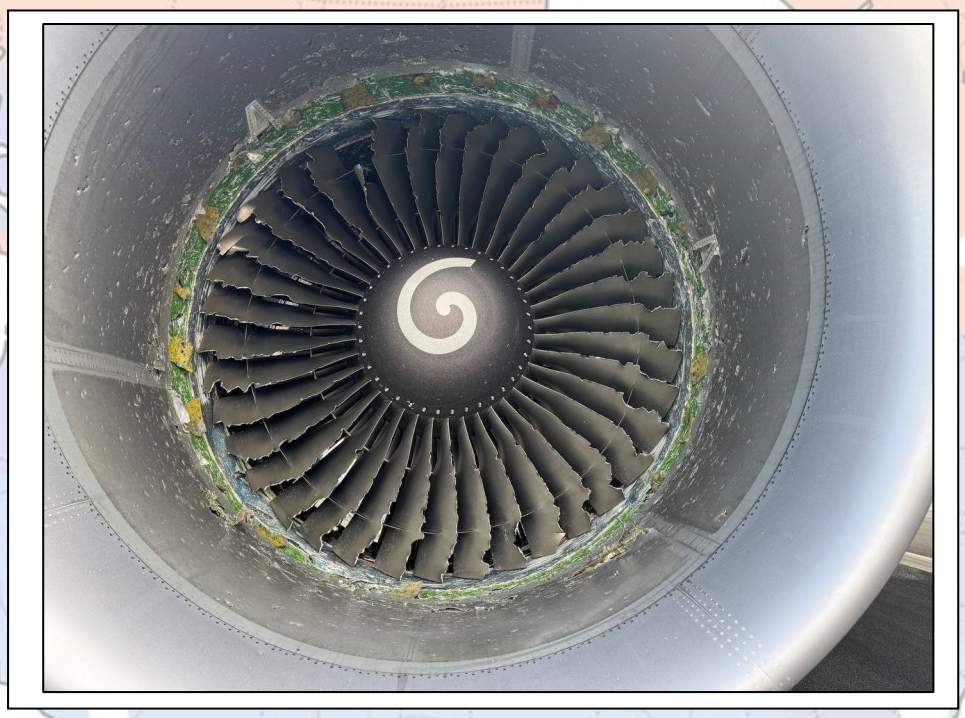
U. S. DEPARTMENT
OF TRANSPORTATION
FEDERAL AVIATION
ADMINISTRATION

Wildlife Strikes to Civil Aircraft in the United States 1990-2025

U. S. DEPARTMENT
OF AGRICULTURE
WILDLIFE SERVICES



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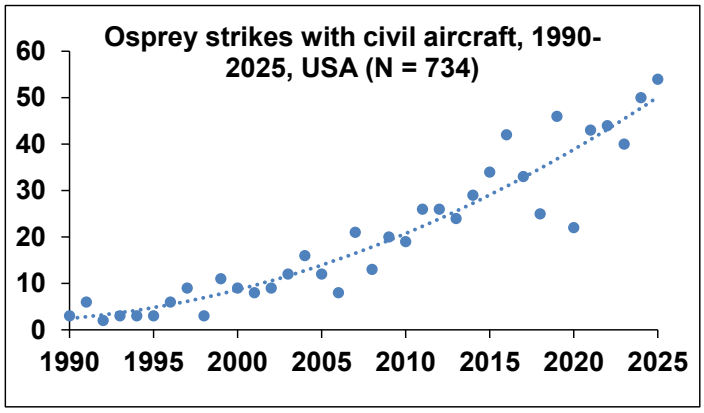
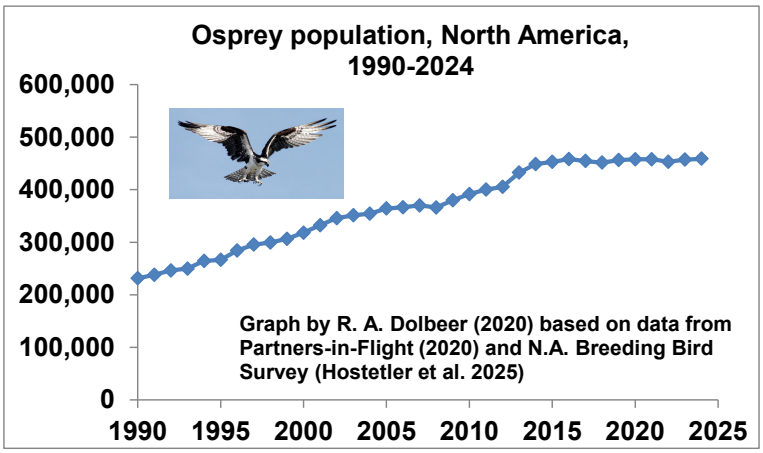
The Federal Aviation Administration (FAA) produced this report in cooperation with the U. S. Department of Agriculture, Wildlife Services (USDA/WS), under an interagency agreement (692M15-19-T-00017). The purpose of this agreement is to 1) document wildlife strikes to civil aviation through management of the FAA National Wildlife Strike Database (NWSD) and 2) research, evaluate, and communicate the effectiveness of various habitat management and wildlife control techniques for minimizing wildlife strikes with aircraft at and away from airports. These activities provide a scientific basis for FAA policies, regulatory decisions, and recommendations regarding airport safety and wildlife.





A record number of osprey strikes with civil aircraft (54) was reported in 2025. The osprey population has doubled since 1990, and the species has adapted to nesting in close association with human activities.

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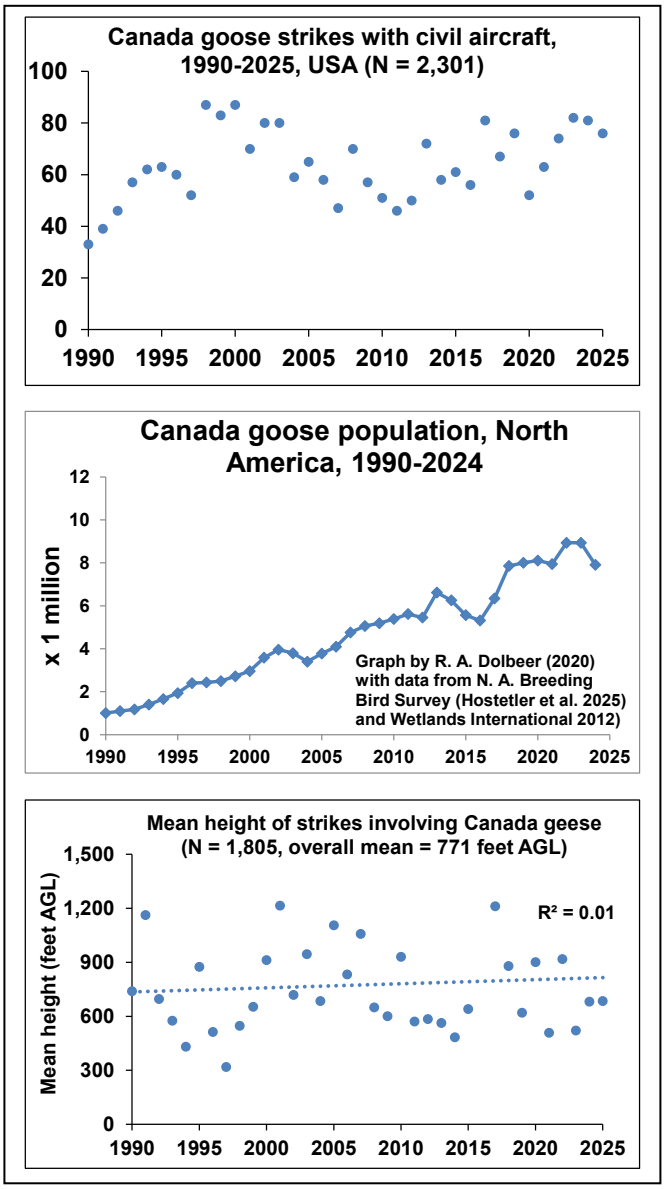
“When you can measure what you are speaking about, and express it in numbers, you know something about it.” Lord Kelvin (1824-1907)

COVER PAGE

A Boeing 767-300 operated by FedEx struck a flock of Canada geese at 750 feet above ground level (AGL) and 163 knots during climb from Newark (New Jersey) Liberty International Airport (EWR), 1 March 2025. Geese were ingested in both engines which resulted in engine #2 fire and shut down. The aircraft diverted back to EWR for an emergency landing. A 4-foot piece of the engine cowling was found in a nearby New Jersey Turnpike maintenance yard. The aircraft was out of service for 17 days and repair costs totaled $7 million. The bird remains (snarge) were identified by the Smithsonian Institution Feather Identification Lab (Smithsonian FIL) as from migratory (non-resident) Canada geese. From 1990-2025, 2,301 Canada geese were reported struck by civil aircraft in the U.S., including 76 in 2025. Photo, Airport.

The population of Canada geese in North America has increased more than 6-fold since 1990. However, the number of strikes has remained relatively constant (an average of 71/year, 2016-2025). The mean height above ground level for Canada goose strikes was 771 feet, making the management of these flocking birds in climb and approach paths at airports a challenging endeavor. Multiple geese were seen or struck in 65 % of strike events.

The NWSD provides the scientific foundation for policies and management programs to mitigate the risk of strikes by Canada geese and other wildlife in ways compliant with the Migratory Bird Treaty Act (MBTA) and other environmental laws at all levels of government.



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The NWSD team acknowledges the many people who took the time and effort to report the 343,556 wildlife strikes summarized in this report: pilots, mechanics, control tower and airport operations personnel, airline flight safety officers, airport wildlife biologists, and many others. We recognize **Mahalah Schank** (USDA/WS) and **Kent Thompson, Sarah Thumhart,** and **Jennifer Dahlstrom** (Applied Research Associates, Inc.) for their diligence in entering data and for the technical support of the database provided by **Shawn Hershman, Matthew Nelson,** and **Andrew Koenig** (Enterprise Engineering Services), and **Prakash Patel** (General Dynamics Information Technology). Special recognition is given to **Sandra Wright**, who managed the NWSD from its inception in 1995 until her retirement in 2015. She set a high standard for data quality and consistency so that analyses such as presented in this report could be accomplished. Sandra also edited this report. We also acknowledge **Gene LeBoeuf** (FAA, retired) and **Edward Cleary** (FAA, deceased) for their leadership in initiating and developing the NWSD. Finally, we acknowledge the suggestions and critiques made by various people over the years that have enhanced the usefulness and accuracy of the NWSD and annual reports such as presented here.

Sponsorship and funds for the ongoing maintenance and analysis of the NWSD are provided by the FAA, Office of Airports Safety and Standards, Washington, DC, and the Airport Technology Research and Development Branch, FAA William J. Hughes Technical Center, Atlantic City, NJ.

EXECUTIVE SUMMARY - PART 1: WILDLIFE STRIKES TO CIVIL AIRCRAFT IN THE UNITED STATES, 1990-2025

Although birds are critical ecological, economic, and esthetic components of the environment deserving rigorous international protection, they can at times conflict with human activities such as aviation. Aircraft collisions with birds and other wildlife (wildlife strikes) have become a growing concern for aviation safety. Factors that contribute to this threat are increasing populations of large birds and increased air traffic by quieter, turbofan-powered aircraft. Globally, wildlife strikes with civil and military aircraft combined have killed more than 649 people and destroyed over 342 aircraft from 1990-2025. Specific to the U.S., wildlife strikes with civil and military aircraft have killed 89 people and destroyed 128 aircraft from 1990-2025.

This report presents an analysis of data from the NWSD for the 36-year period, 1990 through 2025. A sample of 12 significant wildlife strikes to civil aircraft in the U.S. during 2025 is also included as Appendix A. Appendix B explains how to report strikes and the role of the Smithsonian FIL in identifying bird and other wildlife species that are struck. Appendix C is a special report summarizing 2,750 bird strikes with medical transport helicopters. Appendix D lists the scientific names and mean body masses for the 828 wildlife species mentioned in the report.

In 2025, 24,447 strikes were reported, an increase of 9.3% compared to the 22,371 strikes reported in 2024. This increase in reports was higher than the respective 2% increase and 2% decline in aircraft movements at Part 139 airports (certificated for passenger service) and general aviation (GA) airports in 2025 compared to 2024. For the 36-year period (1990-2025), 343,556 strikes were reported, of which 337,882 (98.3%) occurred in the U.S.

Both Part 139-certificated airports and GA airports have recorded significant increases in reported strikes per 100,000 movements from 2000-2025. However, the number of damaging strikes per 100,000 movements below 1,500 feet AGL has remained stable at Part 139-certificated airports from 2000-2025 whereas there has been a significant increase in the damaging strike rate at GA airports and at Part-139 airports for flights on approach or climb at >1,500 feet AGL.

In 2025, 76% and <1% of the 24,447 strike reports were filed using the electronic and paper versions, respectively, of FAA Form 5200-7, Bird/Other Wildlife Strike Report. More than one type of report was filed for the same strike event in 15% of the strikes (many of these had at least one FAA Form 5200-7E report filed). Nine percent of reports were submitted via the FAA Air Traffic Organization Mandatory Occurrence Reporting system.

The 870 U.S. airports with strikes reported in 2025 were comprised of 454 Part 139-certificated airports and 416 GA airports. From 1990-2025, strikes have been reported from 2,417 different U.S. airports. Commercial transport and GA aircraft were involved in 89% and 11% of reported strikes, respectively, in 2025.

From 1990 to 2025, 54% of bird strikes occurred between July and October; 38% of deer strikes occurred in September-November. Terrestrial mammals are more likely to be struck at night (61%) whereas birds are struck more often during the day (62%). Birds, terrestrial mammals, and bats are all more likely to be struck during the arrival phase of flight (63%, 63%, and 84% of strikes, respectively) compared to departure (34%, 32% and 13%, respectively).

For commercial transport and fixed-wing GA aircraft, about 71% and 75% of bird strikes occurred at or below 500 feet AGL from 1990 to 2025. Above 500 feet AGL, the number of strikes declined by 35% for each 1,000-foot gain in height for commercial transport aircraft. Strikes occurring above 500 feet were more likely to cause damage than strikes at or below 500 feet. The record height for a reported bird strike was 32,000 feet AGL (Wilson's warbler, identified by Smithsonian Institution Feather Identification Lab, Appendix B).

From 1990 to 2025, 665 species of birds, 58 species of terrestrial mammals, 59 species of bats, and 46 species of reptiles were identified as struck by aircraft (828 species in total). Waterfowl, raptors, and gulls are the species groups of birds with the most damaging strikes; artiodactyls (mainly deer) and carnivores (mainly coyotes) are the terrestrial mammals with the most damaging strikes. Although the percentage of wildlife strikes with reported damage has averaged 6% for the 36-year period, this number has declined from a peak of 18% in 1995 to 4% in 2025.

A negative effect-on-flight was reported in 4% and 15% of the bird and terrestrial mammal strike reports, respectively, 1990-2025. Precautionary/emergency landing after striking wildlife was the most reported negative effect (9,797 incidents), including 422 incidents in which the pilot either jettisoned fuel (70 incidents, mean of 13,910 gallons), made an overweight landing (172 incidents), or burned fuel in circling pattern (180 incidents). Aborted take-off was the second most reported negative effect (3,337 incidents). These negative incidents included 568 aborted take-offs at $\geq$100 knots. As with the trend for the percentage of strikes causing damage, the percentage of strikes with a reported negative effect-on-flight has declined from a high of 11% in 1995-1996 to 4% in 2025. For commercial transport aircraft, the number of high-speed ($\geq$100 knots) aborted take-offs declined from a high of 26 in 2000 to 4 in 2020 but increased to 12 in 2024 and 8 in 2025.

For the 33 species of birds most frequently identified as struck by civil aircraft in 2025, there was a strong correlation (R^2 = 0.85) between mean body mass and the likelihood of a strike causing damage to aircraft. For every 100-gram increase in body mass, there was a 1.13% increase in the likelihood of damage. Thus, body mass is a good predictor of relative hazard level among bird species.

Eighty-nine strikes resulted in destroyed aircraft from 1990-2025 (0 in 2025); 51 (57%) of these occurred at GA airports. The annual cost of wildlife strikes to the U.S. civil aviation industry in 2025 was projected to be 74,372 hours of aircraft downtime and $391 million in direct and other monetary losses. These projections may be at the high end of actual costs because of the skewed nature of reported cost data. More thorough reporting of

strike events and associated costs combined with additional economic analyses are needed to refine the actual costs of wildlife strikes to the aviation industry.

Management actions to mitigate the risk have been implemented at many airports since the 1990s; these efforts are likely responsible for the general stabilization or decline in reported strikes with damage and a negative effect-on-flight at Part 139-certificated airports below 1,500 feet AGL from 2000-2025 despite continued increases in populations of many large bird species. However, much work remains to be done to reduce wildlife strikes, especially during the climb and approach phases of flight outside the airport boundaries. Management actions at airports should be prioritized based on the hazard level of species observed on the airfield.

To address strikes outside the airport boundaries, municipalities and the aviation community must first widen their view of wildlife management to minimize hazardous wildlife attractants within 5 miles of airports. Second, the aviation community needs to broaden the view of wildlife strike risks from a ground-based wildlife management problem to conceivably an airspace management problem that also encompasses Air Traffic Control, flight crews, and aircraft manufacturers. Long-term goals could include the integration of avian radar and bird migration forecasting into airspace management and the development of aircraft lighting systems to enhance detection and avoidance by birds. Finally, there continues to be a need for increased and more detailed strike reporting. When reports are filed, it is important that relevant information be provided whenever possible regarding species identification, number of wildlife struck, time and height of strike, phase of flight, and damage to aircraft components. A problem that is not well defined cannot be properly managed.

EXECUTIVE SUMMARY- PART 2: FAA ACTIVITIES FOR MITIGATING WILDLIFE STRIKES

In 2025, the FAA continued a multifaceted approach for mitigating wildlife strikes both nationally and globally. This included continuing a robust research program, making improvements to the NWSD and outreach, working with the International Civil Aviation Organization (ICAO) on multiple projects, as well as providing Airport Improvement Program (AIP) funding to conduct Wildlife Hazard Assessments (Assessments) and develop Wildlife Hazard Management Plans (Plans).

Significant wildlife / aircraft strikes such as the Airbus A330 that ingested eight Canada geese shortly after take-off on January 28, 2026, at Cincinnati/Northern Kentucky International Airport (CVG) continue to demonstrate the severity of aircraft collisions with birds and other wildlife. The FAA, in conjunction with the USDA/WS and Smithsonian FIL, has worked to improve strike reporting options, turnaround time from report submission to public availability, data processing and analysis, as well as data access via this report and our web sites. The reduced turnaround time benefits airport owners and operators, airlines, engine and airframe manufacturers and biologists alike.

In the seventeen-year span since the emergency forced landing of US Airways Flight 1549 Airbus into the Hudson River on January 15, 2009, over $400 million of AIP funds have been allocated for wildlife-related projects such as Assessments, Plans and airport perimeter fencing. All required Part 139 certificated airports have successfully completed Assessments followed by Plans. Many of those airports have already updated their original Assessments with new ones while others have chosen to implement Continual Monitoring programs as detailed in Advisory Circular 150/ 5200- 38 - *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans* (published August 20, 2018).

The FAA dedicated over $30 million in research funds since Flight 1549's emergency forced landing into the Hudson River in 2009. These research funds help us better understand the capabilities of advanced detection and monitoring systems such as avian radars, Foreign Object Debris (FOD) radars and infrared / electro-optical scanning systems. Other research initiatives included aircraft-mounted lighting systems to enhance bird detection and avoidance, wildlife control techniques, habitat management, Canada goose movement analyses, capture and relocation efficacy of raptors, DNA and molecular identifications, and the evaluation of unmanned aerial systems (UAS) for hazing, detection and monitoring hazardous wildlife.

In October 2022, the FAA released a new Wildlife Hazards video. This updated outreach endeavor is part of the FAA Airport Safety Information Video Series. It discusses how successful wildlife strike reporting, and the NWSD (jointly administered by USDA/WS and FAA) is reducing the impact of wildlife strikes on both commercial and general aviation.

Continuing international efforts in 2025 included: 1) leading ICAO's ADOP.015.05 Job Card to rewrite the ICAO Birdstrike Information System (IBIS) manual (Doc 9332) as Rapporteur of the Wildlife Hazard Management Expert Group (WHMEG); 2) assisting ICAO on an initiative to support access to IBIS data; 3) presentations for international forums and; 4) providing assistance to foreign regulators and aerodromes on an as-needed basis.

The Sandy Wright / Richard Dolbeer Excellence in Strike Reporting award was initiated in 2014 to recognize those airports that have exhibited a noteworthy strike-reporting program. For their commitment to the identification and documentation of wildlife / aircraft strike information, the FAA recognizes the strike reporting programs at **Detroit Metropolitan Wayne County Airport (DTW)** and **Wood County Regional Airport (1GO)** as the winners of the 2025 Sandy Wright / Richard Dolbeer Excellence in Strike Reporting award.

Eighty-two percent of strikes occur at or below 1,500 feet AGL. This altitude falls within the 5-mile separation distance recommended for wildlife attractants, meaning that on-ground wildlife mitigation activities out to 5 miles can have a positive effect on risk reduction for the majority of all wildlife strikes. This again shows why managing wildlife attractants off airport properties out to 5-miles is critical.

The FAA offers two key essentials to aid the aviation community with reporting and monitoring strikes. First, the NWSD can receive wildlife strike reports that are completed through an organization's internal reporting system. This synchronized reporting uses an

application programming interface (API) to safely and securely allow different software systems to communicate and exchange data. Secondly, the NWSD can automatically send an email notification when a wildlife strike report is received. This can be set based on airfield code, engine make/model involved, aircraft operator, and a few other select parameters. This feature allows key aviation stakeholders to know about a wildlife strike as soon as possible.

Wildlife strikes with aircraft are rare events that occur every day. They are a reminder that ensuring safe coexistence between aviation and wildlife is challenging. When strikes are compared to the total number of flights in the system their scarcity becomes apparent. With enough data points, trends begin to show involving location, altitude, season, phase of flight, time of day and species; and identifiable trends can be mitigated. Even if it is impossible to eliminate all strikes at all times between aircraft and animals, comprehensive assessment, planning, consistent management and collaboration between an airport and its neighbors have successfully mitigated damaging strikes $\leq$1,500 feet AGL. Recent analyses though have identified strike trends within aircraft approach/departure phases of flight $\geq$1,500 feet AGL that merit innovative detection, monitoring and communication procedures to extend the mitigation of damaging strikes farther from airports. Combined with systematic evaluation, adaptation of techniques and inclusion of technological advancements, safety can be increased one less strike at a time.

