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BIRD-STRIKE REMAINS IDENTIFICATION IN INDIA

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ABSTRACT

Since 1966 the Bombay Natural History Society started receiving bird remains from Indian aerodromes. Since 1980 with the sponsorship of Aeronautics R & D Board of India (Ministry of defence), the BNHS has launched a major ecological study of bird hazard at 22 aerodromes and also started receiving bird strike remains for identification from a larger number of aerodromes on a regular basis. Seventy species of birds and three species of bats have been identified from bird or animal remains from 1966 to 1991. Analysis of 460 bird and bat remains revealed that birds of prey have caused 56% of the incidents of which *Milvus* kites formed 25% and vultures 23% topping the list of problem birds. Some of the other birds encountered by aircraft were pigeons and doves, ducks, egrets and herons, cranes, sandgrouse, lapwings, stone curlew, peafowl, crows, rollers, gulls, mynas and starlings as well as swifts and swallows. More than 50% of the birds and bats which hit aircraft in India weighed from half a kg to five kg.

INTRODUCTION

Since 1966 the Bombay Natural History Society has assumed a pivotal role in the national bird strike prevention program assisting the civil and military aviations in India through identification of bird remains and suggesting ecological methods to reduce bird menace to aircraft. As a part of this study the BNHS also has been receiving bird remnants along with bird-strike data from aerodromes. The following is a report on the identification of bird-strike remains handled by the BNHS from 1966 to 1991.

MATERIALS AND METHODS

The BNHS has prepared a national bird-strike reporting form incorporating all categories of questions included in the ICAO bird-strike reporting form, together with ICAO computer code. It also includes some additional questions relevant to the Indian situation. Bird and other animal remains accompanying data were cleaned first with warm and diluted detergent and then rinsed repeatedly with cold running water and dried using an air blower before examination. Investigation to identify the species consisted of comparing the samples macroscopically and microscopically with bird and bat skins present in the Collections of the BNHS. Standard methods used by others for microscopic identification of feathers were used (Brom & Buurman 1979, Brom 1980, 1991, Laybourne 1984 and Rosalind and Grubb 1987).

RESULTS AND DISCUSSION

By the end of 1988, 60 species of birds and three species of bats were identified from bird-strike remains (Grubb 1989). By 1990, 7 more species of birds were added to the list (Satheesan 1990, Satheesan, Grubb & Pimento IN PRESS). By the end of 1990 the figure rose to 73 species of birds and three species of bats from a total of 460 bird remains (TABLE 1).

Out of 460 incidents 55.97% was caused by raptors or birds of prey. 25.44% of the strikes were caused by *Milvus* kites and 22.82% by vultures, the two groups of birds causing extensive damage to aircraft in India. As individual species the Pariah Kite *Milvus migrans govinda* responsible for 25% of the and the Whitebacked Vulture *Gyps bengalensis* for 17.8%, were a greater menace to flying aircraft. Till 1988 the number of vulture hits to aircraft (23.78%) was more than kite hits (16.29%) as revealed by analysis of 307 bird and bat strikes where the species were identified from remnants. Other birds encountered

