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APPARENT EFFICACY OF BIRD AIRCRAFT STRIKE HAZARD PROGRAMS AT FOUR NAVAL AIR STATIONS

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APPARENT EFFICACY OF BIRD AIRCRAFT STRIKE HAZARD PROGRAMS AT FOUR NAVAL AIR STATIONS

by Thomas C. Walker and C. Willard Bennett*

ABSTRACT

The Department of the Navy implemented its present mandatory bird-aircraft strike reporting system in 1981. Reported bird-aircraft strikes have increased each year, presumably due to increased awareness and compliance with regulations. Four Naval air stations implementing bird-aircraft strike hazard reduction programs in 1984 reported 57-78% fewer strikes in 1984 than in 1983.

INTRODUCTION

Ever since the first recorded bird-strike fatality on April 3, 1912, bird hazards have been of major concern to pilots and the entire aviation community. Bird-strikes can be divided into two major categories based on location: those that occur in the airdrome environment and those that occur enroute.

Solman (1971) reported that 75% of all bird-strikes occur at or near airports. Kull (1983) reported that 47.9% of the U.S. Air Force bird-strikes from 1980-1982 occurred in the airdrome environment. For this reason, reduction of bird populations and bird-strikes within the airdrome has been the subject of numerous studies, papers and conferences.

Most studies have been field evaluations or trials of bird control methods. Many have involved a single species or management technique. Boudreau (1971a, 1971b) reported the effectiveness of bio-accoustics in dispersing horned larks, house finches and gulls. Nemergut, et al. (1976) successfully dispersed starlings from Seymour-Johnson Air Force Base, NC using distress calls. Mead and Carter (1973) documented a 12.1% decrease in bird observations on long grass versus short grass on 10 airports in the United Kingdom. Many studies of the effectiveness of bird dispersal and control techniques in reducing bird numbers in the airfield environment and agricultural situations are documented in the literature. Defusco and Nagy (1983) provided a detailed literature review.

Relatively few studies document reductions in bird-strikes as a result of control programs. This is probably due to the specter of liability associated with experimenting with aviation safety and undoubtedly influenced by Federal Aviation Administration regulations prohibiting experimentation on civil airports. Cooper (1970) and Heighway (1969) reported 100% reductions in bird-strikes after implementing falconry programs at Lossiemouth Air Base, Scotland and Torrejon Air Base, Spain. Mattingly (1974) achieved an 83.3% reduction in bird-strikes involving prairie chickens at Whiteman Air Force Base, MO using falconry. The U.S. Air Force Bird Aircraft Strike Hazard (BASH) Team has documented the effectiveness of on-site reviews by professional

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biologists in reducing bird-strikes in the airdrome (Kull and Will, 1985).

The information collected by the Naval Safety Center and the Naval Facilities Engineering Command since 1981 and discussed in this paper provides another opportunity to infer the effectiveness of bird-aircraft strike hazard reduction programs.

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METHODS

The Department of the Navy implemented its present mandatory bird-aircraft strike reporting system in 1981. A data management system was established on an IBM computer system. Information collected is compatible with the Air Force BASH data system to allow for comparison and transfer of data.

Starting in 1981, the Naval Safety Center began a program to increase pilots' and airport managers' awareness of the seriousness of bird-aircraft hazards through articles in the Naval Air Safety Review, the Weekly Aviation Safety Summary and command briefings at Naval air stations. The major emphasis of the awareness program was the need for accurate reporting to document the nature and severity of the bird-strike hazard at Naval air stations and to dispel the common belief within the Naval air community that nothing could be done to reduce or prevent bird-strikes.