Table of Contents

Acknowledgments	iv
Executive Summary	v
List of Tables	xi
List of Figures	xiii
List of Appendices	xv
Part 1: Wildlife Strikes to Civil Aircraft in the United States, 1990-2025	1
Introduction	1
Results	5
Conclusions	15
Part 2: FAA Activities for Mitigating Wildlife Strikes	18
Literature Cited	28
Tables	38
Figures	94
Appendix A. Selected Significant Wildlife Strikes to U.S. Civil Aircraft, 2025	109
Appendix B. Reporting a Strike and Identifying Species of Wildlife Struck	113
Appendix C. Trends and Characteristics of Reported Bird Strikes with Medical Transport Helicopters, U.S., 1990-2025	116
Appendix D. Scientific Names and Body Masses for Identified Wildlife Species Struck by Civil Aircraft in U.S. or by U.S.-registered Aircraft in Foreign Countries, 1990-2025	120

LIST OF TABLES

Table 1.	Reported wildlife strikes to civil aircraft in U.S. and to U.S.-registered civil aircraft in foreign countries, 1990-2025.	38
Table 2.	Reported wildlife strikes to civil aircraft in U.S. by wildlife group, 1990-2025.	39
Table 3.	Number and rate of reported wildlife strikes and strikes with damage for transport aircraft at 335 Part-139 certificated airports, U.S., 2000-2025 (see Figure 2).	40
Table 4.	Number and rate of reported wildlife strikes and strikes with damage for general aviation aircraft at 115 non-Part-139 certificated (general aviation) airports, U.S., 2000-2025 (see Figure 2).	41
Table 5.	Methods of reporting and source of information for reported wildlife strikes to civil aircraft, U.S., 2025 only and 1990-2025.	42
Table 6.	Person filing report of wildlife strike to civil aircraft, U.S., 2025 only and 1990-2025.	43
Table 7.	Number of reported wildlife strikes to civil aircraft by type of operator, U.S., 2025 only and 1990-2025.	44
Table 8.	Number of Part 139-certificated airports and general aviation (GA) airports with reported wildlife strikes and number of strikes reported for these airports, civil aircraft, U.S., 1990-2025 (see Figure 5).	45
Table 9.	Reported time of occurrence of wildlife strikes with civil aircraft, U.S., 1990-2025.	46
Table 10.	Reported phase of flight at time of occurrence of wildlife strikes with civil aircraft, U.S., 1990-2025.	47
Table 11.	Number of reported bird strikes to commercial transport aircraft by height above ground level (AGL), U.S., 1990-2025. See Figure 8 for graphic analysis of strike data from 501 to 18,500 feet AGL.	48
Table 12.	Number of reported bird strikes to general aviation aircraft by height above ground level (AGL), U.S., 1990-2025.	49
Table 13.	Civil aircraft components reported as being struck and damaged by wildlife, U.S., 1990-2025.	50
Table 14.	Number of civil aircraft with reported damage resulting from wildlife strikes, U.S., 1990-2025. See Tables 1-4 and Figures 2, 3, 10, and 15 for trends in damaging strikes, 1990-2025.	51
Table 15.	Reported effect-on-flight of wildlife strikes to civil aircraft, U.S., 1990-2025. See Figure 10 for trend in strikes with a negative effect-on-flight (NEOF), 1990-2025.	52

Table 16.	Number of reported incidents where pilot made a precautionary or emergency landing after striking wildlife during departure in which fuel was jettisoned or burned (circling pattern) to lighten aircraft weight or in which an overweight (greater than maximum landing weight) landing was made, civil aircraft, U.S., 1990-2025. See Figure 11 for trend in incidents, 1990-2025.	53
Table 17.	Indicated air speed (nautical miles/hour [knots]) at time pilot aborted take-off after striking or observing wildlife on runway, civil aircraft, U.S., 1990-2025. See Figure 12 for trend in high-speed aborted take-offs at ≥100 knots caused by wildlife, 1990-2025.	54
Table 18.	Total reported strikes, strikes causing damage, strikes having a negative effect-on-flight (NEOF), strikes involving >1 animal, and reported aircraft downtime and costs by identified wildlife species, civil aircraft, U.S., 1990-2025.	55
Table 19.	Number of reported strikes, strikes with damage, and strikes involving multiple animals for the five most struck bird groups and three most struck terrestrial mammal groups, civil aircraft, U.S., 1990-2025.	86
Table 20.	The 33 species of birds identified most frequently as struck by civil aircraft in U.S., 1990-2025 and 2025 only. See Figure 14 for relation between mean body mass and percentage of strikes causing damage for these 33 species in 2025.	87
Table 21.	Number of strikes to civil aircraft causing human fatality and number of fatalities by wildlife species, U.S., 1990-2025.	88
Table 22.	Number of civil aircraft lost (destroyed or damaged beyond repair) after striking wildlife by wildlife species group and aircraft mass category, U.S., 1990-2025. See Figure 15 for number of lost aircraft by year, 1990-2025.	89
Table 23.	Number of reported wildlife strikes indicating damage, a negative effect-on-flight (NEOF), aircraft downtime, repair costs, and other costs; and the mean losses per report in hours of downtime and inflation-adjusted U.S. dollars, civil aircraft, U.S., 1990-2025.	90
Table 24.	Projected annual losses in aircraft downtime (hours) and in repair and other costs (inflation-adjusted U.S. dollars) from wildlife strikes with civil aircraft, U.S., 1990-2025. Losses are projected from mean reported losses per incident (Table 23).	91

LIST OF FIGURES

Figure 1. Number of reported wildlife strikes with civil aircraft, U.S., 1990-2025. The 337,882 strikes involved birds (323,355), terrestrial mammals (6,702), bats (6,898), and reptiles (927). An additional 5,674 strikes were reported for U.S.-registered aircraft in foreign countries for a total of 343,556 strikes (see Tables 1, 2, and 18). 94

Figure 2. The strike rate and damage strike rate (number of reported strikes and damage strikes per 100,000 aircraft movements) for commercial (air carrier and air taxi service) transport aircraft at 335 Part 139-certificated airports and general aviation aircraft at 115 general aviation airports, U.S., 2000-2025. Strikes involving U.S.-registered aircraft in foreign countries are excluded. R^2 values greater than 0.15 and 0.24 indicate significant trends at the 0.05 and 0.01 levels of probability, respectively (Steele and Torrie 1960; see Tables 3 and 4 for complete data). 95

Figure 3. The damage strike rate (number of reported damaging strikes per 100,000 aircraft movements) with commercial transport aircraft at 335 Part 139-certificated airports (top graph) and general aviation aircraft at 115 general aviation airports (bottom graph) occurring at ≤ and >1,500 feet above ground level (AGL) for all wildlife species, U.S., 2000-2025. Strikes with unknown height AGL and strikes involving U.S.-registered aircraft in foreign countries are excluded. R^2 values greater than 0.15 and 0.24 indicate significant trends at the 0.05 and 0.01 levels of probability, respectively (Steele and Torrie 1960). 96

Figure 4. The mean body mass of birds reported as struck by civil aircraft in U.S. has declined by 67% from 2000 (0.76 kg) to 2025 (0.25 kg). This trend indicates that airports, pilots, and commercial transport aviation in general, are doing a better job of documenting all wildlife that are struck, many of which are small species that rarely cause damage. Means were calculated from all strikes in U.S. in which the bird was identified to species level. See Figure 13 for number of identified bird species struck each year and Table 18 and Appendix D for numbers struck and mean biomass by species. 97

Figure 5. Number of Part 139-certificated airports and general aviation (GA) airports in U.S. with reported wildlife strikes and number of foreign airports at which strikes were reported for U.S.-registered civil aircraft, 1990-2025. Strikes were reported from 2,417 U.S. airports (513 Part 139-certificated, 1,904 GA) and 351 foreign airports in 113 countries, 1990-2025 (Table 8). 98

Figure 6. Percentage of reported bird (top graph) and bat (bottom graph) strikes with civil aircraft by month, U.S., 1990-2025. In addition, 927 strikes with reptiles were reported, of which 57% occurred in May - July. Strikes reported for U.S.-registered aircraft in foreign countries were excluded. 99

Figure 7. Percentage of reported deer (top graph) and coyote (bottom graph) strikes with civil aircraft by month, U.S., 1990-2025. One deer and 1 coyote strike reported for U.S.-registered aircraft in foreign countries were excluded. Deer (1,381 white-tailed, 93 mule, 1 axis, 17 unidentified to species) and coyotes are the most frequently struck terrestrial mammals (Table 18). Biondi et al. (2011) provide a more detailed analysis of deer strikes with civil aircraft in the U.S.; Ball et al. (2021) summarize data on mammal strikes worldwide. 100

Figure 8. Number of reported bird strikes with commercial transport aircraft in U.S. by 1,000-foot height intervals above ground level from 501-1,500 feet (interval 1) to 17,501-18,500 feet (interval 18), 1990-2025. This graph excludes strikes at ≤500 feet and strikes with rotorcraft. Above 500 feet, the number of reported strikes declined consistently by 35% for each 1,000-foot gain in height. The exponential equation explained 99% of the variation in number of strikes by 1,000-foot intervals from 501 to 18,500 feet. See Table 11 for sample sizes. 101

Figure 9. Percentages of total strikes and total damaging strikes occurring at 500 feet or less and above 500 feet for commercial transport (top graph) and general aviation (bottom graph) aircraft in U.S., 1990-2025. See Tables 11 and 12 for sample sizes. 102

Figure 10. Percentage of reported strikes that indicated damage to the civil aircraft (top graph) or a negative effect-on-flight (NEOF, bottom graph), U.S., 1990-2025. See Tables 1, 14, and 15 for sample sizes and classifications of damage and negative effects-on-flight. 103

Figure 11. Number of reported incidents where pilot made an emergency or precautionary landing after striking wildlife during departure in which fuel was jettisoned or burned (circling pattern) to lighten aircraft weight or in which an overweight (greater than maximum landing weight) landing was made (no fuel jettison or burn), U.S. civil aircraft, 1990-2025. See Table 16 for details on aircraft involved and amount of fuel jettisoned. 104

Figure 12. Number of reported incidents in which pilot made a high-speed aborted take-off (≥100 knots) after striking or observing wildlife during take-off run, U.S. civil aircraft, 1990-2025. See Table 17 for classification of aborted take-offs by indicated airspeed. 105

Figure 13. In 2025, 406 bird species were identified as struck by civil aircraft (top graph); the bird was identified to species level in 55% of reported strikes (bottom graph). From 1990 through 2025, 665 species of birds, 58 species of terrestrial mammals, 59 species of bats, and 46 species of reptiles (828 species total) have been identified. See Tables 1 and 18 and Appendix D for sample sizes and list of species. 106

Figure 14. Relation between mean body mass (Dunning 2008) and likelihood of a strike causing damage to aircraft for the 33 species of birds most frequently identified as struck by civil aircraft in U.S., 2025 (Table 20). The linear regression equation explained 85% of the variation in the likelihood of damage among the 33 species. For every 100-gram increase in body mass, there was a 1.13% increase in the likelihood of damage. 107

Figure 15. Number of civil aircraft destroyed or damaged beyond repair after striking wildlife, U.S., 1990-2025. From 1990-2025, 89 aircraft have been lost. See Table 22 for wildlife species groups associated with these events. The graph includes 1 unmanned aerial vehicle (drone) destroyed in 2020 after being attacked by a bald eagle during a shoreline erosion survey on Lake Michigan. 108

LIST OF APPENDICES

Appendix A. Selected Significant Wildlife Strikes to U.S. Civil Aircraft, 2025 109

Appendix B. Reporting a Strike and Identifying Species of Wildlife Struck 113

Appendix C Trends and Characteristics of Reported Bird Strikes with Medical Transport Helicopters, U.S., 1990-2025 116

Appendix D. Scientific Names and Body Masses for the 828 Identified Wildlife Species Struck by Civil Aircraft in U.S. or by U.S.-Registered Aircraft in Foreign Countries, 1990-2025 120

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PART 1: WILDLIFE STRIKES TO CIVIL AIRCRAFT IN THE UNITED STATES, 1990-2025

INTRODUCTION

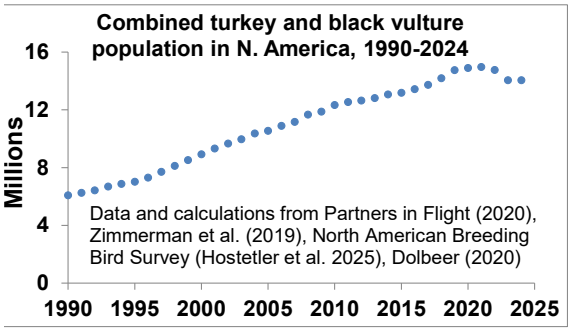
By the end of 2025, the NWSD contained strike records involving civil aircraft and 665 species of birds, 58 species of terrestrial mammals, 59 species of bats, and 46 species of reptiles for a total of 828 wildlife species since 1990. Each species has unique characteristics regarding body mass, physical density, social behavior, habitat use, feeding habits, movement patterns, and response to approaching aircraft. In addition to these factors, about 90% of the bird strikes involve species federally protected by the MBTA (Dolbeer 2021). Most of the remaining 10% of bird species and the various mammal and reptile species have legal protection at the state and local level. This diversity of species, the overlying legal protections, and broad public concern for wildlife require that airport owners and operators and engine and aircraft manufacturers consider a broad range of elements when mitigating the risk of bird and other wildlife strikes.

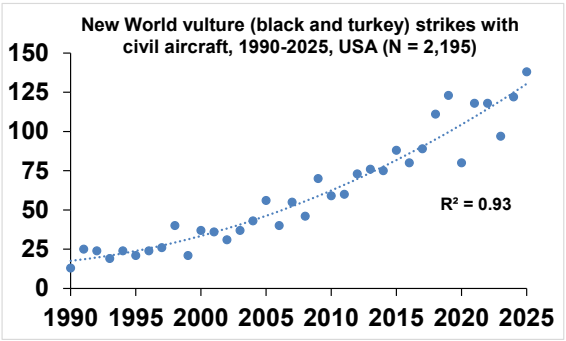
A B-737-800 ingested a large bird in the #2 engine during take-off run at a west coast airport, December 2025. Flames were observed coming from engine after take-off; the aircraft returned to airport and was taken out of service for repairs. Bird remains from engine sent to Smithsonian Feather Lab were identified as red-tailed hawk (1.2 kg). In 2025, 210 red-tailed hawks were reported as struck by civil aircraft. Photo, airport.

Although birds and other wildlife are critical ecologic, economic, and esthetic components of the environment deserving rigorous protection (Sekercioglu et al. 2016), they at times conflict with human activities such as agriculture (Linz et al. 2017), health (Ringenberg et al. 2024), and aviation. Aircraft collisions with birds and other wildlife have become an increasing concern for aviation safety in recent years (Bogaisky 2019, Koerner 2020, Ghayad 2022, Air Line Pilots Association, International 2026).

The reasons for the increasing concern are complex. A major factor is that due to the MBTA, other environmental initiatives, and land-use changes, populations of most large bird species in North America have increased markedly in the last 3 decades and adapted to urban environments, including airports (Rutledge et al. 2015, Ma et al. 2024). Dolbeer (2020) examined the estimated population trends and numbers for the 36 species of birds in North America with mean body masses $\geq$1.1 kg and at least 20 reported strikes with civil aircraft, 1990-2018 (certification standards for aircraft engines and airframe components require testing with bird masses from 1.1 kg to 3.6 kg depending on component and aircraft type [Croft 2011, 14 CFR Part 33-77]). Of these 36 larger species,

26 indicated population increases of greater than 10%, 5 were unchanged, and 5 showed declines of greater than 10%. The net gain in numbers for the 36 species was an estimated 35 million birds (62% increase). Notably, all 9 species with body mass ≥3.6 kg indicated population increases.





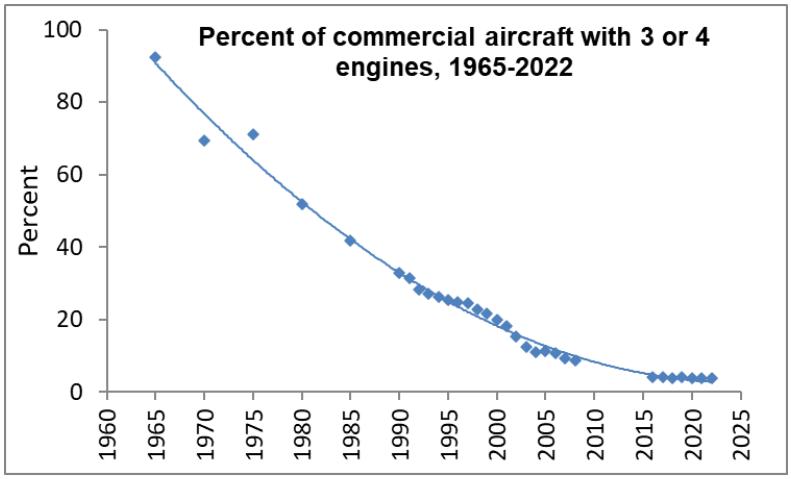
A record number of strikes with vultures (138) was reported in 2025.

As specific examples, the combined turkey and black vulture population in North America increased about 130% from 6 million to 14 million birds, 1990-2024. The estimated population in 2024 was 4.9 million black vultures and 9.1 million turkey vultures.

In addition, populations of various large terrestrial mammal species that encroach on airfields such as deer and coyotes have also increased. For example, the white-tailed deer population in the U.S. increased from about 15 million in 1984 to 32 million by 2025 (Hanberry 2021, World Population Review 2026). Furthermore, most of these large bird and mammal species have adapted to living in urban environments, including airports (e.g., Rutledge et al. 2015, Hanberry 2021, Belant et al. 2025).

A second factor relates to aircraft and engine design. Commercial air carriers have replaced their older three or four-engine aircraft fleets with more efficient and quieter, two-engine aircraft. In 1965, about 94% of the 1,037 turbine-powered transport aircraft in the U.S. had three or four engines compared to 3% of the 8,162 aircraft in 2022 (U.S. Department of Transportation 2026, Forecast International 2026). With steady advances in technology over the past several decades, today's two-engine aircraft are more powerful and reliable than yesterday's three and four-engine aircraft. However, in the event of multiple-engine ingestions, aircraft with two engines may have vulnerabilities not shared by their three or four engine-equipped counterparts (Langston 2019). In addition, bird strikes to critical aircraft sensors connected to flight control systems (e.g., Angle of Attack Vanes) can be problematic (National Transportation Safety Board 2023).

Four incidents in the past 17 years have highlighted these vulnerabilities. On 15 January 2009, US Airways Flight 1549 (Airbus 320) with 155 persons aboard made a forced landing in the Hudson River after ingesting Canada geese into both engines at 2900 feet AGL after departure from LaGuardia Airport, New York (Marra et al. 2009, National Transportation Safety Board 2010). On 15 August 2019, Ural Airlines Flight 178 (Airbus 321) with 234 persons aboard made a forced landing in a corn field 3 miles from Zhukovsky International Airport, Moscow, Russia after ingesting herring gulls into both



engines during take-off (Aviation Safety Network 2026*a*). Incredibly, none of the 389 people were killed in these "Miracle on the Hudson" and "Miracle in the Corn Field" bird-strike events even though both aircraft were damaged beyond repair.

However, on 10 March 2019, a Boeing 737 Max 8 crashed shortly after take-off from Addis Ababa Bole International Airport, Ethiopia, killing all 157 people aboard. The U.S. National Transportation Safety Board concluded that the "erroneous Angle of Attack sensor output [which forced the aircraft into a steep dive] was caused by the separation of the Angle of Attack sensor vane due to impact with a foreign object, which was most likely a bird" (National Transportation Safety Board 2023). On 29 December 2024, a Boeing 737-800 on approach to Muan International Airport, South Korea, ingested ducks (Baikal teal) into both engines. The resulting crash killed 179 of 181 passengers and crew (Aviation Safety Network 2026*b*).

A third complicating factor is that birds are less able to detect and avoid modern jet aircraft with quieter turbofan engines (Chapter 3, International Civil Aviation Organization 1993) compared to older aircraft with noisier (Chapter 2) engines (Burger 1983, Kelly et al. 1999). This is analogous to the demonstrated greater "strike rate" for pedestrians and bicyclists (increases of 35% and 57%, respectively) with electric vehicles compared to vehicles with noisier internal combustion engines (Wu et al. 2011, Edwards et al. 2024). In October 2017, the FAA adopted a rule requiring new transport aircraft to have noise levels further reduced by at least 7 decibels compared to the current fleet (Federal Register 2017).

As a result of these factors, experts within the FAA, USDA/WS, and U.S. military expect the risk of bird and other wildlife strikes to be a continuing challenge. Mitigating these risks can be difficult because of the diversity of wildlife species involved, their mobility and adaptability, legal requirements of the MBTA and other environmental laws, and overall public interest in the protection of wildlife. But these challenges must be met. Globally, wildlife strikes have killed more than 649 people and destroyed over 342 civil and military aircraft from 1990-2025 in addition to causing economic losses in the billions of dollars (Allan and Orosz 2001; Richardson and West 2000; Thorpe 2012; Avisure 2026). Specific to the U.S., wildlife strikes with civil and military aircraft have killed at least 89 people and destroyed 128 aircraft from 1990-2025 (Avisure 2026).

The FAA has initiated several programs to address this important safety issue. A foundation of these programs is the collection and analysis of data from wildlife strikes.

The FAA began collecting bird and bat strike data in 1965 (expanded to include terrestrial mammals and reptiles in 1990). However, except for cursory examinations of strike reports to determine general trends, the data were never organized and submitted to rigorous analysis until the 1990s.

A B-777 struck two Canada geese at 100 feet AGL during the final approach to an east coast airport, February 2025. The radome and nose landing gear were damaged. Aircraft was out of service for at least 34 hours. Photo, Airport.