TABLE 1. Bird and
remains i

Sp	

(A) Birds	
1 Pond Heron <i>Ardeotis</i>	
2 Cattle Egret <i>Ardeotis</i>	
3 Little Egret <i>Ardeotis</i>	
4 Night Heron <i>Nycticorax</i>	
5 Bittern <i>Botaurus</i>	
6 Pintail <i>Anas</i>	
7 Common Teal <i>Anas</i>	
8 Blackwinged Kite <i>Elanus</i>	
9 Pariah Kite <i>Elanus</i>	
10 Blackeared Kite <i>Elanus</i>	
11 Brahminy Kite <i>Elanus</i>	
12 Sparrow Hawk <i>Accipiter</i>	
13 Longbilled Vulture <i>Gyps</i>	
14 Whitebacked vulture <i>Gyps</i>	
15 Scavenger Vulture <i>Gyps</i>	
16 Montagu's Harrier <i>Circus</i>	
17 Pale Harrier <i>Circus</i>	
18 Marsh Harrier <i>Circus</i>	
19 Short-toed Eagle <i>Nyctala</i>	
20 Readheaded Merula <i>Merula</i>	
21 Kestrel <i>Falco</i>	
22 Black Partridge <i>Turnix</i>	
23 Rain Quail <i>Turnix</i>	
24 Painted Bush Quail <i>Turnix</i>	
25 Indian Peafowl <i>Pavo</i>	
26 Demoiselle Crane <i>Antelope</i>	
27 Painted Snipe <i>Rostratula</i>	
28 Blackwinged Stilt <i>Himantopus</i>	
29 Stone Curlew <i>Burhinus</i>	
30 Small Indian Plover <i>Pluvialis</i>	
31 Large Indian Plover <i>Pluvialis</i>	
32 Redwattled Lapwing <i>Vanellus</i>	
33 Yellowwattled Lapwing <i>Vanellus</i>	
34 Eastern Golden Plover <i>Pluvialis</i>	
35 Gull <i>Larus</i> sp	
36 Sooty Tern <i>Sterna</i>	

Unidentified e	
Unidentified r	
Unidentified v	
Unidentified h	

TABLE 1. Bird and bat species identified from aircraft strike remains in India from 1966 to 1991 (n = 460)

Species	c wt in g	No. of cases	%
(A) Birds			
1 Pond Heron <i>Ardeola grayii</i>	215	1	0.22
2 Cattle Egret <i>Bubulcus ibis</i>	450	4	0.87
3 Little Egret <i>Egretta garzetta</i>	400	1	0.22
4 Night Heron <i>Nycticorax nycticorax</i>	275	1	0.22
5 Bittern <i>Botaurus stellaris</i>	900	1	0.22
6 Pintail <i>Anas acuta</i>	700	1	0.22
7 Common Teal <i>A. crecca</i>	300	1	0.22
8 Blackwinged Kite <i>Elanus caeruleus</i>	270	6	1.30
9 Pariah Kite <i>Milvus migrans govinda</i>	680	115	25.00
10 Blackeared Kite <i>M. (m.) lineatus</i>	750	2	0.43
11 Brahminy Kite <i>Haliastur indus</i>	600	12	2.61
12 Sparrow Hawk <i>Accipiter nisus</i>	200	1	0.22
13 Longbilled Vulture <i>Gyps indicus</i>	5000	2	0.43
14 Whitebacked vulture <i>G. bengalensis</i>	4500	82	17.83
15 Scavenger Vulture <i>Neophron percnopterus</i>	2000	3	0.65
16 Montagu's Harrier <i>Circus pygargus</i>	250	2	0.43
17 Pale Harrier <i>C. macrourus</i>	300	1	0.22
18 Marsh Harrier <i>C. aeruginosus</i>	400	1	0.22
19 Short-toed Eagle <i>Circaetus gallicus</i>	1500+	1	0.22
20 Readheaded Merlin <i>Falco chicquera</i>	225	1	0.22
21 Kestrel <i>Falco tinnunculus</i>	125-150	3	0.65
22 Black Partridge <i>Francolinus francolinus</i>	400	1	0.22
23 Rain Quail <i>Coturnix coromandelica</i>	75	2	0.43
24 Painted Bush Quail <i>Perdica erythrorhyncha</i>	80	1	0.22
25 Indian Peafowl <i>Pavo cristata</i>	4000	1	0.22
26 Demoiselle Crane <i>Anthropoides virgo</i>	2500	1	0.22
27 Painted Snipe <i>Rostratula bengalensis</i>	125	1	0.22
28 Blackwinged Stilt <i>Himantopus himantopus</i>	170	1	0.22
29 Stone Curlew <i>Burhinus oedicnemus</i>	380	9	1.96
30 Small Indian Pratincole <i>Glareola lactea</i>	40	2	0.43
31 Large Indian Pratincole <i>G. pratincola</i>	125	1	0.22
32 Redwattled Lapwing <i>Vanellus indicus</i>	190	15	3.26
33 Yellowwattled Lapwing <i>V. malabaricus</i>	110	7	1.52
34 Eastern Golden Plover <i>Pluvialis dominica</i>	103	1	0.22
35 Gull <i>Larus</i> sp	116-405	2	0.43
36 Sooty Tern <i>Sterna fuscata</i>	200	1	0.22
Unidentified egret		1	0.22
Unidentified raptor		1	0.22
Unidentified vultures <i>Gyps</i> sp		18	3.91
Unidentified harrier <i>Circus</i> sp		2	0.43