During 1983, four Naval air stations (sites 1-4, Table 1) were assisted in developing aggressive bird hazard reduction programs. All four sites were visited by biologists experienced in bird management. Surveys were conducted to identify existing and potential attractions to birds. Programs included alteration of flight operations, habitat manipulation, bird dispersal or control and pre-flight planning and pilot awareness as recommended by the U.S. Air Force Engineering Services Center (1985) and Lucid and Slack (1980). The most commonly implemented operational change was delaying take offs and landings until birds could be dispersed from the active runways. Habitat manipulations included changes in grass height management, removal of roost and nest sites and improvement of drainage to reduce water sources. Bird dispersal methods implemented included the use of pyrotechnics, distress calls, shooting, avitrol and hazing with vehicles. Not all of these methods were employed at any one site. No attempt was made to evaluate the effectiveness of individual techniques. The objective was to incorporate as many techniques as practical and necessary into an integrated program to reduce the number of bird-strikes.

Programs were considered implemented when standard operating procedures or station regulations were developed. Sites 5, 6, 7, 11, and 12 were visited by the authors, members of the Air Force BASH Team or

representatives of the Naval Safety Center, but had not implemented bird-aircraft strike hazard reduction programs by January 1, 1984.

The number of bird-strikes reported at sites 1-4 is compared to bird-strike data reported for 31 other Naval air stations.

RESULTS

The Navy recorded bird-strikes at 181 military and civilian airports. The number of bird-strikes reported at 35 Naval air stations during 1983 and 1984 is shown in Table I. These represent Navy-operated air stations for which five or more bird-strikes were reported in 1983 or 1984. Using Navy bird-strike data from 1981-1984, five is the mean number of bird-strikes per year expected to differ at the 90% confidence level from a theoretical population of airports with no bird-strikes (Mean=2.2, standard deviation= 2.7). These stations accounted for 75.2% and 74.6% of all Navy bird-strikes reported as occurring in airdrome environments in 1983 and 1984 respectively.

Navy bird-strike reporting increased each year after implementation of the Naval Safety Center awareness program in 1981. Operating hours remained relatively constant. Bird-strike rates increased proportionally to bird-strikes (Table II). Enroute and location unknown bird-strikes represented 20.5% and 13.3% of the reported bird-strikes in 1983 and 23.9% and 12.8% in 1984 respectively.

The four Naval air stations that implemented bird-aircraft strike hazard reduction programs by January 1, 1984 reported 57-78% fewer bird-strikes in 1984 than 1983 (Table I). The species of birds involved in bird-strikes at sites 1-4 during 1983 and 1984 are shown in Table III. One bat-aircraft strike was reported at site 3 in 1983. Nine bat-aircraft strikes are included in the data base for 1983 and 1984. All species and groups showed reductions in bird-strikes after program implementation.

The five sites which had received on-site assistance, but which had not implemented bird-aircraft strike hazard reduction programs by January 1, 1984 showed net changes in reported bird-strikes ranging from -33.3% to +12.5%. Twenty-four of the remaining 26 sites showed net changes of +11.1% to +1000% and two sites showed no change (Table I).

DISCUSSION

The findings presented in this paper are not the result of scientific investigations. The effectiveness of the bird-strike hazard reduction programs must be inferred from the Navy-wide trends during the same time period and comparison with Air Force and other available data.

Reported bird-strikes increased each year from 1981-1984. The percentage of bird-strikes occurring in the airdrome and enroute remained relatively constant while the reports for unknown locations decreased slightly. This suggests that increased reporting was a result of increased awareness and efforts to comply with regulations. This assumption is supported by Air Force findings that bird-strike reporting increased after publications or on-site visits promoting bird-strike awareness (Kull and Will, 1985). The geographic distribution of the

35 sites included in this study makes it unlikely that the increases are the result of localized increases in bird populations. Similarly, it is unlikely that the decreases in bird-strikes reported at sites 1-4 are all the result of natural declines in local bird populations. The intermediate status of sites 5, 6, 7, 11, and 12 corresponds with the findings of Kull and Will (1985) that review of airfield practices and management by personnel experienced in airport bird management reduces bird-strikes.

The occurrence of bird-strikes in the airdrome (66.1% in 1983 and 63.2% in 1984) is intermediate between the 75% reported by Solman (1971) and the 47.9% reported by Kull (1983). Like the Air Force, the Navy conducts operations at low levels. Navy low level operations are not as large a proportion of total flight hours as for the Air Force. This explains the intermediate value for Navy enroute bird-strikes as compared to civil aviation and Air Force operations. The occurrence of bird-strikes at unknown locations (13.3% in 1983 and 12.8% in 1984) is comparable with the 11.2% for the Air Force reported by Kull (1983).

