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BIRD STRIKES TO CIVIL HELICOPTERS IN THE UNITED STATES, 1990-2005

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To our knowledge, there has been no published analysis of bird strike data regarding helicopters. From 1990-2005, 370 (0.6 percent) of the 64,734 reported bird strikes to civil aircraft involved helicopters (Table A1). We believe that this is a sufficient sample size to provide an initial summary and analysis of data for bird strikes involving helicopters.

Of the 370 reported bird strikes involving helicopters, 186 (50 percent) indicated damage and 67 (18 percent) indicated substantial damage (Table A1). In contrast, only 15% of bird strikes with all aircraft types resulted in damage and 4% resulted in substantial damage (Table 11). Whereas helicopters accounted for only 0.6 percent of all bird strikes, helicopters accounted for 13 percent (2) of the 16 aircraft destroyed and 24 percent (34) of the 141 injuries caused by bird strikes (Tables A1, 11, 15)

Sixty-three percent of the bird strikes to helicopters and 77 percent of the damaging strikes occurred during the en-route phase of flight (Table A2). In contrast, only 2 percent of bird strikes and 7 percent of damaging strikes for fixed-wing aircraft occurred during the en-route phase. The much higher en-route strike rate for helicopters is related to the lower height AGL at which helicopters typically fly compared to fixed-wing aircraft. For helicopters, about 52 percent of strikes occurred from 501-2,000 feet AGL (Table A2) compared to 14 percent for all aircraft (Table 9). This is a height zone frequently used by many bird species, especially gulls, waterfowl, raptors and vultures (Dolbeer 2006), the species most commonly struck by helicopters (Table A3). Ninety-seven percent of strikes with helicopters causing damage occurred at an indicated airspeed of more than 60 knots (Table A2).

Windshields represented 36 percent of helicopter components reported as struck and 41 percent of components damaged (Table A4). In contrast, windshields represented 17 and 6 percent, respectively, of all components struck and damaged for all aircraft

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types (Table 10). The high percentage of windshields damaged for helicopters, combined with the disproportionate number of human injuries, indicates that improvements are needed in windshield design and strength for these aircraft.

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APPENDIX A TABLES

Table A1. Reported phase of flight and damage at time of bird strikes to civil helicopters, USA, 1990–2005.

Phase of flight	No. of strikes		No. of strikes with damage	
	16-year total	% of total known	16-year total	% of total known
Parked	5	1	0	0
Taxi	5	1	1	<1
Takeoff run	7	2	0	0
Climb	55	16	18	10
En route	221 ¹	63	137 ¹	77
Descent	12	3	7	4
Approach	44	13	16	9
Landing roll	3	<1	0	0
Total known	352	100	179	100
Unknown	18		7	
Total	370		186²	

¹ In comparison, for fixed-winged aircraft only 1,051 (2 percent) of 47,711 strikes occurred during en-route and only 465 (7 percent) of 6,499 damaging strikes occurred en-route.

² Of the 186 bird strike incidents in which damage occurred, 2 helicopters were destroyed, 67 received substantial damage, 87 received minor damage, and 30 received an undetermined level of damage. Thirty-four pilots or passengers were reported as injured in 29 bird strike events with helicopters.

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Table A2. Number of reported bird strikes to civil helicopters by height (feet) above ground level (AGL), USA, 1990–2005.

Height of strike (feet AGL)	All reported strikes ¹			Strikes with damage ¹		
	16-year total	% of total known	% cumulative total	16-year total	% of total known	% cumulative total
0	17	5	5	1	<1	<1
1-100	38	12	17	8	5	5
101-500	112	34	51	56	35	40
501-1000	86	26	77	54	34	74
1001-2000	52	16	93	29	18	92
2001-5100 ²	23	7	100	12	8	100
Total known	328	100		160	100	
Unknown ht.	42			26		
Total	370			186		

¹ Ninety percent of all reported bird strikes with civil helicopters occurred at an indicated air speed (IAS) ≥60 knots and 97 percent of strikes causing damage occurred at an IAS ≥60 knots.

² The maximum height AGL for a reported helicopter strike was 5,100 feet.

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Table A3. Number of reported strikes and strikes with damage to civil helicopters for the four most commonly struck bird groups, USA, 1990–2005.

Species group	Reported strikes		Strikes with damage	
	16-year total	% of total known	16-year total	% of total known
Gulls	65	32	35	28
Waterfowl	49	24	37	29
Vultures	19	9	17	13
Raptors	17	8	10	8
All other known	54	26	28	22
Total known birds	204	100	127	100
Unknown birds	166		59	
Total birds	370¹		186	

¹Thirty-two (9 percent) of the 370 strike events with helicopters involved multiple birds.

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Table A4. Civil helicopter components reported as being struck and damaged by birds, USA, 1990–2005.

Aircraft component	Struck		Damaged	
	Number	% of total	Number	% of total
Windshield	157	36	98	41
Rotor	95	21	26	11
Nose	53	12	29	12
Other	46	10	40	17
Fuselage	41	9	17	7
Engine	19	4	7	3
Radome	12	3	7	3
Tail	9	2	5	2
Landing gear	6	1	3	1
Light	4	<1	6	3
Total	442	100	238	100