TABLE 1. (Contd.)

37 Indian Sandgrouse <i>Pterocles exustus</i>	250	4	0.8
38 Yellowlegged Green Pigeon <i>Treron phoenicoptera</i>	250	2	0.4
39 Blue Rock Pigeon <i>Columba livia</i>	300	30	6.5
40 Ring Dove <i>Streptopelia decaocto</i>	130	7	1.5
41 Red Turtle Dove <i>S. tranquebarica</i>	90	1	0.2
42 Spotted Dove <i>S. chinensis</i>	125	12	2.6
43 Little Brown Dove <i>S. senegalensis</i>	80	3	0.6
44 Roseringed Parakeet <i>Psittacula krameri</i>	120	4	0.8
45 Koel <i>Eudynamys scolopacea</i>	160	1	0.2
46 Spotted Owlet <i>Athene brama</i>	120	1	0.2
47 Great Horned Owl <i>Bubo bubo</i>	1100	1	0.2
48 Barn Owl <i>Tyto alba</i>	300	2	0.4
49 European Nightjar <i>Caprimulgus europaeus</i>	75-100	1	0.2
50 Indian Little Nightjar <i>C. asiaticus</i>	46	1	0.2
51 Swiftlet <i>Collocalia</i> sp.	15	2	0.4
52 House Swift <i>Apus affinis</i>	20	21	4.5
53 Palm Swift <i>Cypsiurus parvus</i>	18	5	1.3
54 Bluetailed Bee-eater <i>Merops philippinus</i>	30-40	1	0.2
55 Kashmir Roller <i>Coracias garrulus</i>	170	2	0.4
56 Indian Roller <i>C. benghalensis</i>	170	3	0.6
57 Short-toed Lark <i>Calandrella cinerea</i>	20	2	0.4
58 Crested Lark <i>Galerida cristata</i>	20	1	0.2
59 Common Swallow <i>Hirundo rustica</i>	18	2	0.4
60 Indian Cliff Swallow <i>H. fluvicola</i>	10	1	0.2
61 Redrumped Swallow <i>H. daurica</i>	18	4	0.8
62 Rufousbacked Shrike <i>Lanius schach</i>	25	1	0.2
63 Common Myna <i>Acridotheres tristis</i>	110	6	1.3
64 Pied Myna <i>Sturnus contra</i>	75	1	0.2
65 Starling <i>Sturnus vulgaris</i>	60-80	1	0.2
66 House Crow <i>Corvus splendens</i>	300	4	0.8
67 Jungle Crow <i>C. macrorhynchos</i>	500	2	0.4
68 Bluethroated Flycatcher <i>Muscicapa rubeculoides</i>	15	1	0.2
69 Longtailed Warbler <i>Prinia</i> sp.	5-8	1	0.2
70 House Sparrow <i>Passer domesticus</i>	25	1	0.2
(B) Bats			
71 Indian Pigmy Pipistrelle <i>Pipistrellus mimus</i>	20	2	0.4
72 Tomb Bat <i>Taphozous</i> sp.	25	1	0.2
73 Flying Fox <i>Pteropus giganteus</i>	600	2	0.4
Unidentified dove <i>Streptopelia</i> sp.		1	0.2
Unidentified nightjar <i>Caprimulgus</i> sp.		1	0.2
Unidentified swifts and swallows		5	1.0
Unidentified mynas		2	0.4

