 30 percent of the strikes resulted in damage. On the other hand, strikes to the nose of the aircraft (excluding the radome) occurred 8 131 times or 13 percent of the total, with only 354 cases or one-half of one percent resulting in damage. This represents the lowest incidence of damage per number struck. The attached Chart 3 presents two graphs showing the percentage and numerical distribution of bird strikes by part of aircraft struck over the ten-year period 1984-1993 inclusive. It should be noted that, while the numbers of parts struck varies from year to year, the percentage distribution of the parts struck varies very little. Table 1 contains the numerical values used to generate the two charts.

4.6 While minor damage occurred in 7 percent and serious damage in 3 percent of the bird strikes reported to IBIS, only 3 percent resulted in precautionary landings and 2 percent in aborted take-offs. These are the two most common effects on flight as the result of bird strikes.

5. Conclusion

5.1 Since becoming operational in 1980, the IBIS System has been used to collect and disseminate information on bird strikes to aircraft. It has enjoyed support among the many ICAO Member States which have supplied bird strike data since its inception and continue to do so on a consistent basis. This reliable data forms the nucleus of the IBIS data base which continues to grow and improve. It is intended that this data be shared and used to understand and reduce the problem of bird strikes. To this end, IBIS special analyses are available on request to ICAO Member States and other interested parties and may be obtained by writing to: The Secretary General, International Civil Aviation Organization, 1000 Sherbrooke Street West, Suite 400, Montreal, Quebec, Canada, H3A 2R2.