The Navy experiences bird-strikes at a rate approximately eight times that reported by the Air Force from 1980-1982 (Kull, 1983). Extrapolation of the reductions in bird-strikes at sites 1-4 to bird-strike rate yields a projected rate of 100 bird-strikes per 100,000 flight hours. This is close to the maximum of the range of 12-95 reported for Air Force commands in 1978, three years after the formation of the BASH Team (Gillespie, 1980).

Air Force bird-strike rates have gradually decreased with the progressive development of the BASH program (Gillespie, 1980). The effectiveness of bird-aircraft strike hazard programs at airports appears to diminish over time without the input of professionals experienced in airport bird management (Kull and Will, 1985).

The bird-strike hazard to Naval aviation is severe. Approximately 48% of the Navy's recorded bird-strikes occur at 35 Naval air stations. Bird-strikes within these airdromes can be reduced appreciably by implementing bird-aircraft strike hazard reduction programs and providing continuing guidance from professional biologists.

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TABLE I. Bird-strikes at Naval air stations reporting five or more bird-strikes in 1983 or 1984.

Site no.	Geographic location	No. of bird-strikes 1983	1984	Percent change
1.	South Central	14	3	- 78.6
2.	South Central	17	6	- 64.7
3.	Northeast	19	8	- 57.9
4.	Southeast	14	6	- 57.1
5.	Southeast	6	4	- 33.3
6.	Middle Atlantic	9	7	- 22.2
7.	Southwest	18	17	- 5.6
8.	Southwest	17	17	NC [a]
9.	Pacific Theater	8	8	NC [a]
10.	Southwest	9	10	+ 11.1
11.	South Central	16	18	+ 12.5
12.	Southeast	6	7	+ 14.3
13.	Southeast	10	13	+ 30.0
14.	Northwest	13	18	+ 38.5
15.	Southwest	5	7	+ 40.0
16.	Atlantic Theater	5	7	+ 40.0
17.	Middle Atlantic	7	10	+ 42.9
18.	Southwest	5	10	+ 100.0
19.	South Central	6	11	+ 116.0
20.	Southwest	5	11	+ 120.0
21.	Atlantic Theater	3	7	+ 133.3
22.	Southwest	3	7	+ 133.3
23.	Southwest	2	5	+ 150.0
24.	Middle Atlantic	5	14	+ 180.0
25.	Pacific Theater	2	6	+ 200.0
26.	South Central	3	9	+ 200.0
27.	Southeast	2	6	+ 200.0
28.	Southeast	2	6	+ 200.0
29.	South Central	2	7	+ 250.0
30.	Pacific Theater	6	22	+ 266.7
31.	Pacific Theater	0	5	+ 500.0 [b]
32	Atlantic Theater	1	7	+ 600.0
33.	Southwest	1	8	+ 700.0
34.	Pacific Theater	0	7	+ 700.0 [b]
35.	Southwest	1	11	+1000.0

a. No change.
b. Actual pecent incalculable.

TABLE II. Navy bird-strikes 1981-1984.

Year	No. of bird-strikes	Percent change	Bird-strikes per 100,000 hrs	Percent change
1981	309		157	
1982	414	+34	205	+31
1983	487	+18	243	+19
1984	693	+42	331	+36

Table III. Birds involved in bird-strikes at Naval air stations implementing bird-aircraft strike hazard reduction program.

Site no.	Bird species	No. of bird-strikes 1983	1984
1.	Unidentified small/ medium birds	9	2
	Gulls	5	1
2.	Unidentified small/ medium birds	11	5
	Raptors	3	1
	Gulls	1	0
	Ducks	1	0
	Egret	1	0
3.	Gulls	9	2
	Unidentified small/ medium birds	8	6
	Ducks	1	0
	Bat	1	0
4.	Gulls	6	1
	Unidenified small/ medium birds	6	5
	Egret	1	0
	Starling	1	0