In 1995, the FAA, through an interagency agreement with the USDA/WS, initiated a project to obtain more objective estimates of the magnitude and nature of the wildlife strike problem for civil aviation. Specialists from the USDA/WS: (1) research all strike reports (FAA Form 5200-7, *Bird/Other Wildlife Strike Report*) received by the FAA since 1990 to ensure consistent, high-quality data; (2) process all edited strike reports into the FAA NWSD; (3) supplement FAA-reported strikes with additional, non-duplicated strike reports from other sources; and (4) assist the FAA with the production of annual and special reports summarizing the results of analyses of the data from the NWSD. Such analyses are critical to determining the economic cost of wildlife strikes, the magnitude of safety issues, and most important, the nature of the problems (e.g., wildlife species involved, types of damage, height and phase of flight during which strikes occur, seasonal patterns, and long-term trends in strikes). The information obtained from these analyses provides the foundation for FAA national policies and guidance and for refinements in the development and implementation of integrated research and management efforts to reduce wildlife strikes. Data on the number of strikes causing damage to aircraft or other adverse effects (e.g., aborted take-off) also provide a benchmark for individual airports to evaluate and improve their Wildlife Hazard Management Plans in the context of a Safety Management System (Dolbeer and Begier 2012).

The first annual report on wildlife strikes to civil aircraft in the U.S. was completed in November 1995 (Dolbeer et al. 1995). This is the 32nd report in the series and covers the 36-year period, 1990-2025. The current annual report is accessible as a PDF file at: http://www.faa.gov/airports/airport_safety/wildlife/.

To supplement the statistical summary of data presented in tables and graphs, a sample of 12 significant wildlife strikes to civil aircraft in the U.S. during 2025 is presented in Appendix A. These recent strike examples demonstrate the widespread and diverse

nature of the problem. A more extensive list of significant strike events, 1990-2025, is available at http://www.faa.gov/airports/airport_safety/wildlife/.

Appendix B explains how to report strikes and the role of the Smithsonian FIL in identifying bird and other wildlife species that are struck.

Appendix C is a special report on trends and characteristics of strikes involving medical transport helicopters, 1990–2025.

Appendix D lists the common and scientific names for the 828 species of wildlife (665 birds, 59 bats, 58 terrestrial mammals, and 46 reptiles) mentioned in the report, as well as mean and (when available) maximum body masses.

RESULTS

NUMBER OF REPORTED STRIKES AND STRIKES WITH DAMAGE

In 2025, 24,447 strikes were reported, which was an increase of 9.3% compared to the 22,371 strikes reported in 2024 (Table 1, Figure 1). In 2025, 98.6% of the 24,447 strikes occurred in the U.S.[1]; birds were involved in 94.4% of these strikes, bats in 3.9%, terrestrial mammals in 1.3%, and reptiles in 0.4% (Table 2). For the 36-year period (1990-2025), 343,556 strikes were reported of which 337,882 (98.3%) occurred in the U.S. (Table 1).

The 9.3% increase in reported strikes in 2025 compared to 2024 is substantially greater than the 2% increase and 2% decrease in aircraft movements at Part 139 certificated[2] airports and GA aviation airports, respectively, compared to 2024 (Tables 3, 4).

The number of reported strikes per 100,000 movements at Part 139-certificated airports has increased 3.3-fold from 12.72 in 2000 to a record 47.23 in 2025 (Table 3, Figure 2). The number of damaging strikes per 100,000 movements also was a record high (1.76) in 2025 compared to 1.46 in 2024 and 1.40 in 2000. Both trends were statistically significant.

The number of strikes reported per 100,000 movements at GA airports increased 3.2-fold, from 0.79 in 2000 to 2.54 in 2025 (Table 4, Figure 2). The damaging strike rate increased from 0.26 in 2000 to 0.37 in 2025. Both trends were statistically significant.

[1] The database contains strikes involving U.S.- or foreign-registered aircraft in the U.S. and U.S.-registered aircraft in foreign countries.

[2] The U.S. Code of Federal Regulations (14 CFR Part 139) requires the FAA to issue operating certificates to airports that serve scheduled and unscheduled air carrier aircraft with more than 9 seats or that the FAA Administrator requires to have a certificate. Part 39-certificated airports experiencing hazardous wildlife conditions as defined in Part 139.337 must conduct Wildlife Hazard Assessments and develop Wildlife Hazard Management Plans (Federal Aviation Administration 2026*b*).

The increase in the damaging strike rate at Part 139-certificated airports since 2000 can be attributed to the significant increase in damage strikes at >1,500 feet AGL during climb and approach (Figure 3). The damaging strike rate in the airport environment (strikes occurring on departure or arrival at ≤1,500 feet AGL) has shown no increase (Figure 3). This stabilization in damaging strikes for transport aircraft in the airport environment has occurred despite an increase in populations of hazardous wildlife species (Dolbeer 2020) and as noted above, a major increase in reported strikes. These data demonstrate progress in wildlife hazard management programs at Part 139-certificated airports (Dolbeer 2011). The data also demonstrate the lack of progress in mitigating the risk of strikes outside the airport environment and the purview of wildlife hazard management plans (aircraft on approach or departure at >1,500 feet AGL).

A CRJ900 on approach to an airport in Georgia in January 2025 struck a red-tailed hawk at 600 feet AGL. The bird penetrated the nose just forward of the pitot tube. The aircraft was taken out of service for repairs, Photo, Pilot.

As with Part 139-certificated airports, GA airports have not seen a significant increase in the damaging strike rate in the airport environment (at ≤1,500 feet AGL) but there has been an increase at >1,500 feet AGL, 2000-2025 (Figure 3).

The significant increase in the number of reported strikes per 100,000 movements at both Part 139-certificated airports and GA airports from 2000 to 2025, concurrent with the stabilization in damaging strikes at <1,500 feet AGL, indicate that the aviation industry is doing a better job of documenting all wildlife that are struck. Many of these strikes involve small species that rarely cause damage to civil aircraft. This premise is supported by the fact that the mean mass of birds reported as struck has declined 67% from 0.76 kg to 0.25 kg, 2000-2025 (Figure 4).

METHODS OF REPORTING STRIKES

In 2025, 76% and <1% of the 24,447 strike reports were filed using the electronic and paper versions, respectively, of FAA Form 5200-7, *Bird/Other Wildlife Strike Report* (Table 5*)*. Fifteen percent of reports came from multiple sources (i.e., more than one type of report was filed for same strike; many of these had at least one 5200-7E report filed). Strike reports submitted via the FAA Air Traffic Organization (ATO) Mandatory Occurrence Reporting system comprised 9% of reports. Under FAA Order JO 7210.632, (effective 30 Jan 2012), ATO personnel are required to report all bird strikes of which they become aware.

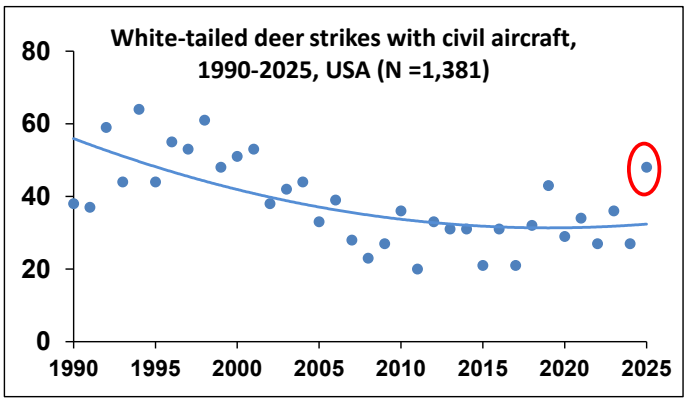
SOURCE OF REPORTS

In 2025, airport operations personnel filed 57% of the strike reports (including "Carcass Found" reports), followed by pilots (23%), Air Traffic Control personnel (10%), air transport operations personnel (4%), and other (6%, Table 6). In 2025, about 89% of the reported strikes involved commercial transport aircraft; the remainder involved business, private, and government aircraft (Table 7).

In 2025, strikes were reported at 870 U.S. airports, an increase of 7% compared to the 811 airports in 2024 (Table 8, Figure 5). Of the 870 airports with strikes reported in 2025, 454 were Part 139-certificated airports and 416 were GA airports.

From 1990-2025, 291,854 strikes have been reported from 2,417 U.S. airports (Table 8). In addition, 5,674 strikes involving U.S.-registered civil aircraft were reported at 351 foreign airports in 113 countries, 1990-2025. In 2025, 342 strikes were reported at 114 foreign airports in 63 countries.

Timing of Occurrence and Phase of Flight of Strikes



In 2025, 48 strikes involving civil aircraft and white-tailed deer were recorded which was the highest number since 2001 (51 strikes). About 72% of strikes with deer occur during landing and 28% occur during take-off.

From 1990-2025, most bird strikes (54%) occurred between July and October (Figure 6) which is when birds are migrating, and populations are at their annual peak in North America following the nesting season. Sixty-two percent of bird strikes occurred during the day and 30 % at night (Table 9). Almost twice as many strikes (62% of total) occurred during the arrival (descent, approach, or landing roll) phase of flight compared to 34% during departure (take-off run and climb, Table 10).

Most terrestrial mammal strikes occurred between July and November; with 38% of deer strikes concentrated in September-November and 38% of coyote strikes in August-October (Figure 7). Most terrestrial mammal strikes (61%) occurred at night (Table 9). As with birds, about twice as many strikes (63% of total) occurred during the arrival (final approach or landing roll) phase of flight compared to 32% during departure (take-off run and initial climb, Table 10).

For bats, 88% of strikes occurred at dawn, dusk, or night (Table 9). The difference in numbers of strikes during arrival compared to departure phase of flight was even greater for bats compared to birds and terrestrial mammals. Eighty-four percent of reported bat strikes occurred during arrival compared to only 13% during departure (Table 10).

HEIGHT AGL(AGL) OF STRIKES

Bird strikes with transport aircraft- From 1990-2025, about 43% of bird strikes with transport aircraft occurred when the aircraft was at 0 feet AGL, 71% occurred at 500 feet or less AGL, and 92% occurred at or below 3,500 feet AGL (Table 11). About 1% of bird strikes occurred above 9,500 feet AGL. Above 500 feet AGL, the number of reported strikes declined consistently by 35% for each 1,000-foot gain in height (Figure 8). The record height for a reported bird strike involving a transport aircraft in U.S. was 32,000 feet AGL (Wilson's warbler).

Strikes occurring above 500 feet AGL had a greater probability of causing damage to the aircraft compared to strikes at 500 feet or less. Although only 29% of the reported strikes were above 500 feet AGL, these strikes represented 46% of the damaging strikes (Table 11, Figure 9).

A pintail duck shattered the windshield on a Bell-407 helicopter at 1,000 feet AGL and 100 knots during initial nighttime approach to a hospital heliport in Oklahoma, February 2025. An emergency landing was made at a nearby airport. See Appendix C for a summary of strikes involving medical transport helicopters. Photo, Pilot.

Bird strikes with general aviation fixed wing aircraft- From 1990-2025, about 41% of the bird strikes with GA aircraft occurred when the aircraft was at 0 feet AGL, 75% occurred at 500 feet or less AGL, and 96 % occurred at or below 3,500 feet AGL (Table 12). Less than 1% of bird strikes occurred above 7,500 feet AGL. The record height for a reported bird strike involving a GA aircraft in U.S. was 27,500 feet AGL.

Strikes occurring above 500 feet AGL had an even greater probability of causing damage to GA aircraft compared to strikes at 500 feet or less than was shown above for commercial transport aircraft. Although only 25% of the reported strikes were above 500 feet AGL, these strikes represented 50% of the damaging strikes (Table 12, Figure 9).

Terrestrial mammal strikes- As expected, terrestrial mammal strikes predominately occurred at 0 feet AGL; however, 11% of the reported strikes occurred when the aircraft was in the air immediately after take-off or before touchdown (e.g., aircraft struck a deer with landing gear, Table 10).

AIRCRAFT COMPONENTS DAMAGED

The aircraft components most commonly reported as struck by birds from 1990-2025 were the nose/radome, wing/rotor, windshield, engine, and fuselage (Table 13). Wing/rotors and aircraft engines were the components most frequently reported as being damaged by bird strikes (26% and 25%, respectively, of all damaged components). There were 28,331

strike events in which a total of 29,543 engines were reported as struck (27,153 events with one engine struck, 1,151 with two engines struck, 20 with three engines struck, and 7 with four engines struck). In 5,714 damaging bird-strike events involving engines, a total of 5,907 engines were damaged (5,524 events with one engine damaged, 188 with two engines damaged, 1 with three engines damaged, and 1 with four engines damaged).

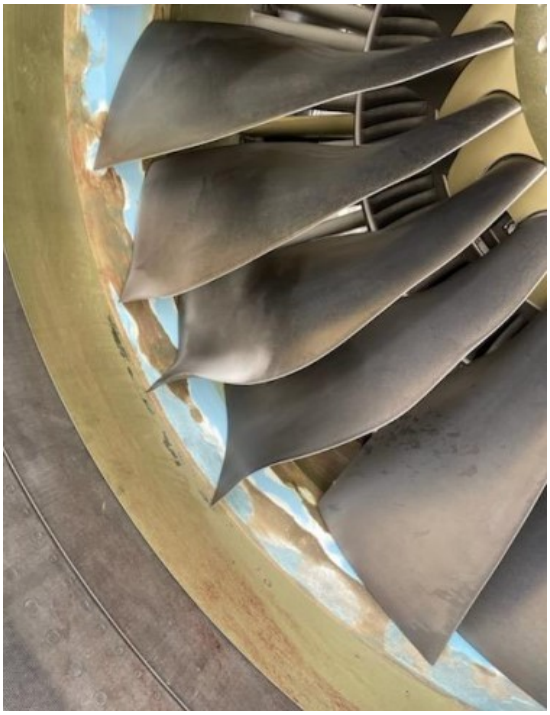
A BE-400 hit a bald eagle at 106 knots during take-off rotation from airport in Michigan, November 2025. The strike disabled the pitot tube and damaged the fuselage and landing gear door. From 1990-2025, 977 pitot tubes have been reported as struck (43 in 2025). Photo, Pilot.

Aircraft components most commonly reported as struck by terrestrial mammals were the landing gear, “other”, propeller, and wing/rotor. Aircraft components most commonly reported as damaged were the landing gear, wing/rotor, propeller, and “other” (Table 13).

“Other” components reported as struck (all wildlife species combined) include critical sensors such as pitot tubes (977), antenna (communication, radar, global position; 321), angle of attack vanes (229), and temperature gauges (TAT, RAT, OAT, SAT; 199).

Reported Damage

For the 328,949 strike reports involving birds from 1990-2025, 20,339 (6%) indicated damage to the aircraft (Table 14). When classified by level of damage, 8,132 (2%) indicated the aircraft suffered minor damage; 8,259 (3 %) indicated the aircraft suffered an uncertain level of damage; 3,894 (1%) reported substantial damage; and 54 reports (less than 1%) indicated the aircraft was destroyed because of the bird strike (Table 14).



A B-737-800 ingested a “medium-sized” black bird (likely a vulture) in the #2 engine at 1200 feet AGL during climb out from an airport in Florida, September 2025. The pilot declared an emergency due to engine surges, reduced the engine to idle power, and made an emergency, overweight landing back at the airport. A record 138 strikes involving vultures (black and turkey) was reported in 2025. Photo, Airport.

For the 6,713 terrestrial mammal strikes reported, 1,421 (21%) indicated damage to the aircraft. When classified by level of damage; 622 (9%) indicated the aircraft suffered minor damage; 483 (7%) indicated the aircraft suffered substantial damage; 281 (4%) reported an uncertain level of damage; and 35 (1%) indicated the aircraft was destroyed because of the strike (Table 14). Not surprisingly, a much higher percentage of terrestrial mammal strikes (21%) resulted in aircraft damage than did bird strikes (6%). Deer (1,492 strikes, of which 1,223 caused damage; Table 18) were involved in 22% of the strikes and 86 % of the damaging strikes involving terrestrial mammals. Coyotes caused 5% of damaging strikes by terrestrial mammals.

Although the percentage of wildlife strikes (all species) with reported damage has averaged 6% for the 36-year period (Table 14), this number has declined from a peak of 18% in 1995 to 4% in 2025 (Figure 10).

Reported Negative Effect-on-Flight

A negative effect-on-flight was reported in 4% and 15% of the bird and terrestrial mammal strike reports, respectively, (Table 15). Precautionary/ emergency landing after striking wildlife was the most reported negative effect (9,991 incidents, 3% of strike reports). These precautionary landings included 422 incidents in which the pilot jettisoned fuel (70) or burned fuel in a circling pattern (180) to lighten aircraft weight or in which an overweight landing was made (172, Table 16, Figure 11). In the 70 reported incidents in which fuel was jettisoned, an average of 94,590 pounds (13,910 gallons) of fuel was jettisoned per incident (range 44 - 39,706 gallons). Aborted take-off after striking wildlife was the second most reported negative effect (3,337 incidents, 1% of strike reports, Table 15). These negative incidents included 568 aborted take-offs in which the pilot initiated the abort at an aircraft speed of 100 knots (115 miles per hour) or greater (Table 17). For commercial transport aircraft, the number of high-speed aborted take-offs declined from a high of 26 in 2000 to 4 in 2020 but increased to 12 in 2024 and 8 in 2025 (Figure 12). For GA aircraft, the number of high-speed aborted take-offs has averaged about 4 per year (2 in 2025).

There were 93 Cabin Air Quality Events (CAQE, 4 in 2025) documented in which smoke entered the cockpit or cabin after a bird strike event (Table 15, Varley 2024, National Transportation Safety Board 2026).

As has the trend for the percentage of strikes causing damage, the percentage of wildlife strikes (all species) with a reported negative effect-on-flight has declined from a high of 11% in 1996 to 4% in 2025 (Figure 10). However, there were near-record numbers of bird-strike related fuel burns (12) and overweight landings (14) reported in 2025 (Figure 11).

WILDLIFE SPECIES INVOLVED IN STRIKES

Smithsonian Feather Identification Lab Staff (right to left): Carla Dove (Director), Ingrid Rochon, Faridah Dahlan, Jim Whatton, Sarah Luttrell. The number of bird strike cases involving civil aircraft processed by the Smithsonian Institution Feather Identification Lab in 2025 was 7,408 with 8,059 separate identifications (some cases involved remains from multiple impact points, Appendix B). Photo, Smithsonian Institution.

Table 18 shows the number of reported strikes, strikes causing damage, strikes having a negative effect-on-flight, strikes involving >1 animal, the reported aircraft down time, and the reported costs by the 828 identified wildlife species, 1990-2025. This information can be useful in comparing the relative hazard level of bird and other wildlife species encountered during Wildlife Hazard Assessments at airports and in the development of priorities for Wildlife Hazard Management Plans (Dolbeer et al. 2000, Dolbeer and Wright 2009, DeVault et al., 2011).

Birds- Of the 328,949 reported bird strikes, 165,431 (50%) identified the bird to species and an additional 27,422 strikes (8%) identified the bird at least to species group (e.g., gull, hawk, duck). Species identification has improved from less than 30% in the 1990s to 55% in 2025 (Figure 13). In all, 665 species of birds have been identified as struck by aircraft, and 349 of these species were reported as causing damage, 1990-2025. In 2025, 406 bird species were identified as struck by civil aircraft (Figure 13).

Doves/pigeons (13%), raptors (12%), shorebirds (9%), gulls (8%), and waterfowl (4%) were the most frequently struck bird groups (Table 19). However, raptors and waterfowl comprised 45% of the damage strikes in which the bird type was identified, 1990-2025. Doves/pigeons and gulls were responsible for the greatest number of bird strikes (3,617 and 2,772, respectively) that involved multiple birds.

Table 20 lists the 33 species of birds identified most frequently as struck by civil aircraft for 1990-2025 and for 2025 only. Mourning doves, barn swallows, killdeer, American kestrels, and horned larks were the 5 most frequently identified species struck by civil aircraft overall from 1990-2025 and in 2025 only. Canada geese, the 15th most frequently

identified species struck overall from 1990-2025, declined to the 28th most frequently struck species in 2025 although the overall population in North America has increased over 2-fold, 1990-2018 (Dolbeer 2020). This decline is likely related to the integrated management programs implemented in the past decade at many airports to dissuade feeding and nesting by Canada geese (Dolbeer et al. 2014, Rutledge et al. 2015).

For the 33 species of birds most frequently identified as struck by civil aircraft, 2025, there was a strong correlation (R^2 = 0.85) between mean body mass and the likelihood of a strike causing damage to aircraft (Figure 14). For every 100-gram increase in body mass, there was a 1.13 % increase in the likelihood of damage. Thus, body mass is a good predictor of relative hazard level among bird species, as noted previously by Dolbeer et al. (2000) and DeVault et al (2011). Appendix D lists the mean and maximum body mass for the 828 species struck by civil aircraft, 1990-2025.

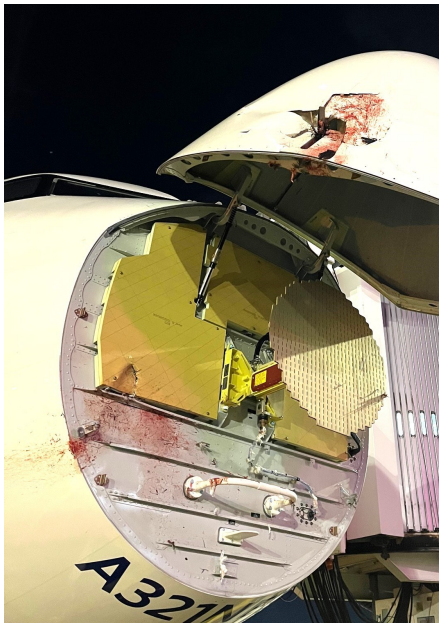
An A-320 was at 4900 feet AGL and 210 knots over Lake Erie on approach to an Ohio airport at night, November 2025. The aircraft struck a “large white bird”, denting the fuselage. Unfortunately, blood and other remains (snarge) were cleaned off the aircraft before a sample could be taken for species identification by Smithsonian Feather Lab. The species was likely a great egret in migration. Photo, Airport.