FIGURE
problem

Soaring bird

52.83%

Typ

FIGURE
problem

Above 20

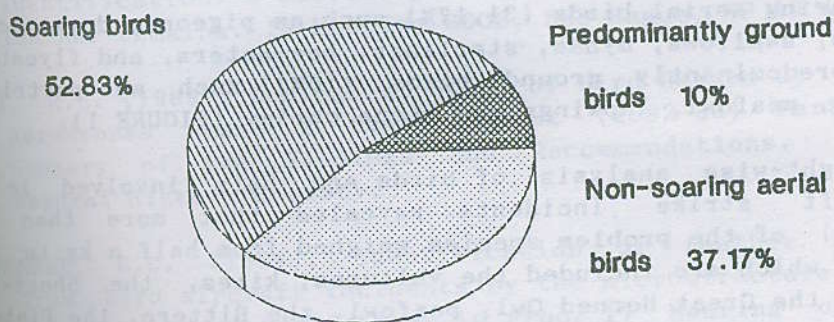
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51-500 g

Up to 50
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FIGURE 1. Activity-wise break up of problem birds in India during 1966-91

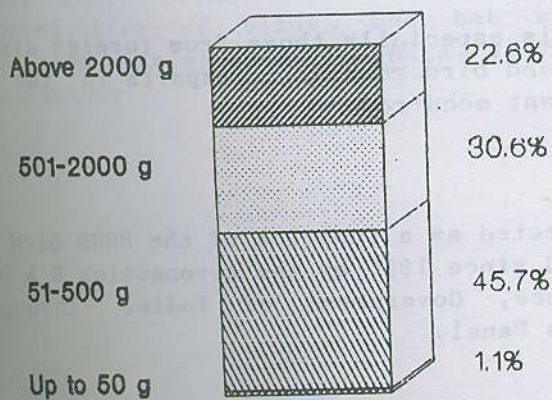
n = 460



Type of birds & % of strikes

FIGURE 2. Weight-wise distribution of problem birds in India during 1966-91

n = 460



Wt. range of birds & % of incidents

more often by aircraft included the pigeons (6.95%), dove (5.27%), lapwings (4.78%), stone curlew (1.96%), owls (0.87%) as well as swifts and swallows (8.91%) as shown in TABLE 1.

An activity-wise break up of the problem birds involved in 46 incidents showed soaring birds such as vultures, kites and harriers have caused more number of strikes (52.83%) than nonsoaring aerial birds (31.17%) such as pigeons, doves, crows, swifts, swallows, mynas, starlings, bee-eaters, and flycatcher and predominantly ground birds (10%) such as partridges, quails, peafowl, lapwings and stone curlew (FIGURE 1).

A weight-wise analysis of birds and bats involved in 46 aircraft strike incidents revealed that more than half (52.8%) of the problem species weighed from half a kg to five kg in which are included the vultures, kites, the Short-toed eagle, the Great Horned Owl, peafowl, the Bittern, the Pintail cranes, gulls, the jungle crow and the Flying fox (TABLE 1, FIGURE 2). Birds weighing less than 50 g caused only 1.1% of the strikes, whereas those weighing between 50 and 500 g were responsible for 45.7%.

Some of the difficulties faced by the BNHS in identifying bird remains are,

1. In many cases the flight safety officials do not send bird remains or identifiable material. At times the feather remains lack downy barbs which are necessary for microscopic examination and identification of bird species.
2. Airline officials especially those from foreign airlines do not send data and bird remains to experts in the country where the incident occurred.

ACKNOWLEDGEMENTS

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