CHART 1: Bird Strikes

CHART 1: Bird Strikes By Height AGL

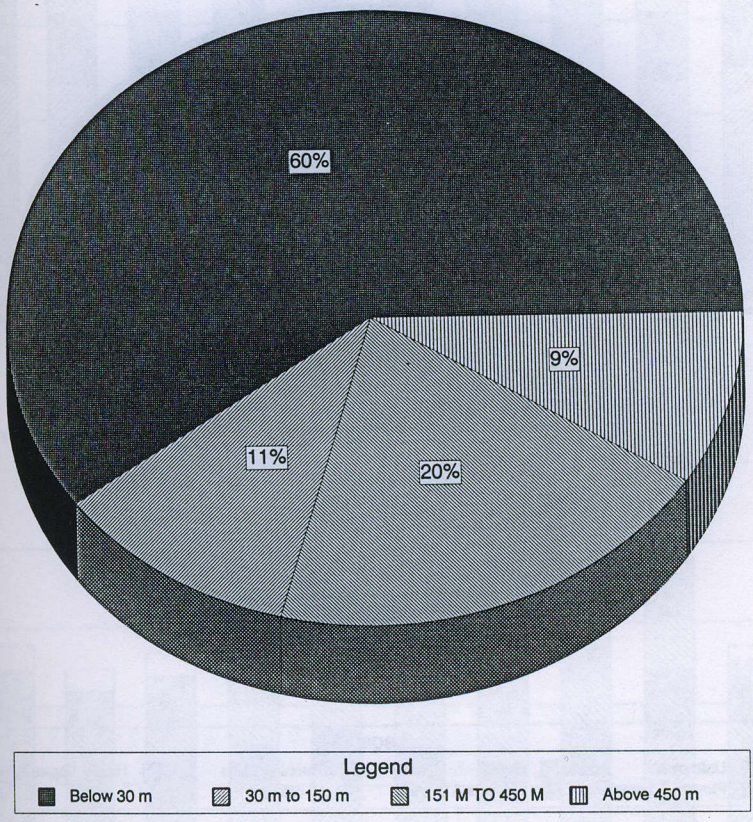


CHART 2: Bird Strikes By Bird Type

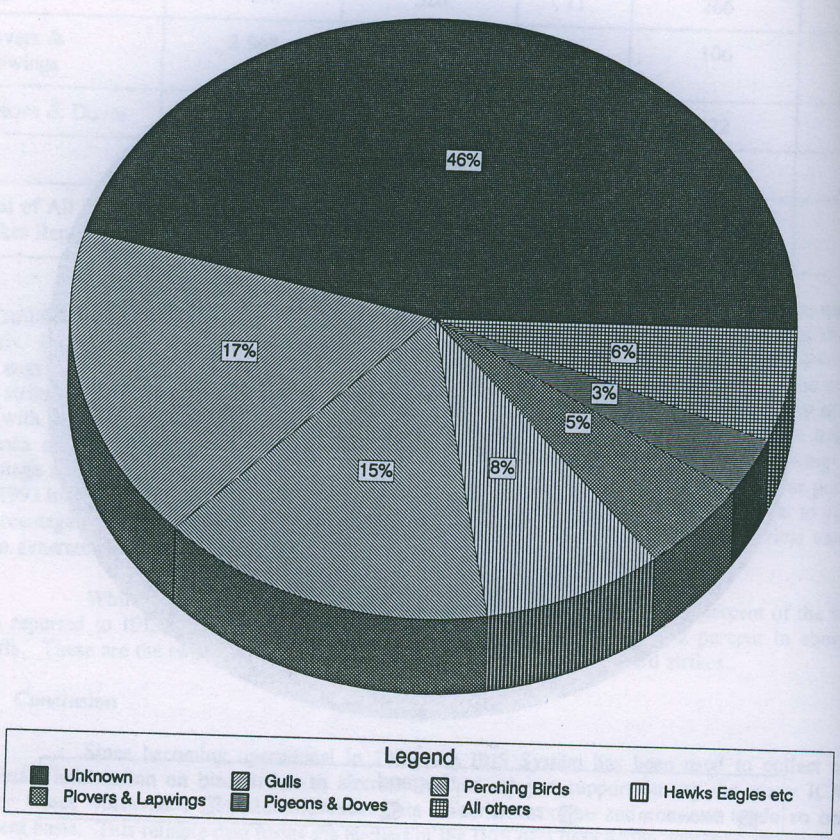
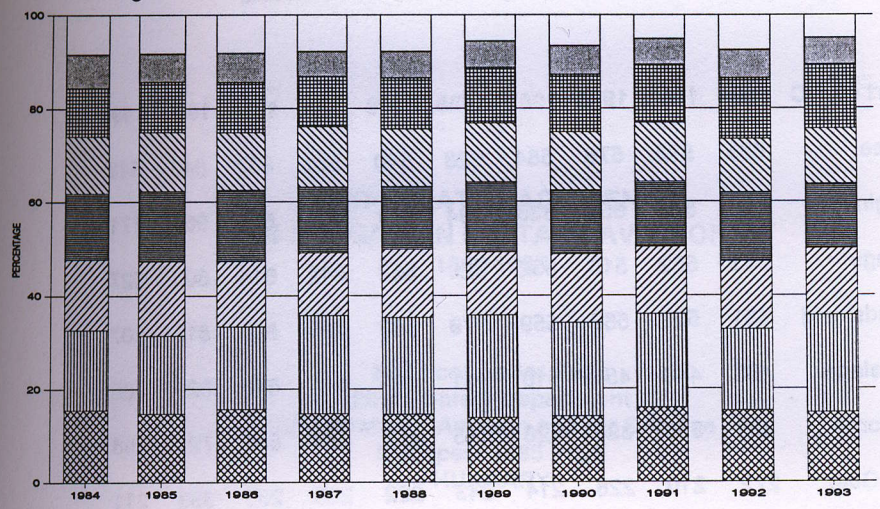


CHART 3: Bird Strikes By Part Struck

Percentage Distribution



Numerical Distribution

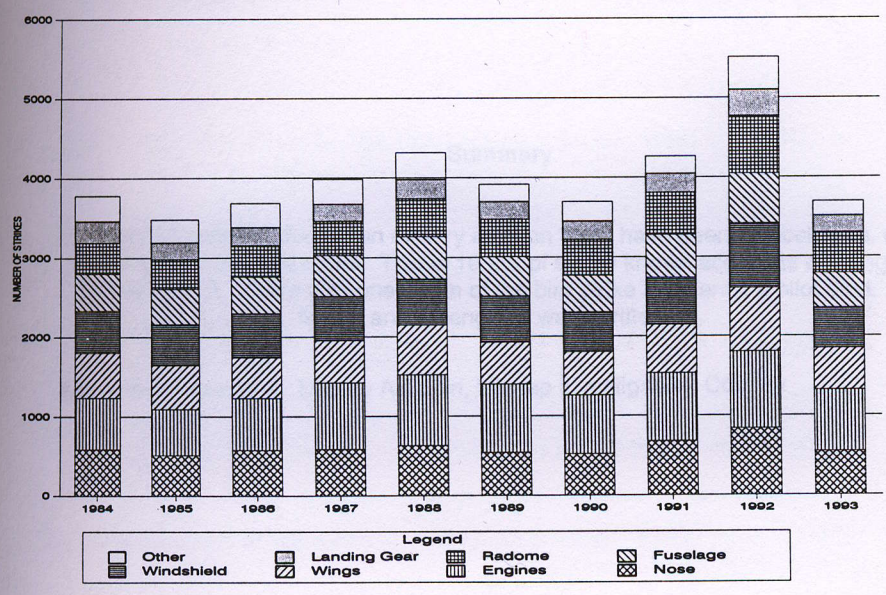


Table 1. Bird Strikes By Part of Aircraft

Part of A/C	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Nose	585	512	576	584	628	540	521	680	840	548
Engines	650	582	654	838	894	861	740	853	965	771
Wings	571	552	513	532	629	528	542	614	800	527
Windshield	531	522	560	559	579	583	504	590	812	507
Fuselage	463	440	454	516	531	495	461	540	629	438
Radome	391	375	398	428	475	467	454	531	721	508
Ldg Gear	272	210	228	214	243	222	229	236	333	211
Other	318	288	301	311	338	219	244	218	412	181