Terrestrial mammals, bats, and reptiles- The most frequently struck terrestrial mammals were Carnivores (40%) and Artiodactyls (23%; Tables 18, 19). Coyotes and skunks were the most frequently struck Carnivores, and deer were the most frequently struck Artiodactyl. Artiodactyls were responsible for 90% of mammal strikes that resulted in damage and 63% of mammal strikes that involved multiple animals. In all, 58, 59, and 46 identified species of terrestrial mammals, bats, and reptiles, respectively, were reported struck; 28, 8, and 2 identified species of these respective wildlife taxa caused damage to aircraft (Table 18).

Human Fatalities and Injuries Due to Wildlife Strikes

For 1990-2025, reports were received of 25 wildlife strikes that resulted in 52 human fatalities (Table 21). Ten of these strikes, resulting in 13 fatalities, involved unidentified species of birds. American white pelicans and red-tailed hawks (8 fatalities each); bald eagles (4); snow geese, turkey vultures, and cackling geese (3 each); Canada geese, green-winged teal, and rock pigeon (2 each); and white-tailed deer, brown pelicans, gulls, and black vultures (1 each) were responsible for the other 39 fatalities. Reports were received of 300 strikes that resulted in 384 human injuries (Table 21). Waterfowl (ducks and geese; 69 strikes, 80 injuries), vultures (43 strikes, 53 injuries), and deer (27 strikes, 38 injuries) caused 171 (54%) of the 292 injuries in which the species or species group was identified.

AIRCRAFT DESTROYED DUE TO WILDLIFE STRIKES



An A-321 struck a flock of Canada geese during final approach to an east coast airport at night, December 2025. One goose penetrated the radome and damaged the radome bulkhead. Another goose damaged a wing slat, and another was ingested into the #1 engine after hitting the cowling. The aircraft was taken out of service for repairs. Photo, Airport.

For 1990-2025, reports were received of 89 aircraft destroyed or damaged beyond repair due to wildlife strikes (range of 0 to 6 per year, Tables 14, 22, Figure 15). No aircraft were lost to a wildlife strike in 2025. Small (≤2,250 kg maximum take-off mass) GA aircraft comprised 59 (66%) of the lost aircraft. Terrestrial mammals (primarily white-tailed deer) were responsible for 35 (39%) of the incidents. Raptors and waterfowl (23 incidents) were responsible for 68% of the 35 incidents involving birds in which the species or species group was identified.

Fifty-one (57%) of the 89 wildlife strikes resulting in a destroyed aircraft occurred at U.S. GA airports; 25 (28%) occurred “en route (Table 22). General aviation airports, often located in rural areas with inadequate fencing to exclude large mammals, face unique challenges in mitigating wildlife risks to aviation (DeVault et al. 2008; Dolbeer et al. 2008).

ECONOMIC LOSSES DUE TO WILDLIFE STRIKES

Of the 40,647 reports from 1990-2025 indicating the strike had an adverse effect on the aircraft and/or flight, 16,116 provided an estimate of the aircraft downtime (1,238,907 hours, mean = 76.9 hours/incident, Tables 18, 23, 24). Regarding monetary losses, 5,395 reports provided an estimate of direct aircraft repair costs ($1.11 billion, mean = $205,378/incident), and 5,507 reports gave an estimate of other monetary losses ($164.4 million, mean = $29,860/incident)[3]. Other monetary losses include such expenses as lost revenue, the cost of putting passengers in hotels, re-scheduling aircraft, and flight cancellations.

[3] Costs from years prior to 2025 are inflation-adjusted to 2025 U.S. dollars.

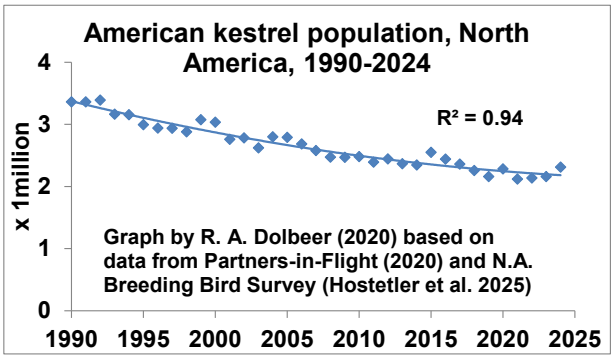
Strike reporting for commercial transport aircraft at Part 139 airports was an estimated 91% in 2009-2013; reporting of strikes with damage was estimated at 93% (Dolbeer 2015). Strike reporting for aircraft at GA airports is lower (Dolbeer et al. 2008). In addition to the underreporting of strikes, only 40% of the 40,647 reports from 1990-2025 indicated an adverse effect provided estimates of aircraft downtime. For the 21,812 reports indicating damage, 25% provided estimates of repair (direct) costs, and 25% provided estimates of other (indirect) costs (these respective percentages were 15% and 38% for 2025 only, Tables 23, 24). Furthermore, some reports providing cost estimates were filed before aircraft damage and downtime had been fully assessed. Lastly, these reported costs do not capture the costs in time and money for aircraft inspections following non-damaging strikes and costs associated with runway closures to inspect for wildlife carcasses after reported strikes. As a result, the information on the number of strikes and associated costs compiled (summarized by species of wildlife struck in Table 18) is believed to underestimate the economic magnitude of the problem.

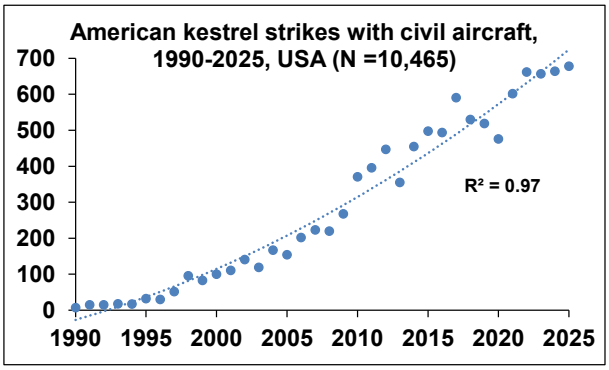
A Cessna 172 on approach to a Florida airport struck a turkey vulture at 1000 feet AGL and 100 knots, November 2025. The vulture hit the propeller and then shattered the windshield. The aircraft landed safely with no injuries to passengers or crew. Photo, Pilot.

Assuming (1) all 40,647 reported wildlife strikes that had an adverse effect on the aircraft and/or flight engendered similar amounts of downtime and/or monetary losses and (2) that these reports are all of the damaging strikes that occurred, wildlife strikes annually cost the U.S. civil aviation industry, on average, 98,770 hours of aircraft downtime and $272 million in monetary losses ($228 million in direct costs and $44 million in other costs), 1990-2025 (Table 24). For 2025 only, the estimates are 74,372 hours of downtime and $391 million in direct and indirect costs.

In contrast to these estimates, a recent analysis by Altringer et al. (2021) using a machine learning approach with cost data from the NWSD, estimated that wildlife strikes cost the US civil aviation industry a minimum average of $54.3 million in losses annually over the 1990-2018 period. A follow-up analysis by Altringer et al. (2022) estimated that damaging wildlife strike events generate additional “spillover” costs of around $25 million (2020 US$) each year for transport aviation related to delays in subsequent flights. Altringer (2025), using the procedures in Altringer et al. (2022) and the strike data for 2024, estimated that minimum spillover costs for transport aviation for the year 2024 were $46.3 million.

Estimating the economic costs of wildlife strike is complex because of the many variables involved and the skewed nature of reported strikes and costs. More thorough reporting of strike events and associated costs combined with additional analyses such as by Altringer et al. (2021, 2022) are needed to refine the actual costs of wildlife strikes to the aviation industry.





Although the American kestrel population in North America has declined by 31% since 1990, strikes with civil aircraft have steadily increased. A record 689 strikes were reported in 2025. This likely is explained by kestrels concentrating at airports to feed on grasshoppers and other prey as other feeding habitats have declined.

CONCLUSIONS

The analysis of 36 years of strike data reveals the magnitude and nature of wildlife strikes with civil aircraft in the U.S., and documents that progress is being made in mitigating the risk. Although wildlife strikes continue to pose an economic and safety risk for civil aviation in the U.S., management actions to mitigate these risks have been implemented at many airports, especially beginning in 2000 when the FAA manual, *Wildlife Hazard Management at Airports*, was initially available to airports nationwide (Cleary and Dolbeer 2005). These efforts are likely responsible for the stabilization in reported strikes with damage and negative effects-on-flight from 2000-2025 for commercial transport aircraft (Table 1, Figures 2, 3, 4, 9, 10) in the airport environment (<1,500 feet AGL) despite continued increases in populations of many large bird species. For example, an economic analysis of 24 joint-use airports revealed the combined benefit-cost ratio of wildlife hazard mitigation programs was 7:1 for civil and military aviation (Altringer et al. 2024). Other examples of the work done to mitigate the risk of strikes at airports are documented in, Human Wildlife Conflicts Journal 2009, Human-Wildlife Interactions Journal 2011, Dolbeer 2011, DeVault et al. 2013, Dolbeer et al. 2014, Rutledge et al. 2015, and Washburn 2019. As another measure of the increase in wildlife management activities, USDA/WS biologists assisted 788 civil and military airports nationwide in 2025 to mitigate wildlife risks to aviation compared to only 42 airports in 1991 and 193 in 1998 (Begier et al. 2026). However, much work remains to be done to reduce wildlife strikes.

To address the problem in the airport environment, airport managers first need to assess the wildlife hazards on their airports with the help of qualified airport wildlife biologists

(FAA Advisory Circular 150/5200-36B, *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports*). They then must take appropriate actions, under the guidance of these biologists, to minimize risks posed by wildlife. Management actions should be prioritized based on the hazard level of species (Table 18, Figure 14) observed in the aircraft operating area. The manual *Wildlife Hazard Management at Airports* (Cleary and Dolbeer 2005), available online in English, Spanish, and French at http://wildlife.faa.gov, provides guidance for conducting Assessments and in developing and implementing Plans. The International Civil Aviation Organization (2020) also provides guidance on wildlife hazard management at airports.

Resident (year-round) populations of Canada geese have become established throughout the U.S. and southern Canada since the 1960s. These geese have adapted to urban environments, including airports, and lost their fear of humans. Thus, aggressive management programs are needed to reduce populations of geese around airports and to quickly disperse any geese that come to airports for feeding and resting. Photo, R. Dolbeer, USDA, Ohio, 2025.

Management efforts to reduce the risks of bird strikes have primarily focused on airports since most civil aircraft strikes occur during take-off and landing at ≤500 feet AGL (see Tables 11, 12). However, the successful mitigation efforts at Part 139-certificated airports that have stabilized damaging strikes for commercial transport aviation in recent years have not effectively reduced strikes outside the airport environment such as occurred with US Airways Flight 1549 in 2009 (Figure 3, and Dolbeer 2011, Dolbeer and Begier 2026).

To mitigate the risk for strikes beyond the airport fence, municipalities and the aviation community must first widen their view of wildlife management to consider habitats and land uses within 5 miles (or sometimes greater distances) of airports (Pfeiffer et al. 2018). For example, wetlands, dredge-spoil containment areas, municipal solid waste landfills, and wildlife refuges typically attract hazardous wildlife. Such land uses, a s discussed in FAA Advisory Circular 150/5200-33C, *Hazardous Wildlife Attractants on or Near Airports*,

are often incompatible with aviation safety and should either be prohibited near airports or designed and operated in a manner that minimizes the attraction of hazardous wildlife (e.g., Washburn et al. 2010, Beffre and Washburn 2020).

A CRJ100/200 on a 12-mile approach at night to an airport in Mississippi hit a flock of white-fronted geese at 3000 feet AGL, January 2025. The radome and nose had significant damage with minor damage to a winglet and vertical stabilizer. The impact caused the captain's primary flight display to become unusable, and the windshield was partially obscured by blood. Mitigation of strikes involving large migratory birds in these off-airport situations during climb and approach will require integration of avian radar and bird migration forecasting into airspace management for civil aviation. Photo, Airline.

Second, the aviation community needs to discuss broadening the view of wildlife strike risks from a ground-based wildlife management problem solely dealt with by airports to possibly an airspace management problem that may encompass Air Traffic Control, flight crews, and aircraft manufacturers (McKee et al. 2016, Metz et al. 2021, Dolbeer and Begier 2026, Air Line Pilots Association, International 2026). Long-term goals could include the integration of avian radar and bird migration forecasting into airspace management for civil aviation (Nohara et al. 2011, Gerringer et al. 2016, Shamoun-Baranes et al., 2019, Nilsson et al. 2021). The further development of aircraft lighting systems to enhance detection and avoidance by birds (Bernhardt et al. 2010, Blackwell et al. 2012, DeVault et al. 2015, Dolbeer and Barnes 2017, Foss et al. 2017, Fedy 2018, Dwyer et al. 2019, Lunn et al. 2023) is also needed as part of an integrated program.

Finally, there continues to be a need for increased and more detailed strike reporting, especially for GA aircraft. When reports are filed, relevant information should be provided whenever possible regarding species identification, number of wildlife struck, time and height of strike, phase of flight, and damage to aircraft components (Dolbeer 2015, see Appendix B: Reporting a Strike and Identifying Species of Wildlife Struck). A problem that is not well defined cannot be properly managed.

PART 2: FAA ACTIVITIES FOR MITIGATING WILDLIFE STRIKES

In 2025, the FAA continued a multifaceted approach for mitigating wildlife strikes both nationally and globally. This included continuing a robust research program, making improvements to the NWSD and outreach, working with ICAO on multiple projects, as well as providing AIP funding to airports to conduct Assessments and developing Plans.

Landmark events such as the catastrophic Jeju Air Flight 2216 bird strike at Muan International Airport, South Korea on 29 December 2024 resulted in the loss of 179 lives and stands as the single-worst wildlife-related aviation accident. More recently, an Amazon cargo flight (operated by Alaska Airlines) encountered a flock of Canada geese shortly after take-off on January 28, 2026, from Cincinnati/Northern Kentucky International Airport (CVG). The Airbus A330 ingested at least eight geese into its two engines and struck others with various parts of the airframe; it safely returned to the airport. Preliminary cost estimates are expected to exceed $50 million.

On January 28, 2026, an Airbus A330 (Amazon cargo flight operated by Alaska Airlines, Flight 2616) experienced a dual engine ingestion involving a minimum 8 Canada geese immediately following departure from CVG which resulted in significant engine and structural damage to the aircraft. Photos, Troy Levanen, Alaska Airlines.

Hull losses of this magnitude result in action. Accident Investigators, Civil Aviation Authorities (CAA), airports, airlines, air traffic organizations and biologists all evaluate, modify and develop improved comprehensive guidance, compliance standards and risk reduction techniques (e.g., detection, monitoring, communication, mitigation) moving forward. Since the first Advisory Circular 150 / 5200-1 *Bird Hazards to Aviation*, published March 1, 1965, these types of evaluations have allowed the FAA wildlife program to systematically improve its oversight to reduce risks within the safest aerospace system in the world. The results from reviews conducted post-1549 have continued to enhance regulations and provide beneficial layers of expansion throughout other key FAA wildlife-related areas (e.g., Data collection and analysis, Partnerships, Research, and Outreach).

FAA Guidance

In the seventeen-year span 2009 - 2025, over $400 million of AIP funds have been allocated for wildlife-related projects such as Assessments, Plans and airport perimeter fencing. All required Part 139 certificated airports have successfully completed Assessments followed by Plans. Many of those airports have already updated their original Assessments with new ones while others have chosen to implement Continual Monitoring programs as detailed in Advisory Circular 150/ 5200- 38 (AC-38) *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and*

Wildlife Hazard Management Plans (2018). AC-38 defines the minimum acceptable standards for the conduct and preparation of Site Visits, Assessments and Plans. Advisory Circular 150/5200-32C (AC-32C) *Reporting Wildlife Aircraft Strikes* (2024) was recently updated to add language on the size of animals to report if involved in a strike with aircraft and a reminder that airport owners and operators should strive to collect and report strike-incident carcasses in a timely manner that optimizes identification of the animal and estimation of the incident date. Also, the FAA address, Business Reply Mail, and Postage Paid identifiers were removed from the updated paper strike report forms (FAA Form 5200-7). **It is now recommended that all strike reports be submitted electronically.** Lastly, the latest version of AC 150/5200-34B (AC-34B) *Construction or Establishment of Landfills Near Public Airports* (2025) updated guidance on compliance with Federal statutory requirements regarding the construction or establishment of landfills near certain public airports.

Since 1991, the annual BSC U.S. conference has provided wildlife / aviation outreach from world-leading experts, researchers, the aviation industry and boots-on-the-ground professionals. Conferences such as the one at Portland International Airport (PDX) (2025, pictured above) are comprehensive and allow the FAA to recognize them as an appropriate substitute for a Qualified Airport Wildlife Biologist's recurrent training. Photo by PDX.

FAA Outreach and Information

The FAA wildlife program uses a multifaceted outreach effort involving partnerships and cooperators to ensure useful, timely information is disseminated to the widest possible audience. Outreach efforts continued to benefit in 2025 from the FAA's Wildlife Hazards video found within the FAA Airport Safety Information Video Series (https://www.faa.gov/airports/safety-video-series). It discusses how wildlife strike reporting, and the NWSD are reducing the impact of wildlife issues on both commercial and general aviation.

A wide range of information sharing in 2025 included the annual Bird Strike Committee USA (BSC USA) Conference in Portland, OR, the 12th Annual Hawaii DOT & USDA/WS Wildlife Hazard Workshop, the ACI-NA Young Professionals Webinar, the CAR/SAM Regional Bird/Wildlife Hazard Prevention Committee and World Birdstrike Association Conference in Guadalajara, Mexico, the ICAO Aerodrome Design And Operations Panel (ADOP) working group 8th meeting in Montreal, the ICAO Aerodrome Operations Working Group (AOWG) 9th meeting in Brazil, the ICAO Asia Pacific (APAC) region Wildlife Hazard Management Training Workshop in Pokhara, Nepal, the ICAO Wildlife Hazard Management Expert Group (WHMEG) 10th meeting in The Hague, Netherlands, and the Board of Audit and Inspection of Korea (BAI) for the Republic of Korea (Washington, DC).

The FAA continued to work closely with ICAO on multiple initiatives. ICAO requested that FAA Chair these collaborative projects as defined on the ADOP.015.05 Job Card as Rapporteur of the WHMEG. The first initiative to update the ICAO Birdstrike Information System (IBIS) manual (Doc 9332) was submitted to ICAO Q4 2023 and is expected to be published in mid-2026 while the second proposal to allow / enhance international data access and data sharing continues to be evaluated by ICAO in 2026.

The ICAO WHMEG utilizes a combination of in-person/virtual meeting format to allow the international team to effectively focus on its ADOP.015.05 Job Card tasks through 12+ UTC time zones. The combination format allowed greater attendance for a meeting in The Hague, Netherlands (June 2025).

Strike Reporting

The FAA has continued to update and improve the existing NWSD website (http://wildlife.faa.gov) to make it more user-friendly and to allow more advanced data mining. Search fields enable users to find data on specific airports, airlines, aircraft and engine types, as well as damage incurred, date of strike and species struck without having to download the entire database. Similarly, the FAA has continued modifications to provide in-depth wildlife guidance at http://www.faa.gov/airports/airport_safety/wildlife. This guidance includes Advisory Circulars and CertAlerts, FAA NWSD analysis reports, the manual *Wildlife Hazard Management at Airports,* Airport Cooperative Research Program (ACRP) wildlife reports, hazardous wildlife mitigation and habitat attractants, Bird Hazard Mitigation Systems (e.g., AHAS and BAM) and Frequently Asked Questions.

The FAA also developed software to make strike reporting easier. Now, anyone who needs to report a wildlife strike can do so via the new web site or their mobile devices at http://www.faa.gov/mobile.

Email Notifications for Wildlife Strike Reports

The NWSD can automatically send an email notification when a wildlife strike report is received. This can be determined based on airfield code, engine make/model involved, aircraft operator, and a few other select parameters. This feature allows key aviation stakeholders to know about a wildlife strike as soon as possible. Keep in mind these email notifications contain the raw report, which has not been checked or validated by the database team. Information sent in the email may change when the final report is published to the public.

If you are interested in receiving an email notification for wildlife strikes submitted to the NWSD, please contact the Wildlife Strike Database Team Lead, Wesley Major at wesley.major@faa.gov.

Direct Reporting to the National Wildlife Strike Database

The NWSD can receive wildlife strike reports that are completed through an organization's internal reporting system. This effectively reduces the workload on reporting personnel by eliminating the need to submit a report twice (once internally and again to the NWSD). This synchronized reporting is accomplished through an application programming interface (API). An API is a safe and secure way for different software systems to communicate and exchange data through a set of rules and specifications.

As of July 2026, the NWSD has 100+ users actively submitting wildlife strike data via the API. The majority of these users are airport owners and operators, but airlines and other aviation stakeholders are able to utilize this API service.

If you are interested in having your organization's internal reporting system automatically report wildlife strikes to the NWSD, please contact the Wildlife Strike Database Team Lead, Wesley Major at wesley.major@faa.gov.

"Excellence in Strike Reporting" Award

The Sandy Wright / Richard Dolbeer Excellence in Strike Reporting award honors the incomparable dedication of Dr. Richard Dolbeer and Sandy Wright for their exceptional and innovative oversight of the collection, quality control, analysis and summation of NWSD. The award recognizes those airports that have exhibited a noteworthy strike reporting program. The criteria for determining which airports will make the initial cuts are objective and include both quantity and quality of strike data (keep in mind though that an airport will not win based solely on number of strikes reported). The criteria include but are not limited to:

1. Number and completeness of reports filed
2. Percentage of reports identified to species
3. Percentage of reports filed on-line
4. Timeliness and consistency of reports being submitted
5. Remains collected when available or necessary
6. Modification of filed reports online when new information is discovered
7. Airport follows up with airline or engine manufacturer for missing information
8. Airport has someone on "Notification" list to receive notice when strikes are filed for their airport

For their commitment to the identification and documentation of wildlife / aircraft strike information, the FAA recognizes the strike reporting programs at **Detroit Metropolitan Wayne County Airport (DTW)** and **Wood County Regional Airport (1GO)** as the winners of the 2025 Sandy Wright / Richard Dolbeer Excellence in Strike Reporting award.

	AWARD WINNERS	
	PART 139 AIRPORTS	**GA AIRPORTS**
2014	DALLAS / FORT WORTH (DFW)	MORRISTOWN (MMU)
2015	LAGUARDIA (LGA)	VAN NUYS (VNY)
2016	MINNEAPOLIS / ST. PAUL (MSP)	CENTENNIAL (APA)
2017	PORTLAND (PDX)	HENDERSON FIELD - MIDWAY ATOLL (MDY)
2018	SEATTLE / TACOMA (SEA)	PAGE FIELD (FMY)
2019	Charlotte Douglas (CLT)	Kalaeloa Airport - John Rodgers Field (JRF)
2020	Chicago O'Hare (ORD)	Dekalb/Peachtree Airport (PDK)
2021	Hartsfield-Jackson Atlanta International Airport (ATL)	Prescott Regional Airport, Ernest A. Love Field (PRC)
2022	Newark Liberty International Airport (EWR)	Quonset State Airport (OQU)
2023	Boston Logan International Airport (BOS)	Chicago Executive Airport (PWK)
2024	Orlando International Airport (MCO)	Mankato Regional Airport (MKT)
2025	**Detroit Metropolitan Wayne County Airport (DTW)**	**Wood County Regional Airport (1GO)**

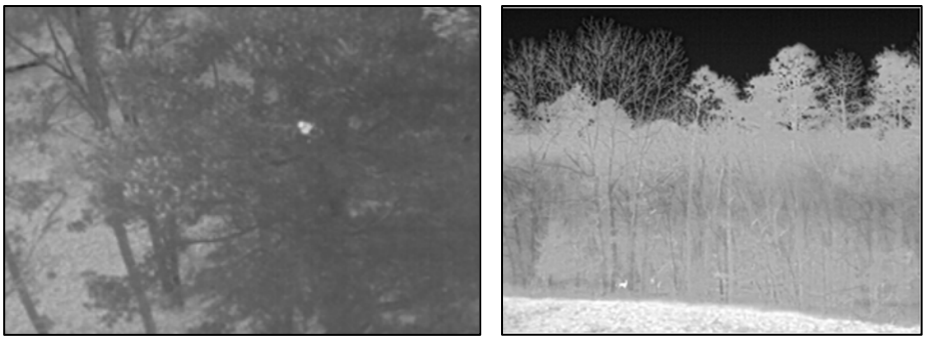
Wildlife Hazard Mitigation Research

The FAA continues to dedicate funds for wildlife mitigation research. Events like US Airways Flight 1549's emergency forced landing into the Hudson River in 2009 and the JeJu Air Flight 2216 accident in late 2024 highlight the continued need to manage wildlife at airports. The FAA continues to support research that explores new and novel wildlife mitigation methods. Research seeks to increase the Agency's understanding and application of existing technologies such as advanced detection and monitoring systems (e.g., avian radars, Foreign Object Debris (FOD) radars, and infrared / electro-optical scanning systems), as well as exploring new technologies.

One new technology under research is the efficacy of unmanned aerial systems (UAS) for monitoring hazardous wildlife. This research started at off-airport settings, such as landfills and rooftops. In 2024, the FAA worked closely with the USDA/WS wildlife biologists based at the Atlantic City International Airport (ACY) to explore the procedures and effectiveness of using an UAS on an active airport. The testing began in December 2023 and UAS operations continued throughout 2025. Over 190 hours of flight time and

over 375 flights have occurred during the testing period. Multiple UAS platforms and payloads were used. The UAS was also used as a tool to conduct nighttime mammal surveys with great success. A dedicated report detailing findings is expected to be published in late 2026.

Another UAS research effort is taking place with a team from the University of North Dakota (UND). The UND researchers are working closely with Grand Forks International Airport (GFK) and testing the use of UAS as a tool to prevent gulls, pelicans, and waterfowl from roosting on open ponds at a wastewater treatment plant near GFK. The research is looking at using UAS as a tool to prevent target species entering the ponds in the evening. Journal articles are expected to be published on this research in late 2026.



Using a UAS camera to find a perched red-tailed hawk (left) in daylight and white-tailed deer (right) during a nighttime mammal survey on airport property. Photos by: Alexandra Kane.

With the advent of electric vertical takeoff and landing (eVTOL) aircraft, the FAA is exploring research in this area to better understand the risks these aircraft may experience. Accordingly, the FAA began specific analysis of rotorcraft strike reports in the database. It is currently unclear how eVTOL aircraft will operate, but analyses of rotorcraft-focused strike data offers a different perspective than looking at mixed data with fixed-winged aircraft. This report is expected to be published in late 2026.

Other research initiatives include understanding the vision acuity of select avian species and how their sight characteristics influence their behavioral response to moving objects. This data could help inform the design of an aircraft-mounted lighting system to make aircraft more conspicuous with the goal to enhance the detection and avoidance period for wildlife. The FAA is frequently exploring new wildlife control and mitigation techniques, conducting wildlife movement analyses, working with the Smithsonian FIL on DNA and molecular identifications, alternative habitat management strategies to reduce attraction to airports of hazardous wildlife species, land cover analyses, and attempting to quantify strike risk.

Bird Strike Committee USA

The FAA participates in the Bird Strike Committee USA (BSC USA) as part of its continued public outreach and education effort to increase awareness within the aviation community about wildlife hazards. A Memorandum of Understanding between the FAA and the BSC USA was signed May 2012 to formalize this cooperative relationship. The BSC USA Steering Committee is comprised of 25 diverse, subject-matter experts

representing pilots, airlines, airframe and engine manufacturers, wildlife biologists, airport managers, Department of Defense personnel, air traffic control (ATC) personnel, Airport Certification Safety Inspectors (ACSI), research, private sector and government personnel. The Steering Committee receives further guidance from distinguished emeritus members and liaisons representing a diversity of experts including the U.S. Fish and Wildlife Service (USFWS), The Wildlife Society (TWS), the National Transportation Safety Board (NTSB), Airbus, the Air Line Pilots Association (ALPA) and the National Air Traffic Controllers Association (NATCA). Special thanks to the indefatigable efforts from the BSC USA Executive Team **Laura Francoeur** (Chair), **Nick Atwell** (past Chair), and **Jeff Follett** (vice Chair).

The BSC USA offered another outstanding conference hosted by the Portland International Airport (PDX) in Portland, OR. Executive Team past-Chair, Nick Atwell (pictured above) answered attendee's questions on avian identification, ecology and effective exclusion devices. Photo by PDX.

Throughout 2025, the BSC USA has continued its collaboration with TWS for the vetting of prospective Qualified Airport Wildlife Biologists (QAWB). In March 2022, TWS announced a collaboration with BSC USA to develop a designation that would expand TWS Wildlife Biologist Certification Program's current opportunities. That certification process for QAWB's was finalized in 2023 and continues to be available to qualified candidates. For more information, please visit TWS web site: https://wildlife.org/.

Performance Metrics

The FAA has adopted various performance metrics to aid with measuring program efficacy under a voluntary strike reporting environment where the absolute number of bird strikes is not known. These performance metrics allow the FAA to monitor multiple factors that affect strike reporting and the effectiveness of wildlife mitigation in any State, the District of Columbia, or any territory or possession of the U.S. (14 CFR Part 139 [a] Certification of Airports). To date, strike reporting trends continue to show an increase in overall reporting contrasted with a decline or stabilization in damaging strikes within the wildlife designation of "near airport" (5-miles and/or ≤1,500 feet AGL). Given that no single metric for strikes tells the complete story for wildlife concerns (e.g., risks, hazards, attractants, etc.) on or near the airport, the following indicators have proven useful:

1. **Monitor triggering events** – Strike events in the U.S. or with U.S. air carriers abroad that involve a substantial damaging strike, a strike comprised of multiple animals or an engine ingestion are defined as triggering events (14 CFR Part 139.337 (b) (1-3) that may lead to an Assessment or the review of an existing Plan. In 2025 there were a

total of 1,533 triggering events for air carrier aircraft[4] arriving or departing[5] from U.S. airports (1,481 triggering events) and for U.S.-registered aircraft at foreign airports (52 triggering events). The totals for each of the three triggering events for all U.S. air carrier incidents were: strikes with an ingestion (554), strikes with multiple animals (1,104) and strikes with substantial damage (7).

2. **Monitor the percentage of strikes for Part 139-certificated airports and GA airports with damage compared to total reported strikes and the percentage of strikes that resulted in a negative effect on flight (NEOF).** Since 1996, the percentage of strikes with damage has steadily declined or remained stable; they comprised only 6.0% of all strikes in 2010 and remained below 4% in 2025 where 902 (3.7%) damaging strikes were reported out of 24,447 total strikes. Similarly, strikes resulting in a NEOF have steadily declined since 1997 and stabilized between 3-4% since 2010.

3. **Monitor the number of damaging strikes per 100,000 operations for Part 139-certificated airports and GA airports.** The number of reported strikes per 100,000 movements for transport aircraft at 335 Part-139 certificated airports (2000-2025) increased from 41.35 in 2024 to a record 47.23 in 2025. The number of damaging strikes per 100,000 movements also was a record high (1.76) in 2025 compared to 1.46 in 2024. Both trends were statistically significant. The number and rate of reported wildlife strikes and strikes with damage for GA aircraft at 115 non-Part-139 certificated (general aviation) airports (2000-2025) per 100,000 movements declined from 3.08 in 2024 to 2.54 in 2025 while the number of damaging strikes per 100,000 movements similarly decreased from 2024 (0.46) to 2025 (.037).

4. **Monitor the altitude of reported strikes including a comparison of damaging vs nondamaging strikes to evaluate off-airport hazards.** For commercial transport and fixed-wing GA aircraft, about 71 and 54% of bird strikes occurred at or below 500 feet AGL from 1990 to 2025. Above 500 feet AGL, the number of strikes declined by 34% for each 1,000-foot gain in height for commercial transport aircraft. Strikes above 500 feet AGL are also more likely to cause damage than strikes at or below 500 feet. The increases noted in Performance Metric #3 for the overall damaging strike rate at Part 139-certificated airports can be attributed to the significant increase in damage strikes at >1,500 feet AGL during climb and approach whereas the damaging strike rate in the airport environment (strikes occurring on departure or arrival $\leq$1,500 feet AGL) has shown no increase.

5. **Monitor number of Part 139-certificated airports and GA airports with reported wildlife strikes.** The 870 U.S. airports with strikes reported in 2025 were comprised of 454 Part 139-certificated airports and 416 GA airports. From 1990-2025, strikes have been reported from 2,417 different U.S. airports. Commercial transport and GA aircraft were involved in 85% and 15% of reported strikes, respectively, in 2024.

[4] Aircraft with 3-letter operator code assigned by ICAO. This excludes strikes with business aircraft, privately-owned aircraft, and government aircraft.

[5] Strike events that occurred during approach, landing roll, taxi, take-off run or climb from an airport. Enroute strikes are excluded as are strikes discovered during post-flight inspection in which the location and phase of flight where strike occurred is unknown.

6. **Monitor the percentage of reported strikes where the animal was positively identified to species level.** Although terrestrial animals involved in strikes are predominantly identified to species level, avian species identification represents a greater challenge (e.g., unidentifiable snarge evidence is oftentimes not collected or submitted to Smithsonian FIL, small birds leave less identifiable evidence when struck, and atmospheric conditions can result in lost snarge evidence). Overall, total species identifications in 2025 exceeded 60% (again) but the identification of avian species was less successful at 55%.

7. **Monitor mean body mass of birds involved in wildlife / aircraft strikes.** The mean body mass of birds reported as struck by civil aircraft in the U.S. has declined by 67% from 0.76 kg to 0.25 kg, 2000-2025. This trend indicates that airports, pilots, and commercial transport aviation in general, are doing a better job of documenting all wildlife that are struck, many of which are small species that rarely cause damage. This downward trend reflects improved safety at U.S. airports and effective wildlife programs founded on comprehensive Assessments and Plans. For every 100-gram increase in body mass, there was a 1.13% increase in the likelihood of damage. Thus, body mass is a good predictor of relative hazard level among bird species.

Conclusions

The 24,447 documented strikes in 2025 equated to 67 wildlife strikes every day, or 1 per 806 flights[6]. The 902 damaging strikes in 2025 represent an average of approximately 2.5 damaging strikes per day or about 1 per 21,620 of the estimated 54,050 flights per day (Commercial passenger, General Aviation, Air Taxi, Air Cargo) handled by FAA ATC. Overall, 82% of strikes occur at or below 1,500 feet AGL. This globally reinforced strike statistic combined with the standard three-degree glide slope for approaching commercial aircraft provides the justification for the recommended 5-mile wildlife-related separation distance around airports[7]. This separation criteria can be used by airport owners and operators to identify and monitor hazardous wildlife populations, attractants, and strikes. Trends in strike data have shown that on-ground wildlife mitigation activities extending out 5 miles from an airport can have a positive effect on risk reduction for 82% of all wildlife strikes.

There are many reasons why reported strikes continue to increase. First and foremost, airport wildlife programs have continued to improve and broaden. All Part 139 certificated airports have approved Assessments and Plans that typically require wildlife strike documentation. Outreach efforts by the FAA and BSC USA, improved access to online reporting and a user-friendly, electronic strike reporting form have all benefited airports, pilots, airlines, Air Traffic Controllers, engine manufacturers and wildlife personnel alike.

[6] The number of flights per year and day were calculated using the Air Traffic Activity System (ATADS) at https://www.aspm.faa.gov/opsnet/sys/Airport.asp.

[7] For all airports, the FAA recommends a distance of 5 miles between the closest point of the airport's aircraft operations area and the hazardous wildlife attractant (AC No: 150/5200-33C *Hazardous Wildlife Attractants on or near Airports*).

An ever-increasing human population has given rise to more enplanements and flights for both commercial and general aviation. Correspondingly, the peak hours of operation have also expanded in response to increased demands for air travel, meaning there are more flights from early morning to late night. Further impacts from the rise in our population also include increased development on and near airports, resulting in habitat modification. This, in turn, forces animals to adapt or move. Animals such as Canada geese have adapted to changes in habitats to become resident, nonmigratory birds while white-tailed deer and coyotes continue to expand their territories. These, and other animals have habituated to human activities, aircraft and often harassment / dispersal techniques. In the end, they represent a greater risk than those less tolerant.

Equally important is the rise in some animal populations due to conservation efforts. Common avian species (e.g., Canada geese, European starlings, bald eagles and osprey) and mammals (e.g., white-tailed deer, coyotes) have increasing populations. Thirteen of the 14 avian species nesting in North America with mean body masses over 8 lbs. show population increases as do most of the 36 avian species with mean body masses over 4 lbs.

Technological improvements with aircraft have resulted in quieter, more powerful engines which may be more difficult for animals to detect and avoid. This trend towards quieter engines and the subsequent increased challenge of mitigating strikes will continue as Advanced Air Mobility (AAM) aircraft technology also advances.

Further influences on increased strike reporting into the NWSD include the ATO which detailed steps within its Orders to address wildlife hazards and to ensure documentation of wildlife strikes. ATO Order JO_7210.632A (2020) *Air Traffic Organization Occurrence Reporting* established an internal mandate to report wildlife strikes in 2012. ATO Order JO 7210.3DD (2023) *Facility Operation and Administration* ensures that any reported bird strike or trend towards an increase in bird activity on or around the airport served by the ATC tower are reported to airport management.

Finally, all of this is augmented by the somewhat recent publication of the Safety Management System (SMS) regulatory guidance, a formal, top-down approach to managing safety risk that has been mandated at certain U.S. airports. It is a structured process that requires organizations to prioritize safety as much as other core business processes and has helped usher in a cultural change that has diminished past stigmas such as sharing wildlife strike data. Ultimately, wildlife strikes are rare events that occur every day. When strikes are compared to the total number of flights in the system their scarcity becomes apparent. Although it is impossible to eliminate all strikes at all times, comprehensive assessment, planning, evaluation and adaptation of management techniques have successfully mitigated damaging strikes on or near airports one less strike at a time.

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TABLES

Table 1. Reported wildlife strikes to civil aircraft in U.S. and to U.S.-registered civil aircraft in foreign countries, 1990-2025.

	U.S.[1]			Foreign			Total	
Year	Strikes	Damage strikes		Strikes	Damage strikes		Strikes	Damage strikes
1990	2,089	367		34	6		2,123	373
1991	2,478	395		37	5		2,515	400
1992	2,615	359		37	5		2,652	364
1993	2,591	395		34	4		2,625	399
1994	2,672	452		35	7		2,707	459
1995	2,774	488		52	11		2,826	499
1996	2,980	493		51	10		3,031	503
1997	3,491	566		69	9		3,560	575
1998	3,741	577		67	10		3,808	587
1999	5,024	687		95	18		5,119	705
2000	5,899	744		128	21		6,027	765
2001	5,704	634		124	15		5,828	649
2002	6,082	659		141	11		6,223	670
2003	5,856	611		137	20		5,993	631
2004	6,453	615		159	16		6,612	631
2005	7,093	590		180	19		7,273	609
2006	7,131	584		163	19		7,294	603
2007	7,607	552		143	16		7,750	568
2008	7,453	513		186	14		7,639	527
2009	9,259	589		250	20		9,509	609
2010	9,672	586		229	18		9,901	604
2011	9,848	523		264	24		10,112	547
2012	10,672	607		265	21		10,937	628
2013	11,212	604		195	12		11,407	616
2014	13,460	576		230	16		13,690	592
2015	13,535	612		242	12		13,777	624
2016	13,211	588		166	11		13,377	599
2017	14,594	671		162	10		14,756	681
2018	15,984	712		222	13		16,206	725
2019	17,170	756		178	9		17,348	765
2020	11,492	485		133	8		11,625	493
2021	15,450	658		191	9		15,641	667
2022	16,990	682		232	20		17,222	702
2023	19,385	711		240	10		19,625	721
2024	22,110	808		261	15		22,371	823
2025	24,105	887		342	15		24,447	902
Total	**337,882**	**21,336**		**5,674**	**479**		**343,556**	**21,815**

[1] Includes strikes where airport is unknown because strike was en route, or phase of flight was undetermined (see footnote 2, Table 8). Table 2 shows numbers of strikes in U.S. by type of wildlife.

Table 2. Reported wildlife strikes to civil aircraft in U.S. by wildlife group, 1990-2025.

Year	Birds	Bats	Terrestrial mammals[1]	Reptiles[1]	Total strikes	Strikes with damage[2]
1990	2,031	3	55	0	2,089	367
1991	2,417	3	58	0	2,478	395
1992	2,539	2	73	1	2,615	359
1993	2,519	6	66	0	2,591	395
1994	2,588	2	81	1	2,672	452
1995	2,677	4	85	8	2,774	488
1996	2,887	1	89	3	2,980	493
1997	3,384	1	92	14	3,491	566
1998	3,618	3	113	7	3,741	577
1999	4,920	6	97	1	5,024	687
2000	5,758	15	123	3	5,899	744
2001	5,547	8	141	8	5,704	634
2002	5,929	19	119	15	6,082	659
2003	5,708	20	123	5	5,856	611
2004	6,294	27	126	6	6,453	615
2005	6,929	27	130	7	7,093	590
2006	6,926	46	149	10	7,131	584
2007	7,378	51	171	7	7,607	552
2008	7,221	43	184	5	7,453	513
2009	8,952	66	230	11	9,259	589
2010	9,296	112	253	11	9,672	586
2011	9,494	138	201	15	9,848	523
2012	10,270	162	217	23	10,672	607
2013	10,748	223	208	33	11,212	604
2014	12,941	254	230	35	13,460	576
2015	12,970	316	213	36	13,535	612
2016	12,690	248	232	41	13,211	588
2017	13,853	409	273	59	14,594	671
2018	15,102	510	317	55	15,984	712
2019	16,097	553	420	100	17,170	756
2020	10,918	289	240	45	11,492	485
2021	14,625	451	297	77	15,450	658
2022	16,103	517	295	75	16,990	682
2023	18,402	609	324	50	19,385	711
2024	20,870	818	359	63	22,110	808
2025	22,754	936	318	97	24,105	887
Total	**323,355**	**6,898**	**6,702**	**927**	**337,882**	**21,336**

[1] For terrestrial mammals and reptiles, species with body masses <0.5 kilogram (1 pound) such as small rodents generally are excluded from database (Dolbeer et al. 2005).

[2] Birds, terrestrial mammals, bats, and reptiles respectively accounted for 19,865 (93.1%), 1,423 (6.7%), 45 (0.2%), and 3 (<0.1%) of the 21,336 damage strikes.

Table 3. Number and rate of reported wildlife strikes and strikes with damage for transport aircraft at 335 Part-139 certificated airports[1], U.S., 2000-2025 (see Figure 2).

Year	No. of reported strikes[2]		Aircraft movements (x 1 million)[3]	Strikes/100,000 movements	
	All strikes	Strikes with damage		All strikes	Strikes with damage
2000	3,228	355	25.39	12.72	1.40
2001	3,046	288	24.38	12.50	1.18
2002	3,272	303	23.74	13.78	1.28
2003	3,224	281	23.56	13.68	1.19
2004	3,644	271	24.76	14.72	1.09
2005	3,739	285	25.09	14.90	1.14
2006	3,853	300	24.34	15.83	1.23
2007	4,116	275	24.45	16.83	1.12
2008	3,893	265	23.41	16.63	1.13
2009	5,071	297	21.49	23.59	1.38
2010	4,905	288	21.49	22.82	1.34
2011	4,864	266	21.37	22.76	1.24
2012	5,036	285	21.01	23.97	1.36
2013	4,922	233	20.91	23.54	1.11
2014	6,293	255	20.67	30.44	1.23
2015	6,169	247	20.90	29.52	1.18
2016	6,105	264	21.23	28.76	1.24
2017	6,226	300	21.47	28.99	1.40
2018	6,922	329	22.11	31.31	1.49
2019	7,313	303	22.70	32.22	1.34
2020	4,120	189	14.27	28.87	1.32
2021	6,232	266	18.54	33.61	1.43
2022	7,157	300	20.48	34.95	1.46
2023	8,460	315	21.68	39.03	1.45
2024	9,283	328	22.45	41.35	1.46
2025	10,811	403	22.89	47.23	1.76
Total	**141,904**	**7,491**	**574.78**	**24.69**	**1.30**

[1] Data are presented for the 335 larger Part 139-certificated airports for which movement data (Federal Aviation Administration 2026*a*) were available in all years, 2000-2025. In 2025, there were 517 Part 139 airports (Federal Aviation Administration 2026*b*).

[2] Strikes involving an unknown operator (96,451 of which 94,628 were “Carcass Found” reports-see Tables 6 and 7) were excluded from this analysis as were all strikes by U.S.-registered aircraft in foreign countries.

[3] Departures and arrivals for air carrier and air taxi service aircraft (Federal Aviation Administration 2026*a*).

Table 4. Number and rate of reported wildlife strikes and strikes with damage for general aviation aircraft at 115 non-Part-139 certificated (general aviation) airports[1], U.S., 2000-2025 (see Figure 2).

Year	No. of reported strikes[2]		Aircraft movements (x 1 million)[3]	Strikes/100,000 movements	
	All strikes	Strikes with damage		All strikes	Strikes with damage
2000	119	39	15.10	0.79	0.26
2001	136	34	14.47	0.94	0.23
2002	144	32	14.75	0.98	0.22
2003	129	37	13.83	0.93	0.27
2004	127	45	13.34	0.95	0.34
2005	123	22	12.94	0.95	0.17
2006	103	23	12.71	0.81	0.18
2007	98	15	12.82	0.76	0.12
2008	111	30	12.00	0.93	0.25
2009	123	20	10.61	1.16	0.19
2010	123	28	9.90	1.24	0.28
2011	122	17	9.70	1.26	0.18
2012	163	35	9.60	1.70	0.36
2013	173	35	9.58	1.81	0.37
2014	209	31	9.51	2.20	0.33
2015	238	32	9.59	2.48	0.33
2016	265	24	9.67	2.74	0.25
2017	260	36	9.82	2.65	0.37
2018	291	40	10.26	2.83	0.39
2019	302	44	10.81	2.79	0.41
2020	267	29	9.74	2.74	0.30
2021	295	33	10.52	2.80	0.31
2022	240	28	10.93	2.20	0.26
2023	310	43	11.52	2.69	0.37
2024	365	55	11.84	3.08	0.46
2025	296	43	11.66	2.54	0.37
Total	**5,132**	**850**	**297.24**	**1.73**	**0.29**

[1] Data are presented for the 115 larger non-Part 139-certificated (general aviation) airports for which movement data (Federal Aviation Administration 2026*a*) were available in all years, 2000-2025.

[2] Strikes involving an unknown operator (96,451 of which 94,628 were “Carcass Found” reports-see Tables 6 and 7) were excluded from this analysis as were all strikes by U.S.-registered aircraft in foreign countries.

[3] Itinerant and local departures and arrivals for general aviation aircraft (Federal Aviation Administration 2026*a*).

Table 5. Methods of reporting and source of information for reported wildlife strikes to civil aircraft, U.S.[1], 2025 only and 1990-2025.

	2025 only		1990-2025	
Source	Total	% of total	Total	% of total
FAA Form 5200-7-E[2]	18,566	76	212,771	62
Multiple[3]	3,570	15	39,635	12
Mandatory Occurrence Report	2,254	9	17,486	5
Other[4]	36	<1	5,182	1
FAA Form 5200-7 (Paper)	13	<1	41,782	12
Air Transport Report	7	<1	17,182	5
Airport Report	1	<1	7,336	2
Daily Report	0	0	2,182	1
Total	**24,447**	**100**	**343,556**	**100**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Bird/Other Wildlife Strike Report. Electronic filing of reports (http://wildlife.faa.gov) began in April 2001.

[3] More than one type of report was filed for the same strike (many of these had at least one FAA Form 5200-7E report filed).

[4] Various sources such as news media, Preliminary Aircraft Incident Report, Aviation Safety Reporting System, National Transportation Safety Board, Transport Canada, and engine manufacturers.

Table 6. Person filing report of wildlife strike to civil aircraft, U.S.[1], 2025 only and 1990-2025.

	2025 only		1990-2025	
Person filing report	Total	% of total	Total	% of total
Airport Operations	14,055	57	178,211	55
Misc. reports[2]	7,852	32	83,583	26
Carcass Found[3]	6,203	25	94,628	29
Pilot	5,503	23	63,190	20
Tower	2,503	10	35,964	11
Other	1,516	6	9,743	3
Air Transport Operations[4]	870	4	35,356	11
Total known	**24,447**	**100**	**322,464**	**100**
Unknown	**0**		**21,092**	
Total	**24,447**		**343,556**	

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Airport personnel observed the strike or reported a strike that had been communicated to them by pilot, tower, or airline.

[3] Airport personnel found fresh wildlife remains within 250 feet of a runway centerline or elsewhere on or near airport that appeared to have been struck by aircraft, but no strike was observed or reported by pilot, tower, or airline (FAA Advisory Circular 150/5200-32B).

[4] Personnel at air transport companies (other than the pilot/flight crew) involved with flight safety, flight operations, and maintenance.

Table 7. Number of reported wildlife strikes to civil aircraft by type of operator, U.S.[1], 2025 only and 1990-2025.

	2025 only		1990-2025	
Type of operator	Total	% of total	Total	% of total
Commercial transport[2]	16,091	89	211,568	86
General Aviation	2,040	11	35,537	14
Business	1,758	10	28,622	12
Private	114	1	4,080	2
Government/police[3]	168	1	2,835	1
Total known	**18,131**	**100**	**247,105**	**100**
Unknown[4]	**6,316**		**96,451**	
Total	**24,447**		**343,556**	

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Air carrier, commuter, and air taxi service with 3-letter Operator Code.

[3] U.S. Customs and Border Protection (USCBP) and U.S. Coast Guard (USCG) aircraft were respectively involved in 20% (559) and 34% (961) of the 2,835 Government/police strikes, 1990-2025. For 2025 only, 1% (3) and 32% (53) of the 168 Government/police strikes involved USCBP and USCG aircraft, respectively.

[4] Ninety-eight percent (94,628) of the 96,451 strikes involving an unknown operator were “Carcass Found” reports, 1990-2025. For 2025 only, 98% (6,203) of the 6,316 strikes involving an unknown operator were “Carcass Found” reports (see Table 6).

Table 8. Number of Part 139-certificated airports[1] and general aviation (GA) airports with reported wildlife strikes and number of strikes reported for these airports, civil aircraft, U.S., 1990–2025 (see Figure 5)[2].

	Part 139 airports			GA airports			All U.S. airports	
Year	Airports	Strikes		Airports	Strikes		Airports	Strikes
1990	236	1,780		99	163		335	1,943
1991	259	2,115		97	199		356	2,314
1992	256	2,257		107	228		363	2,485
1993	256	2,266		101	219		357	2,485
1994	265	2,296		110	244		375	2,540
1995	260	2,383		120	208		380	2,591
1996	257	2,595		111	194		368	2,789
1997	283	3,013		124	199		407	3,212
1998	287	3,216		148	271		435	3,487
1999	302	3,807		147	258		449	4,065
2000	309	4,487		157	283		466	4,770
2001	312	4,432		162	304		474	4,736
2002	303	4,765		160	315		463	5,080
2003	306	4,647		153	328		459	4,975
2004	306	5,262		179	321		485	5,583
2005	322	5,552		176	328		498	5,880
2006	318	5,971		148	275		466	6,246
2007	324	6,570		167	333		491	6,903
2008	328	6,628		167	316		495	6,944
2009	363	8,016		238	460		601	8,476
2010	372	8,298		227	474		599	8,772
2011	359	8,436		240	520		599	8,956
2012	382	8,912		268	611		650	9,523
2013	375	9,121		284	638		659	9,759
2014	392	11,002		292	727		684	11,729
2015	403	11,089		276	707		679	11,796
2016	400	10,813		273	807		673	11,620
2017	418	11,722		288	846		706	12,568
2018	416	12,816		309	894		725	13,710
2019	419	13,493		353	978		772	14,471
2020	411	9,197		308	968		719	10,165
2021	429	12,344		330	1,049		759	13,393
2022	431	13,469		319	969		750	14,438
2023	432	15,155		348	1,071		780	16,226
2024	434	16,767		377	1,270		811	18,037
2025	454	17,970		416	1,217		870	19,187
Total	**513**	**272,662**		**1,904**	**19,192**		**2,417**	**291,854**

[1] 517 U.S. airports were certificated for passenger service, January 2026 (FAA 2026b).

[2] In addition, 5,674 strikes involving U.S.-registered aircraft were reported from 351 foreign airports in 113 countries (342 strikes at 114 airports in 62 countries in 2025). Furthermore, 6,249 strikes (6,196 bird and 57 bat strikes) were reported in which the aircraft was en route (Table 10). An additional 39,075 strikes were reported in which either evidence of strike was discovered on aircraft after landing but phase of flight where strike occurred could not be determined or an airport was not named on reporting form.

Table 9. Reported time of occurrence of wildlife strikes with civil aircraft, U.S.[1], 1990-2025[2].

	Birds		Terrestrial mammals		Bats	
Time of day	36-year total	% of total known	36-year total	% of total known	36-year total	% of total known
Dawn	6,461	3	146	5	23	1
Day	116,987	62	814	27	236	12
Dusk	8,203	4	228	7	83	4
Night	56,982	30	1,877	61	1,673	83
Total known	**188,633**	**100**	**3,065**	**100**	**2,015**	**100**
Unknown[3]	**140,316**		**3,648**		**4,952**	
Total	**328,949**		**6,713**		**6,967**	

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] In addition, 927 strikes with reptiles were reported from 1990-2025: time not reported (795), day (105), night (21), dusk (4), and dawn (2).

[3] Of the 140,316 strike reports with “Unknown” time of day (all species), 94,628 (67 %) were “Carcass Found” reports (Table 6).

Table 10. Reported phase of flight at time of occurrence of wildlife strikes with civil aircraft, U.S.[1], 1990-2025[2].

	Birds		Terrestrial mammals[3]		Bats	
Phase of flight	36-year total	% of total known	36-year total	% of total known	36-year total	% of total known
Parked	113	<1	2	<1	0	0
Taxi	683	<1	91	3	1	<1
Take-off Run	33,503	17	1,023	30	78	4
Climb[3]	30,490	15	69	2	101	5
Departure[4]	3,889	2	12	<1	87	4
En Route	6,196	3	0	0	57	3
Arrival[4]	1,059	1	8	<1	15	1
Descent	2,925	1	0	0	40	2
Approach[3]	86,925	43	311	9	1,321	65
Landing Roll	35,484	18	1,844	54	321	16
Local[4]	1,426	1	68	2	12	1
Total known	**202,693**	**100**	**3,428**	**100**	**2,033**	**100**
Unknown[5]	**126,256**		**3,285**		**4,934**	
Total	**328,949**		**6,713**		**6,967**	

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] In addition, 927 strikes with reptiles were reported: phase of flight not reported (775), landing roll (65), take-off run (48), taxi (25), approach (10; pilot missed approach because reptile was on runway or hit reptile before aircraft touched down), and local (4).

[3] In some cases, terrestrial mammals (e.g., deer, coyote) were hit after aircraft lifted off runway or just before touchdown, or pilot had a missed approach because mammal was on runway.

[4] Phase of flight was determined to be Arrival, Departure, or Local (i.e., pilot conducting “touch-and-go” operations) but exact phase of flight could not be determined.

[5] Of the 135,250 strike reports with “Unknown” phase of flight (all species), 94,628 (70%) were “Carcass Found” reports (Table 6).

Table 11. Number of reported bird strikes to commercial transport aircraft[1] by height AGL, U.S.[2], 1990-2025. See Figure 8 for graphic analysis of strike data from 501 to 18,500 feet AGL.[3]

Height of strike (feet AGL)	All reported strikes			Strikes with damage		
	36-year total	% of total known	% cum-ulative total[4]	36-year total	% of total known	% cum-ulative total[4]
0	59,280	43	43	2,507	28	28
1-500	38,131	28	71	2,344	26	54
501-1500	14,624	11	81	1,315	15	69
1501-2500	7,947	6	87	865	10	79
2501-3500	5,945	4	92	567	6	85
3501-4500	3,615	3	94	349	4	89
4501-5500	2,509	2	96	257	3	92
5501-6500	1,619	1	97	174	2	94
6501-7500	1,090	1	98	118	1	95
7501-8500	848	1	99	113	1	96
8501-9500	447	<1	99	53	1	97
9501-10500	595	<1	99	88	1	98
10501-11500	298	<1	100	62	1	98
>11500[5]	545	<1	100	143	2	100
Total known	**137,493**	**100**		**8,955**	**100**	
Unknown height	**67,628**			**4,167**		
Total	**205,121**			**13,122**		

[1] Air carrier, commuter, and air taxi service with 3-letter Operator Code (see Table 7); strikes in which height of strike was reported but the type of operator was unknown were excluded from analysis. Strikes with rotorcraft are excluded.

[2] Includes strikes to U.S.-registered aircraft in foreign countries.

[3] A more detailed analysis of bird strikes by height AGL is provided by Dolbeer (2006).

[4] The cumulative percentage of strikes that occur at or below the upper range of the corresponding 1,000-foot interval.

[5] Thirty-five strikes involving commercial transport aircraft (11 with damage to aircraft) were reported at ≥20,000 feet AGL; the highest was 32,000 feet.

Table 12. Number of reported bird strikes to general aviation aircraft[1] by height AGL, U.S.[2], 1990-2025.[3]

Height of strike (feet AGL)	All reported strikes			Strikes with damage		
	36-year total	% of total known	% cum-ulative total[4]	36-year total	% of total known	% cum-ulative total[4]
0	9,710	41	41	921	18	18
1-500	7,932	34	75	1,701	32	50
501-1500	2,873	12	88	1,286	25	75
1501-2500	1,290	6	93	609	12	86
2501-3500	719	3	96	306	6	92
3501-4500	358	2	98	161	3	95
4501-5500	184	1	98	69	1	96
5501-6500	119	1	99	54	1	97
6501-7500	91	<1	99	34	1	98
7501-8500	46	<1	99	21	<1	99
8501-9500	28	<1	100	14	<1	99
9501-10500	39	<1	100	21	<1	99
10501-11500	7	<1	100	3	<1	99
>11500[5]	45	<1	100	38	1	100
Total known	**23,441**	**100**		**5,238**	**100**	
Unknown height	**6,167**			**862**		
Total	**29,608**			**6,100**		

[1] Private, Business, and Government/Police aircraft (see Table 6); Strikes in which height of strike was reported but type of operator was unknown were excluded from analysis. Strikes with rotorcraft are excluded.

[2] Includes strikes to U.S.-registered aircraft in foreign countries.

[3] A more detailed analysis of bird strikes by height AGL is provided by Dolbeer (2006).

[4] The cumulative percentage of strikes that occur at or below the upper range of the corresponding 1,000-foot interval.

[5] Seven strikes involving general aviation aircraft (6 with damage to aircraft) were reported at ≥20,000 feet AGL; the highest was 27,500 feet.

Table 13. Civil aircraft components reported as being struck and damaged by wildlife, U.S.[1], 1990-2025.

	Birds (36-year total)				Terrestrial mammals (36-year total)			
Aircraft component	Number struck	% of total	Number damaged	% of total	Number struck	% of total	Number damaged	% of total
Windshield	39,965	14	1,504	6	8	0	17	1
Nose	38,615	14	1,723	7	141	3	124	5
Wing/rotor	41,052	15	6,170	26	420	10	425	17
Radome	29,717	11	2,163	9	23	1	17	1
Fuselage	29,320	11	1,042	4	202	5	204	8
Engine(s)[2]	29,543	11	5,907	25	223	5	207	8
Other[3]	46,805	17	2,196	9	626	15	360	15
Landing gear	12,152	4	752	3	1,912	46	599	24
Propeller	4,897	2	353	1	430	10	368	15
Tail	3,334	1	989	4	76	2	98	4
Light	1,522	1	994	4	62	2	63	3
Total[4]	**276,922**	**100**	**23,793**	**100**	**4,123**	**100**	**2,482**	**100**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] For birds, 29,543 engines were reported as struck in 28,331 strike events involving engines (27,153 events with one engine struck, 1,151 with two engines struck, 20 with three engines struck, and 7 with four engines struck). A total of 5,907 engines was damaged in 5,714 bird-strike events with engine damage (5,524 events with one engine damaged, 188 with two engines damaged, 1 with three engines damaged, and 1 with four engines damaged). For terrestrial mammals, 223 engines were reported as struck in 211 strike events (199 events with one engine struck and 12 with two engines struck). A total of 207 engines was damaged in 187 terrestrial mammal strike events with engine damage (167 events with one engine damaged and 20 with two engines damaged). Some engines were damaged without being struck when the landing gear collapsed.

[3] “Other” parts reported struck included 977 pitot tubes, 484 wiper blades, 321 antennae (communication, radar, or global position), 229 Angle of Attack (AOA) sensors (including SMART sensors), and 199 air temperature probes (TAT, RAT, OAT, SAT).

[4] In addition, bat strikes had 4,089 and 50 components reported as struck and damaged, respectively: radome/nose (1,387, 9), windshield (571, 7), engine (330, 10), propeller (9, 0), wing/rotor (924,13), fuselage (315, 2), tail (49, 4), other (318, 3), landing gear (171, 0), light (15, 2). For reptile strikes, there were 143 and 7 components reported struck and damaged, respectively: windshield (1, 1), wing/rotor (2, 2), fuselage (1, 1), landing gear (117, 1), tail (1, 1), nose (5, 0), other (16, 1).

Table 14. Number of civil aircraft with reported damage resulting from wildlife strikes, U.S.[1], 1990-2025. See Tables 1-4 and Figures 2, 3, 10, and 15 for trends in damaging strikes, 1990-2025.

	Reported strikes					
	Birds		Terrestrial mammals		Total (all species)[2]	
Damage category[3]	36-year total	% of total[4]	36-year total	% of total[4]	36-year total	% of total[4]
None	195,488	59	1,576	23	200,622	58
Unknown	113,122	34	3,716	55	121,122	35
Damage	20,339	6	1,421	21	21,812	6
Minor	8,132	2	622	9	8,769	3
Uncertain	8,259	3	281	4	8,571	2
Substantial	3,894	1	483	7	4,383	1
Destroyed[5]	54	<1	35	1	89	0
Total	**328,949**	**100**	**6,713**	**100**	**343,556**	**100**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Included in totals are 6,967 and 927 strikes involving bats and reptiles, respectively. For bats, 3,432 reports indicated no damage, 3,486 failed to indicate if damage occurred, and 49 indicated damage (13 minor, 31 uncertain level, 5 substantial [caused by megabats at foreign airports]). For reptiles, 126 reports indicated no damage, 798 failed to indicate if damage occurred, and 3 indicated damage (2 minor, 1 substantial).

[3] The damage codes and descriptions are from the International Civil Aviation Organization (1989): Minor = the aircraft can be rendered airworthy by simple repairs or replacements and an extensive inspection is not necessary; Uncertain = the aircraft was damaged, but details as to the extent of the damage are lacking; Substantial = the aircraft incurs damage or structural failure that adversely affects the structure strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component (specifically excluded are bent fairings or cowlings; small dents or puncture holes in the skin; damage to wing tips, antenna, tires, or brakes; and engine blade damage not requiring blade replacement); Destroyed = the damage sustained makes it inadvisable to restore the aircraft to an airworthy condition.

[4] The percentage of strikes causing damage is calculated using the total strikes reported as the divisor, including the 121,122 reports that did not indicate if damage occurred or not (Unknown). “Carcass found” reports (see Table 6) comprised 94,628 (78 %) of these 121,122 reports.

[5] Includes 1 Government-operated drone destroyed after being attacked by a bald eagle in 2020.

Table 15. Reported effect-on-flight of wildlife strikes to civil aircraft, U.S.[1], 1990-2025. See Figure 10 for trend in strikes with negative effect-on-flight (NEOF), 1990-2025.

	Reported strikes					
	Birds		Terrestrial mammals		Total[2]	
Effect-on-flight[3]	36-year total	% of total[4]	36-year total	% of total[4]	36-year total	% of total[4]
None	147,455	45	1,430	21	150,843	44
Unknown	166,864	51	4,252	63	177,007	52
Flights with NEOF	14,630	4	1,031	15	15,706	5
Precautionary landing[5]	9,797	3	167	2	9,991	3
Aborted take-off[5]	3,012	1	323	5	3,337	1
Engine shutdown[5]	531	<1	56	1	554	0
Other	2,169	1	506	8	2,691	1
Total NEOF events[5]	15,509		1,052		16,573	
Total	**328,949**	**100**	**6,713**	**100**	**343,556**	**100**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Included in totals are 6,967 and 927 strikes involving bats and reptiles, respectively. For bats, 1,851 reports indicated no effect-on-flight, 5,087 failed to indicate if an effect-on-flight occurred, and 29 indicated a negative effect (26 precautionary landings, 3 “Other”). For reptiles, 107 reports indicated no effect-on-flight, 804 failed to indicate if an effect-on-flight occurred, and 16 indicated a negative effect (1 precautionary landing, 2 aborted take-off, 13 “Other”).

[3] Effect-on-flight: None = flight continued as scheduled, although delays and costs caused by inspections or repairs may have been incurred after landing; Aborted take-off = pilot aborted take-off after initiating take-off run (aircraft may have become airborne but pilot landed on departing runway without doing a “go around”); Precautionary landing (includes “declared emergency” landings) = pilot completed take-off but returned to land at departure airport or landed at an “other-than-destination” airport; Engine shut down = pilot shut down engine or engine stopped running; Other = miscellaneous, e.g., smoke in cabin (93 events), evasive maneuver to avoid birds, or aborted landing (go-around); Unknown = insufficient information to determine an effect-on-flight.

[4] The percentage of strikes causing negative effect-on-flight is calculated using the total strikes reported as the divisor, including the 166,864 reports that did not indicate if a negative effect occurred or not (Unknown). “Carcass found” reports (see Table 6) comprised 94,628 (57%) of these 166,864 reports.

[5] There were 16,573 NEOF events in the 15,706 flights with a NEOF (840 flights had 2 or more negative effects such as an engine shutdown and precautionary landing).

Table 16. Number of reported incidents where pilot made a precautionary or emergency landing after striking wildlife during departure in which fuel was jettisoned or burned (circling pattern) to lighten aircraft weight or in which an overweight (greater than maximum landing weight) landing was made, civil aircraft, U.S., 1990-2025[1]. See Figure 11 for trends in incidents, 1990-2025.

Action taken after bird strike on departure	Number of incidents	Comments
Fuel jettison	70	Aircraft with most incidents: B-747 (22), B-767 (8). A mean of 94,590 lbs (13,910 gallons) of fuel jettisoned per incident in which amount of fuel jettison was reported (N = 29, range 300-270,000 lbs; 44-39,706 gallons).
Fuel burn	180	Aircraft with most incidents: A-320 (14), CRJ 100/200 (11), B-737-800 (9)
Overweight landing	172	Aircraft with most incidents: A-320 (29), B-737-800 (24), B-757-200 (16)
Total (1990-2025)	**422**	**A mean of 11.7 (range 0 - 33) incidents (fuel jettison, fuel burn, or overweight landing) per year, 1990-2025.**
Total (2016-2025)	**191**	**A mean of 19.1 (range 7 - 33) incidents (fuel jettison, fuel burn, or overweight landing) per year, 2016 - 2025.**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

Table 17. Indicated air speed (nautical miles/hour [knots])[1] at time pilot aborted take-off after striking or observing wildlife on runway, civil aircraft, U.S.[2], 1990-2025. See Figure 12 for trend in high-speed aborted take-offs at ≥100 knots caused by wildlife, 1990-2025.

	Commercial transport aircraft[3]		General aviation aircraft[4]		All aircraft[5]	
Aircraft speed (knots)	36-year total	% of total known	36-year total	% of total known	36-year total	% of total known
1-49	38	4	218	29	258	14
50-99	511	50	448	60	965	54
≥100	481	47	83	11	568	32
Total known	**1,030**	**100**	**749**	**100**	**1,791**	**100**
Unknown	**848**		**668**		**1,547**	
Total	**1,878**		**1,417**		**3,338**	

[1] A speed of 100 knots equals 185 kilometers/hour (115 miles/hour).

[2] Includes strikes to U.S.-registered aircraft in foreign countries.

[3] Air carrier, commuter, and air taxi service with 3-letter identifying code (see Table 7).

[4.] Business, Private, or Government aircraft (see Table 7).

[5] Included in totals are 43 aborted take-offs in which type of operator was unknown: speed unreported (31), 1-49 knots (2), 50-99 knots (6), and >100 knots (4).

Table 18. Total reported strikes, strikes causing damage, strikes having a negative effect-on-flight (NEOF), strikes involving >1 animal, and reported aircraft downtime and costs by identified wildlife species, civil aircraft, U.S.[1], 1990-2025 (page 1 of 31).

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Birds						
Loons	**88**	**46**	**24**	**2**	**7,076**	**4,863,939**
Loons	2	1	1			
Common loon	60	33	15		6,533	4,661,889
Red-throated loon	23	11	8	2	351	200,264
Pacific loon	3	1			192	1,786
Grebes	**242**	**58**	**24**	**31**	**4,515**	**8,533,245**
Grebes	14	2		1		
Eared grebe	38	9	2	6	586	1,088,792
Western grebe	43	12	7	9	334	3,204,169
Pied-billed grebe	69	7	3	1	119	57,704
Horned grebe	28	6	3	4	150	183,798
Red-necked grebe	8	3	2	1		
Clark's grebe	3					
Great crested grebe	1					
White-tufted grebe	1			1		
Western/Clark's grebe	37	19	7	8	3,326	3,998,782
Albatrosses, shearwaters	**123**	**10**	**5**	**10**	**197**	**107,080**
Laysan albatross	37	8	3	1	197	107,080
Black-footed albatross	8	1				
Bonin petrel	30			9		
Hawaiian petrel	1					
Northern fulmar	1					
Shearwaters	1					
Wedge-tailed shearwater	30	1	2			
Newell's shearwater	11					
Storm-petrels	1					
Fork-tailed storm-petrel	2					
Band-rumped storm-petrel	1					
Tropicbirds	**43**	**23**	**15**	**1**	**265**	**220,349**
Tropicbirds	10	7	4		150	86,560
White-tailed tropicbird	29	15	10	1	115	123,631
Red-tailed tropicbird	4	1	1			10,158

Table 18. Continued (page 2 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Pelicans	**157**	**67**	**43**	**24**	**10,707**	**19,615,451**
Pelicans	10	4			108	28,498
Australian pelican	1	1	1			
Brown pelican	107	37	24	13	595	623,241
American white pelican	39	25	18	11	10,005	18,963,712
Gannets, boobies	**8**	**0**	**0**	**0**	**13**	**0**
Northern gannet	1					
Red-footed booby	4					
Brown booby	3				13	
Cormorants	**289**	**85**	**54**	**46**	**4,383**	**8,829,491**
Cormorants	4	1			12	20,355
Great cormorant	2	1		2		
Double-crested cormorant	273	82	53	44	4,345	8,809,136
Pelagic cormorant	2					
Brandt's cormorant	5	1	1		26	
Neotropic cormorant	3					
Anhinga	**89**	**47**	**27**	**15**	**720**	**1,438,835**
Frigatebirds	**32**	**13**	**9**	**1**	**90**	**46,145**
Frigatebirds	1				1	
Great frigatebird	15	4	3		69	37,871
Magnificent frigatebird	16	9	6	1	20	8,274
Herons, egrets, bitterns	**3,269**	**293**	**285**	**369**	**10,779**	**33,202,147**
Herons, egrets, bitterns	16	1	3	1		
Herons	70	13	9	2	211	6,564
Gray heron	3	1	1			
Great blue heron	670	119	81	11	4,648	19,915,120
Black-crowned night heron	186	12	5	9	240	582,253
Little blue heron	30	1	3	1	1	407
Green heron	65	3	4	1		622
Yellow-crowned night heron	173	14	8	9	189	1,059,820
Tricolored heron	11		2			
Purple heron	2	1			36	
American bittern	30	8	3	1	695	80,692
Yellow bittern	188		2	18		
Least bittern	9	1	1		5	
Egrets	406	38	56	95	3,628	6,240,931

Table 18. Continued (page 3 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Western cattle egret	1,136	60	90	201	820	1,700,858
Great egret	196	14	13	16	180	3,258,591
Medium egret	1					
Eastern cattle egret	4	1			27	292,165
Snowy egret	68	6	4	4	99	64,124
Reddish egret	5					
Storks	**36**	**14**	**7**	**4**	**136**	**52,963**
White stork	1	1				
Wood stork	35	13	7	4	136	52,963
Ibises	**99**	**21**	**15**	**17**	**1,994**	**1,513,553**
Ibises	8		1	1		
Glossy ibis	10	2	2	1		2,800
White ibis	48	5	6	5	138	80,070
White-faced ibis	28	13	4	10	1,844	1,414,411
Roseate spoonbill	5	1	2		12	16,272
Waterfowl	**8,156**	**2,974**	**1,411**	**2,565**	**206,887**	**388,473,361**
Ducks, geese, swans	154	75	34	61	828	1,849,515
Ducks	979	318	155	296	10,939	11,010,711
American wigeon	144	52	15	37	5,100	2,584,598
Northern pintail	312	134	53	115	2,962	14,584,908
Green-winged teal	183	35	11	44	1,277	1,635,720
Blue-winged teal	118	42	14	27	787	1,658,257
Eurasian wigeon	3	1		1		
Mallard	1,544	302	152	331	16,360	37,882,171
Common eider	7	3	1	2	12	6,997
Ring-necked duck	71	32	15	17	2,167	3,033,988
Greater scaup	25	4	2	5		
Wood duck	136	35	10	21	1,131	336,135
Muscovy duck	5	1			120	791,348
Common goldeneye	18	6	4	4	1	3,186
Red-breasted merganser	16	4	1	4	99	
Hooded merganser	29	8	3	5	2,149	535,954
Common merganser	15	4	5	4	120	4,928
Northern shoveler	170	58	19	50	3,227	5,985,734
Gadwall	156	55	17	47	812	14,884,663
Canvasback	38	20	6	11	956	3,447,094

Table 18. Continued (page 4 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
American black duck	103	12	6	24	2,672	1,454,265
Mottled duck	41	6	5	8	25	71,220
Lesser scaup	113	47	22	36	2,296	456,699
Ruddy duck	134	32	10	21	419	448,652
Redhead	23	10	4	9	102	303,930
Bufflehead	46	9	4	5	433	286,275
Long-tailed duck	8	4	3	1	20	64,432
Philippine duck	1	1	1	1	96	15,545,664
Black-bellied whistling-duck	32	8	3	9	120	
Cinnamon teal	17	5	1	4	46	44,907
White-winged scoter	8	7	5	2	1,472	959,827
Hawaiian duck	17			6		
Harlequin duck	1					
Barrow's goldeneye	4					
Surf scoter	7	2	1	2	10	
Mallard/American black duck	64	12	5	11	161	1,091,519
Mallard/mottled duck	6	1	1	1	68	29,449
Diving duck (Aythya)	43	5	2	10	165	339,536
Teal complex	9	4	3	3	119	332,314
Geese	494	259	111	170	28,621	5,153,263
Snow goose	205	135	70	98	13,708	45,308,215
Canada goose	2,301	1,057	567	916	103,580	202,491,109
Brant	77	19	7	22	142	754,622
Greater white-fronted goose	118	68	29	58	1,284	8,061,589
Emperor goose	2	1				13,295
Cackling goose	48	22	6	13	342	1,839,575
Hawaiian goose	14	2		7	11	
Egyptian goose	2			1		
Ross's goose	2			1		
Snow goose/Ross's goose	47	32	11	29	987	820,393
Swans	5	2				
Mute swan	13	3	1	2	48	95,040
Tundra swan	26	18	14	12	824	761,114
Trumpeter swan	2	2	2	1	72	1,510,550
Hawks, eagles, vultures	**11,410**	**2,606**	**1,578**	**333**	**200,634**	**261,430,876**
Unidentified raptors	85	25	19	1	4,373	286,561

Table 18. Continued (page 5 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
New World vultures	433	247	124	30	27,382	19,297,876
Black vulture	426	273	117	18	33,742	18,669,472
Turkey vulture	1,336	629	393	67	58,926	68,702,949
Osprey	735	165	82	9	5,120	11,229,996
Kites, eagles, hawks	8		2		1	
Kites	1					
White-tailed kite	111	4	3	2	46	7,965,000
Black kite	6	4	1			
Mississippi kite	39		2			
Swallow-tailed kite	12	1	2	1	13	3,897
Eagles	8	3	2	1		
Bald eagle	592	209	136	34	17,442	41,132,287
White-bellied sea-eagle	1	1	1			
Golden eagle	41	15	8	2	4,882	1,465,187
Wedge-tailed eagle	1	1	1			
Greater spotted eagle	1	1				
Hawks	1744	335	238	47	18,653	10,231,303
American goshawk	5					
Red-tailed hawk	4,518	573	377	96	24,515	66,093,479
Rough-legged hawk	140	12	5	1	70	111,999
Red-shouldered hawk	151	10	11	1	240	5,393
Swainson's hawk	274	39	21	7	2,143	1,145,639
Sharp-shinned hawk	70	2	1	1	1,049	541,580
Cooper's hawk	249	12	11	3	806	282,827
Ferruginous hawk	78	5	1		96	4,938,646
Broad-winged hawk	73	24	10	7	676	954,036
Harris's hawk	6					
Hawaiian hawk	3	2	3		2	
White-tailed hawk	6	1				
Eurasian buzzard	5	1			26	
Short-tailed hawk	5	2				51,300
Western marsh harrier	1					
Northern harrier	243	8	6	4	192	437,449
Old World vultures	2	1		1		
Lappet-faced vulture	1	1	1		240	7,884,000

Table 18. Continued (page 6 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Falcons, caracaras	**11,657**	**130**	**196**	**488**	**3,509**	**6,999,615**
Falcons, caracaras	14	2	1		96	64,000
Falcons, kestrels, falconets	82	7	11	6	110	74,620
Peregrine falcon	699	39	23	30	360	1,233,078
Gyrfalcon	2					
Merlin	282	4	6	12	29	702,738
Prairie falcon	46	1	4	2		8,113
American kestrel	10,480	64	145	432	2,824	4,915,366
Eurasian kestrel	7	1	1			
Crested caracara	44	12	5	6	91	1,700
Yellow-headed caracara	1					
Gallinaceous birds	**489**	**92**	**72**	**81**	**5,941**	**9,772,579**
Grouse	3	1				
Greater sage-grouse	42	12	5	15	556	662,196
Sharp-tailed grouse	37	2	5	5	48	1,024
Ruffed grouse	4					
Spruce grouse	2					
Ptarmigans	5	1	1	3	18	93,250
Willow ptarmigan	12	3	1	5	211	182,313
Rock ptarmigan	3	1				
Quails, pheasants	4	1				23,818
New World quail	10		3	3		
Northern bobwhite	19	3	4	2	93	10,811
California quail	1					
Scaled quail	6					
Gambel's quail	4	1	1	2	1,845	
Pheasants	2	1		1	48	15,000
Ring-necked pheasant	116	20	11	6	884	141,571
Greater prairie chicken	1		1			
Partridges	3			1		
Red-legged partridge	1					
Gray partridge	48	4	4	16	44	7,360,632
Chukar	4			1		
Gray francolin	9	1	1	1	92	420,091
Black francolin	10				1	
Helmeted guineafowl	3	1		2		

Table 18. Continued (page 7 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Wild turkey	140	40	35	18	2,102	861,873
Cranes	**224**	**81**	**49**	**58**	**3,930**	**575,615**
Cranes	1					
Sandhill crane	222	80	49	58	3,882	497,700
Whooping crane	1	1			48	77,915
Limpkin	**3**					
Rails, gallinules	**829**	**128**	**42**	**34**	**5,397**	**11,709,622**
Rails	17	1	1	1	4	317
Sora	185	14	2	9	227	964,355
Common gallinule	13	2	1		24	1,682
American coot	515	108	37	21	4,987	10,597,016
Eurasian coot	2					
Purple gallinule	7	1	1		72	39,422
Virginia rail	61	1		1	83	106,830
Clapper rail	18					
Yellow rail	3			1		
King rail	5			1		
Eurasian moorhen	1	1				
Corn crake	1					
Rufous-necked wood rail	1					
Shorebirds	**17,761**	**305**	**270**	**2,099**	**7,408**	**16,007,117**
Shorebirds	63	5	2	13	19	
American oystercatcher	58			6		
Plovers, lapwings	15	1		2	2	
Plovers	116	2	4	17	29	5,130
European golden-plover	1					
American golden-plover	368	10	7	79	86	153,239
Black-bellied plover	313	12	9	43	64	607,268
Snowy plover	8			3	1	
Common ringed plover	1					
Siberian sand-plover	1					
Killdeer	11,434	84	115	909	2,198	5,742,299
Pacific golden-plover	1,655	19	21	218	357	492,339
Semipalmated plover	180	1	2	45	9	
Piping plover	5	1		1	2	307
Wilson's plover	7			1		

Table 18. Continued (page 8 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Kentish plover	3					
Oriental plover	2					
Collared plover	1			1		
Lapwings	1					
Northern lapwing	1	1	1	1	25	
Red-wattled lapwing	1					
Southern lapwing	9	2	1			13,960
Spur-winged lapwing	1	1				
Sandpipers, curlews, allies	422	20	34	113	262	522,638
Upland sandpiper	470	11	6	48	81	9,862
Spotted sandpiper	69	4	2	11	6	
Willet	25	1		2		
Common snipe	3					
American woodcock	283	14	4	9	1,191	132,444
Sharp-tailed sandpiper	1		1			
Dunlin	179	9	11	57	689	434,858
Baird's sandpiper	94	2	1	14	79	508,836
Western sandpiper	353	10	9	166	255	236,673
Pectoral sandpiper	89	12	1	23	220	422,272
Sanderling	65	1	3	15	6	
Buff-breasted sandpiper	100	2		13		
Surfbird	1	1		1		7,404
Ruddy turnstone	46		1	7		
Bar-tailed godwit	1					
Least sandpiper	354	3	6	91	24	8,587
Semipalmated sandpiper	231	4	2	77	4	13,478
Lesser yellowlegs	36	9	1	9	105	136,991
Short-billed dowitcher	29	6	1	7	19	14,000
Hudsonian godwit	8	1	1	4	97	45,298
Solitary sandpiper	27	1		2		
Greater yellowlegs	46	6	2	4	121	81,682
Long-billed dowitcher	18	1	1	6	3	
Red knot	5		1			
White-rumped sandpiper	28	1		8	16	2,884,858
Black turnstone	2					
Marbled godwit	12	2	2	3	48	223,156

Table 18. Continued (page 9 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Wilson's snipe	317	19	6	17	181	1,987,381
Rock sandpiper	2			2		
South American snipe	1					
Stilt sandpiper	5	1		2		
Purple sandpiper	2			1	1	
Wood sandpiper	1					
Gray-tailed tattler	1					
Pin-tailed snipe	2					
Wilson/Common snipe	1					
Eurasian curlew	2	1				
Whimbrel	35	3	2	9	384	71,450
Long-billed curlew	25	3	1	1	505	937,720
Red-necked phalarope	28	4	3	6	74	
Wilson's phalarope	38	11	6	23	214	17,622
Red phalarope	7				10	
Avocets, stilts	1					
American avocet	20	1		4		
Black-necked stilt	26			5		
Red-necked stint	1					
Double-striped thick-knee	3	1			22	295,365
Spotted thick-knee	2	1				
Jaegers	**10**					
Parasitic jaeger	3					
Long-tailed jaeger	7					
Gulls	**15,884**	**1,800**	**1,496**	**2,772**	**60,151**	**86,070,250**
Gulls	7,674	1,168	982	1,776	35,383	34,524,943
Herring gull	2,241	176	144	211	3,745	8,293,433
Short-billed gull	93	7	4	15	52	139,719
Ring-billed gull	2,489	151	145	384	9,557	6,951,631
Glaucous-winged gull	243	32	20	25	662	3,058,921
Great black-backed gull	211	17	12	17	227	2,726,692
Franklin's gull	294	21	31	86	468	292,802
Laughing gull	1,350	34	43	114	1,224	1,317,232
Bonaparte's gull	95	4	7	20	78	167,689
Lesser black-backed gull	10	4	1	2	24	
Western gull	241	28	14	17	753	2,825,111

Table 18. Continued (page 10 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
California gull	366	37	32	45	5,409	1,493,714
Heermann's gull	1			1		
Black-headed gull	14					
Iceland gull	4	1	1	1		
Yellow-legged gull	3	3	3	3	456	15,344,471
Glaucous gull	49	5	5	8	563	965,609
Vega gull	1	1			18	16,586
White-headed gull complex	493	111	52	47	1,532	7,951,697
Black-headed gull complex	4					
Common gull	6					
Sabine's gull	2					
Terns, noddies, kittiwakes	**467**	**19**	**13**	**64**	**297**	**1,280,462**
Terns, noddies	57	3	1	17	1	313,600
White-winged tern	2			1		
Little tern	1			1		
Caspian tern	62	4	1	3	24	791,100
Common tern	61	2		3		105,020
Sandwich tern	6					
Gull-billed tern	8			1		
Black tern	15			3	2	
Blue-billed white tern	38	4	4	3	154	47,360
Arctic tern	6	1		2		
Roseate tern	1					
Forster's tern	30		1	2	6	262
Least tern	46			5		
Royal tern	13	2	2	1	37	
Sooty tern	9	1	1		72	23,007
Elegant tern	4					
Whiskered tern	3			1		
Noddies	9			3		
Black noddy	32		2	9		113
Brown noddy	18		1	4		
Kittiwakes	2	1			2	
Black-legged kittiwake	3					
Red-legged kittiwake	1					
Black skimmer	40	1		5		

Table 18. Continued (page 11 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Alcidae	**4**		**1**		**1**	**138**
Pigeon guillemot	1					
Common murre	1					
Horned puffin	1		1		1	138
Marbled murrelet	1					
Pigeons, doves	**25,603**	**754**	**879**	**3,617**	**34,913**	**33,656,048**
Pigeons, doves	80	8	10	18	1,719	80,046
Pigeons	33	1	2	11	7	165
Common wood-pigeon	12	1		1		
Band-tailed pigeon	46	14	3	8	233	477,266
Rock pigeon	4,770	326	343	1,210	18,278	17,631,139
Picazuro pigeon	1					
White-crowned pigeon	4	1				
Bare-eyed pigeon	2					
Scaly-naped pigeon	6	1	2		24	
Speckled pigeon	1					
Red-billed pigeon	1					
Doves	1,418	59	93	277	793	742,632
Eurasian collared dove	121	3	3	15	28	1,357
Mourning dove	17,908	322	392	1,990	13,420	14,226,376
Spotted dove	294	6	11	14	185	471,208
Zebra dove	556	5	17	51	87	22,791
Inca dove	16			1		
White-winged dove	200	6	1	16	107	3,068
Common ground dove	72		1			
Zenaida dove	34	1	1	1	32	
Ruddy ground dove	1					
Eared dove	4			1		
Philippine collared dove	17			2		
African collared dove	4			1		
Oriental turtle dove	2					
Parrots	**59**			**12**	**5**	**10,170**
Parrots	5			1		
Budgerigar	22			1		
Monk parakeet	5			1		
Olive-throated parakeet	1			1		

Table 18. Continued (page 12 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Brown-throated parakeet	1					
Lilac-crowned parrot	1			1		
Red-crowned amazon	2					
Rainbow lorikeet	1					
Parakeets	2					
Nanday parakeet	7			1	5	10,170
Red-masked parakeet	7			3		
Yellow-chevroned parakeet	1			1		
Rose-ringed parakeet	1					
Mitred parakeet	1					
Blue-crowned parakeet	2			2		
Cuckoos, roadrunners	**269**	**35**	**9**	**17**	**832**	**697,372**
Cuckoos	56	9	4	5	689	499,052
Yellow-billed cuckoo	183	24	5	11	125	198,320
Common cuckoo	1					
Black-billed cuckoo	21	1			19	
Dark-billed cuckoo	1	1				
Greater roadrunner	7			1		
Owls	**5,382**	**224**	**125**	**63**	**5,997**	**20,514,134**
Owls	420	35	25	9	1,500	681,932
American barn owl	2,374	70	39	28	891	4,286,228
Western barn owl	4	1				
Eastern barn owl	1					
Typical owls	1					
Snowy owl	394	33	20	2	1,024	3,544,190
Little owl	1					
Short-eared owl	1,058	19	18	11	430	2,350,665
Long-eared owl	27	4			25	70,000
Northern saw-whet owl	11	2			96	
Burrowing owl	533	6	6	10	1,455	1,302,095
Barred owl	65	1	1			221
Northern pygmy-owl	1					
Great gray owl	4	1				
Flammulated owl	7	1				
Eastern screech-owl	8	2			24	17,323
Western screech-owl	3					

Table 18. Continued (page 13 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Great horned owl	468	49	16	3	553	8,261,480
Northern hawk owl	2					
Nightjars	**1,737**	**10**	**8**	**66**	**178**	**1,801**
Nightjars	32				1	
Eastern whip-poor-will	21			2		
Common poorwill	26	1		1	1	
Lesser nighthawk	50		1	3	62	1,026
Chuck-will's-widow	26	1			1	513
Common nighthawk	1540	8	6	58	113	262
Common pauraque	22			2		
Nacunda nighthawk	3					
Antillean nighthawk	17		1			
Swifts	**2,424**	**35**	**25**	**150**	**1,460**	**291,557**
Swifts	29	2		3	1	377
Black swift	9			1		
Chimney swift	2,072	22	18	136	1,322	146,012
Common swift	36	2		2	2	18,870
Vaux's swift	98	1		2	26	500
Pallid swift	2					
White-throated swift	159	7	7	5	110	125,798
Alpine swift	1					
Little swift	1					
Antillean palm swift	16					
White-fronted Swift	1	1		1		
Hummingbirds	**196**		**1**	**5**	**24**	**43**
Hummingbirds	30					14
Ruby-throated hummingbird	91			2	1	
Rufous hummingbird	31		1	1	21	29
Anna's hummingbird	24			2	2	
Black-chinned hummingbird	8					
Allen's hummingbird	3					
Calliope hummingbird	3					
Broad-tailed hummingbird	1					
Costa's hummingbird	5					
Kingfishers	**22**	**1**				
Belted kingfisher	21	1				

Table 18. Continued (page 14 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Mariana kingfisher	1					
Blue-tailed bee-eater	**1**					
Woodpeckers	**560**	**37**	**9**	**22**	**996**	**542,591**
Woodpeckers	16	1	1		1	
Northern flicker	254	17	2	4	657	337,292
Yellow-bellied sapsucker	235	15	3	17	247	170,399
Hairy woodpecker	3					
Red-naped sapsucker	8	3	2		8	24,660
Downy woodpecker	17				1	
Red-bellied woodpecker	19			1	10	
Red-breasted sapsucker	4					
Red-headed woodpecker	1					
Ladder-backed woodpecker	1	1	1		72	10,240
Golden-fronted woodpecker	1					
Pileated woodpecker	1					
Unidentified passiformes	**1,912**	**52**	**28**	**130**	**318**	**336,533**
Old World flycatchers	**7**					
Spotted flycatcher	1					
Black redstart	1					
Rufous-tailed robin	2					
European robin	1					
Mugimaki flycatcher	1					
Bluethroat	1					
Tyrant flycatchers	**2,232**	**20**	**18**	**124**	**136**	**29,802**
Tyrant flycatchers	60			6	1	1,537
Eastern wood-pewee	102	1		5		
Gray kingbird	40	1		3		
Great crested flycatcher	67	3		3	73	633
Eastern kingbird	136	2	3	12	5	18,899
Scissor-tailed flycatcher	469	1	6	25	3	882
Acadian flycatcher	30			2		
Say's phoebe	40				1	
Western kingbird	668	4	7	43	8	4,306
Ash-throated flycatcher	19	1				
Great kiskadee	3			1		
Western wood-pewee	17					

Table 18. Continued (page 15 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Sulphur-bellied flycatcher	5	1		1	12	
Eastern phoebe	95	1		5	2	
Yellow-bellied flycatcher	56	1		3	1	1,468
Least flycatcher	74	2		3	2	
Hammond's flycatcher	42		1		1	
Western flycatcher	112			4	20	2,050
Gray flycatcher	6			1	1	27
White-crested elaenia	5	1				
Willow flycatcher	29			2	1	
Alder flycatcher	24			1		
Dusky flycatcher	9		1			
Couch's kingbird	3					
Thick-billed kingbird	2					
Olive-sided flycatcher	8			1	6	
Loggerhead kingbird	1					
Black phoebe	10					
Tropical kingbird	4					
Olivaceous elaenia	1					
Brown-crested flycatcher	4			1		
Alder/willow flycatcher	90	1		2		
Vermilion Flycatcher	1					
Larks	**10,098**	**50**	**116**	**1,439**	**1,156**	**1,499,276**
Larks	6			1		
Eurasian skylark	181		3	9	5	1,243
Horned lark	9,909	50	113	1,429	1,151	1,498,033
Hume's short-toed lark	1					
Black-crowned sparrow lark	1					
Swallows	**20,206**	**91**	**218**	**3,693**	**1,860**	**4,013,921**
Swallows	1,622	12	47	422	178	181,844
Purple martin	460	20	12	87	350	3,242,139
Bank swallow	962	3	9	313	85	16,194
Barn swallow	11,722	40	91	1,993	934	159,385
Western house-martin	2			1		
Cliff swallow	3,679	9	38	521	210	406,436
Tree swallow	1,386	1	17	316	70	7,539
Violet-green swallow	66	3	1	5	3	384

Table 18. Continued (page 16 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
N. rough-winged swallow	186	1	2	11	6	
Cave swallow	113	2	1	24	24	
Gray-breasted martin	3					
White-winged swallow	1					
Caribbean martin	1					
Blue-and-white swallow	3					
Black drongo	**30**		**1**	**5**		
Starlings, mynas	**7,147**	**175**	**253**	**2,100**	**5,523**	**10,568,411**
European starling	6,977	170	248	2,063	5,448	10,563,946
Mynas	2	1				
Common myna	168	4	5	37	75	4,465
Crows, ravens	**1,160**	**99**	**78**	**120**	**11,093**	**3,942,975**
Crows, ravens	9	2		1	50	
Crows	247	25	13	34	511	195,621
American crow	794	54	55	76	7,294	2,751,401
Carrion crow	3	1			35	6,695
Hooded crow	1	1	1			
Rook	2					
Fish crow	6					
Common raven	98	16	9	9	3,203	989,258
Jays, magpies	**118**	**4**	**2**	**8**	**3**	**1,588**
Blue jay	62	1		2	2	384
Canada jay	2					
Clark's nutcracker	1					
Magpies	1					
Yellow-billed magpie	9		1	3		
Black-billed magpie	43	3	1	3	1	1,204
Titmice, chickadees	**51**		**2**	**10**		
Tufted titmouse	4					
Chickadees	1					
Black-capped chickadee	31		1	6		
Mountain chickadee	8		1	2		
Gray-headed chickadee	1			1		
Carolina chickadee	4			1		
Bushtit	2					
Nuthatches, creepers	**30**			**1**	**30**	

Table 18. Continued (page 17 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Nuthatches	1			1		
White-breasted nuthatch	5					
Red-breasted nuthatch	13					
Brown creeper	10					
Pygmy nuthatch	1				30	
Leaf warblers	**3**					
Yellow-browed warbler	2					
Greenish warbler	1					
Red-vented bulbul	**8**			**2**		
Wrens	**428**	**6**	**5**	**31**	**379**	**46,415**
Wrens	80	1	3	11	2	
Marsh wren	72	1	1	3	36	42,164
Northern house wren	143	2		11	2	690
Carolina wren	20	1		1	1	
Rock wren	16			1		
Cactus wren	7					
Winter wren	43		1		2	
Bewick's wren	4					
Sedge wren	29	1		4	336	3,561
Pacific wren	14					
Mimics	**980**	**15**	**12**	**61**	**297**	**3,085,785**
Thrashers	3					
Brown thrasher	67	3	1	1	177	2,852,535
Sage thrasher	11					
Curve-billed thrasher	2					
Long-billed thrasher	12			4		
Pearly-eyed thrasher	1					
Northern mockingbird	233	3	3	13	1	
Tropical mockingbird	1					
Gray catbird	650	9	8	43	119	233,250
Thrushes	**5,224**	**310**	**71**	**374**	**6,933**	**10,303,313**
Thrushes	70	4		4	17	48,557
Western bluebird	24	1		2	21	1,559
Swainson's thrush	983	45	11	84	493	4,014,310
Redwing	2					
American robin	2,782	198	44	179	4,684	5,640,952

Table 18. Continued (page 18 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Song thrush	3			1		
Hermit thrush	644	17	5	47	838	104,103
Eastern bluebird	40			2		
Gray-cheeked thrush	114	4	1	9	9	330
Varied thrush	162	20	2	11	158	258,241
Wood thrush	140	9	5	11	76	150,786
Mountain bluebird	117	1	1	17	5	
Veery	134	9	2	7	633	84,475
Townsend's solitaire	5	2				
Bicknell's thrush	2					
White's thrush	1					
Dusky thrush	1					
Old World warblers	**130**	**1**	**2**	**6**	**4**	
Old World warblers	1			1		
Garden warbler	1					
Wrentit	1					
Blue-gray gnatcatcher	125	1	2	5	4	
Lesser whitethroat	1					
Lanceolated warbler	1					
Kinglets	**613**	**1**	**1**	**24**	**29**	**997**
Golden-crowned kinglet	142			4		
Ruby-crowned kinglet	471	1	1	20	29	997
Pipits	**580**	**2**	**7**	**85**	**158**	**3,395**
Meadow pipit	3	1			68	
American pipit	559	1	7	85	90	3,395
Sprague's pipit	15					
Olive-backed pipit	2					
Tree pipit	1					
Waxwings	**763**	**21**	**14**	**155**	**436**	**608,982**
Bohemian waxwing	3			2		
Cedar waxwing	760	21	14	153	436	608,982
Shrikes	**102**		**1**	**3**	**1**	
Northern shrike	3					
Loggerhead shrike	99		1	3	1	
Vireos	**821**	**16**	**8**	**39**	**136**	**56,420**
Vireos	7				1	513

Table 18. Continued (page 19 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
White-eyed vireo	30			2	3	14
Blue-headed vireo	58	3		2	5	
Yellow-throated vireo	12			2		
Warbling vireo	103	2		3	12	17,436
Red-eyed vireo	573	10	8	28	116	38,457
Cassin's vireo	10			1		
Philadelphia vireo	26	1		1		
Bell's vireo	1					
Gray vireo	1					
Japanese white-eye	**4**					
New World wood-warblers	**5,246**	**35**	**29**	**285**	**920**	**662,431**
New World wood-warblers	170	1	1	10	8	3,971
Canada warbler	42		1		2	140
Yellow-breasted chat	85	2	1	2	16	20,289
Pine warbler	63			2	4	308
Black-and-white warbler	153	3	2	8	2	106
Northern parula	134	1		5	40	4,352
Ovenbird	387	4	3	24	23	7,506
Wilson's warbler	254	2		7	5	7,799
Common yellowthroat	430	3	1	32	126	526,419
Yellow-rumped warbler	981	5	8	48	220	12,921
Blackpoll warbler	221	2	2	18	20	14,456
Mourning warbler	18					
American redstart	252	2	1	15	20	1,376
Orange-crowned warbler	146			5	5	26
Yellow warbler	232	2	2	12	188	779
Cape May warbler	84			4	1	
Hooded warbler	15	1				
Prairie warbler	34				1	
Northern waterthrush	118	2		7	64	9,818
Nashville warbler	127		1	7	35	10,260
Townsend's warbler	40			2		136
Louisiana waterthrush	5	1				
Palm warbler	259		2	8	41	15,829
Magnolia warbler	113		2	8	28	1,563
Black-throated blue warbler	112		1	7	6	362

Table 18. Continued (page 20 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Prothonotary warbler	9		1		4	302
MacGillivray's warbler	40					26
Yellow-throated warbler	66	1		6	2	
Black-throated gray warbler	13				2	
Black-throated green warbler	90			1	25	21,191
Hermit warbler	8					
Tennessee warbler	215	2		12	3	
Chestnut-sided warbler	81			9	1	1,339
Blackburnian warbler	66			10		
Bay-breasted warbler	126			12	30	1,157
Connecticut warbler	9			1		
Kentucky warbler	20			2	2	
Worm-eating warbler	14	1				
Blue-winged warbler	3					
Golden-winged warbler	2			1		
Lawrence's warbler	2					
Cerulean warbler	1					
Kirtland's warbler	2					
Swainson's warbler	3					
Virginia's warbler	1					
Meadowlarks	**9,207**	**87**	**109**	**712**	**1,140**	**2,141,840**
Meadowlarks	936	5	13	72	20	20,482
Eastern meadowlark	5,270	43	46	327	561	974,329
Western meadowlark	3,000	39	50	313	559	1,147,029
Chihuahuan meadowlark	1					
Blackbirds	**3,090**	**107**	**123**	**616**	**1,181**	**2,429,315**
Blackbirds	1,348	86	88	378	802	2,033,203
Red-winged blackbird	914	8	20	99	322	352,769
Yellow-headed blackbird	40	5	2	3	7	33,900
Brewer's blackbird	112	3	1	14	1	
Brown-headed cowbird	557	4	9	109	39	8,579
Bobolink	82	1	3	10	10	600
Rusty blackbird	34			2		264
Tricolored blackbird	3			1		
Orioles	**116**	**2**	**4**	**8**	**21**	**360**
Orioles	6					

Table 18. Continued (page 21 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Baltimore oriole	64	1	3	5	9	360
Orchard oriole	27	1		3	12	
Bullock's oriole	12		1			
Hooded oriole	7					
Grackles	**831**	**27**	**21**	**130**	**962**	**334,870**
Grackles	196	13	6	35	771	294,682
Common grackle	410	10	10	70	137	38,725
Boat-tailed grackle	110	1	2	12	32	
Great-tailed grackle	113	3	3	13	22	1,463
Greater Antillean grackle	2					
Neotropical tanagers	**24**			**3**	**1**	
Red-crested cardinal	8			1	1	
Morelet's seedeater	2					
Saffron finch	13			2		
Blue-black grassquit	1					
Finches, euphonias	**881**	**11**	**15**	**99**	**66**	**55,990**
Finches, euphonias	149	2	4	29	7	1,859
Common chaffinch	8			1		
Island canary	1					
Pine siskin	60	2	1	13	4	124
Redpoll	22		2	5	3	1,356
Purple finch	35			3		
Red crossbill	10	1	1	5		1,865
Evening grosbeak	5	1		1		
American goldfinch	208		4	8	6	200
House finch	323	2	2	25	22	1,721
White-winged crossbill	7	1	1	2	4	
Lesser goldfinch	15				1	
Cassin's finch	6	1		1	16	48,576
Pine grosbeak	1					
Gray-crowned rosy-finch	2			1		
Blue grosbeak	20	1		3	4	289
Eurasian siskin	1					
Yellow-fronted canary	5			2		
Lawrence's goldfinch	2					
European goldfinch	1					

Table 18. Continued (page 22 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Cardinalidae	**666**	**23**	**6**	**58**	**1,345**	**97,217**
Northern cardinal	19			1		
Rose-breasted grosbeak	87	3	1	11	6	1,107
Black-headed grosbeak	52	6		2	48	62,073
Dickcissel	65	1		8		1,515
Indigo bunting	129	2	2	15	1,122	1,105
Lazuli bunting	19					
Painted bunting	15			1		
Scarlet tanager	123	4		10	92	427
Western tanager	134	7	3	7	78	30,235
Summer tanager	22			2		755
Black-faced bunting	1			1		
New World sparrows	**10,629**	**125**	**175**	**1,281**	**2,066**	**1,759,308**
Sparrows	4,405	57	143	918	876	122,706
Harris's sparrow	9			1		
Swamp sparrow	277	3	1	12	255	6,646
Savannah sparrow	1,869	12	12	96	114	44,402
Fox sparrow	167	6	2	8	47	80,403
White-throated sparrow	815	11	2	66	107	101,769
Golden-crowned sparrow	25				5	
Field sparrow	97	1	1	7	1	
Lark sparrow	82	2	1	12		20,355
White-crowned sparrow	161	5	1	10	72	302,688
Grasshopper sparrow	209	4	2	8	20	44,490
Vesper sparrow	164	1		11	2	
Chipping sparrow	307	4	1	14	6	487
Lincoln's sparrow	273	3	2	12	54	22,183
Song sparrow	588	4	1	34	29	81,285
Bell's sparrow	7				1	
American tree sparrow	60			2	4	345
Nelson's sparrow	9			1	1	295
Black-throated sparrow	16		1	1	1	
Brewer's sparrow	69		3	5	1	
LeConte's sparrow	13					
Cassin's sparrow	10					
Clay-colored sparrow	35					

Table 18. Continued (page 23 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Baird's sparrow	8					
Olive sparrow	3					
Sagebrush sparrow	4			1		
Lark bunting	176	2	1	23	30	
Dark-eyed junco	580	5	1	30	88	17,760
White-/golden-crown sparrow	188	5		9	353	913,494
Seaside sparrow	3					
Towhees	**101**	**4**		**4**	**27**	**22,997**
Towhees	1					
Eastern towhee	58	2		3	27	22,997
Green-tailed towhee	25	2		1		
California towhee	3					
Spotted towhee	14					
Longspurs, snow buntings	**689**	**8**	**40**	**313**	**212**	
Longspurs, snow buntings	2			1		
Lapland longspur	183	2	7	43	36	
Chestnut-collared longspur	15					
Smith's longspur	10			2		
Thick-billed longspur	8			1		
Snow bunting	470	6	32	265	176	33,415
McKay's bunting	1		1	1		
Estrildid finches	**432**	**2**	**2**	**136**	**26**	**13,663**
Waxbills, mannikins	4					
Common waxbill	20		1	8		
African silverbill	8			2	1	400
Munias	119			11		
Scaly-breasted munia	165	1	1	69	22	9,167
Chestnut munia	97	1		37	3	4,096
Indian silverbill	5			4		
Java sparrow	2			1		
Bronze mannikin	1					
Red avadavat	11			4		
House sparrow	**672**	**6**	**8**	**66**	**160**	**57,891**

Table 18. Continued (page 24 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Total known birds	**192,853**	**12,681**	**8,061**	**25,087**	**616,048**	**958,563,659**
Total unknown birds	**136,096**	**9,131**	**6,569**	**11,337**	**268,480**	**216,981,191**
Unknown bird_unknown size	**37,387**	**1,629**	**1,713**	**1,502**	**26,808**	**10,767,753**
Unknown bird or bat	**421**	**13**	**18**	**11**	**820**	**2,461,941**
Unknown bird - large	**3,985**	**1,457**	**688**	**383**	**65,590**	**87,070,215**
Unknown bird - medium	**39,387**	**4,608**	**2,206**	**3,105**	**129,386**	**88,052,957**
Unknown bird - small	**54,916**	**1,424**	**1,944**	**6,336**	**45,876**	**28,628,325**
Total birds[5]	**328,949**	**21,812**	**14,630**	**36,424**	**884,528**	**1,175,544,850**
Flying mammals (bats)						
Bats (mega or micro)	**1**	**1**				**12,754**
Megabats (fruit bats)	**19**	**3**	**2**	**4**	**99**	**5,883,452**
Megabats (unk species)	11	2	1	4	99	5,883,452
Flying foxes	1					
Little red flying fox	1					
Indian flying fox	2	1	1			
Grey-headed flying fox	1					
Leschenault's rousette	1					
Peters's short-nosed fruit bat	1					
Pacific flying fox	1					
Microbats (echo locating)	**6,947**	**45**	**27**	**506**	**2,781**	**941,778**
Microbats	1,855	7	14	219	125	7,541
Vesper bats	389	5	1	13	40	4,853
Eastern red bat	918	6	2	37	2,219	27,927
Hoary bat	296	10		10	114	275,302
Eastern small-footed myotis	2					
Little brown bat	508			28	1	
Big brown bat	404		2	22	3	5,887
Silver-haired bat	180	1	1	8	23	2,634
Seminole bat	50		1	1	15	617
Tri-colored bat	49					

Table 18. Continued (page 22 of 27)

Northern yellow bat	28			5		
Evening bat	142	2		7		
Indiana bat	8			1		
Yuma myotis	3					

Table 18. Continued (page 25 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Long-eared myotis	2					
Western yellow bat	2					
Common pipistrelle	2					
Long-legged myotis	3					
Western small-footed myotis	4			1		
Kuhl's pipistrelle	1					
Western red bat	1					
Western pipistrelle	5				2	
Indian pipistrelle	5					
African yellow bat	1					
Kelaart's pipistrelle	1					
Spotted bat	2					
California myotis	3					
Gray bat	26			2		
Cape serotine	3					
Southeastern myotis	2					
Fringed myotis	1					
Free-tailed bats	210			5	14	782
Brazilian free-tailed bat	1787	11	5	143	193	29,540
Pocketed free-tailed bat	4					
Big free-tailed bat	5		1	1		
Western mastiff bat	7	2			24	452,295
Florida bonneted bat	2					
Pallas's mastiff bat	10			1	1	
Egyptian free-tailed bat	4					
Black mastiff bat	1	1			8	134,400
Angolan free-tailed bat	1			1		
Broad-eared bat	2					
Sinaloan mastiff bat	1					
Wagner's bonneted bat	2					
Hispaniolan mastiff bat	1					
Alvarez’s mastiff bat	1					
Gray sac-winged bat	2					
Naked-rumped tomb bat	1					
Mauritian tomb bat	1					
Jamaican fruit bat	3			1		

Table 18. Continued (page 26 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Antillean fruit-eating bat	1					
Cuban flower bat	1					
Brown flower bat	1					
Pallas's long-tongued bat	1					
Lesser bulldog bat	1					
Sooty mustached bat	1					
Total Megabats	**19**	**3**	**2**	**4**	**99**	**5,883,452**
Total Microbats	**6,947**	**45**	**27**	**506**	**2,781**	**941,778**
Unknown bats	**1**	**1**				**12,754**
Total bats[6]	**6,967**	**49**	**29**	**510**	**2,880**	**6,837,984**
Terrestrial mammals						
Virginia opossum	**534**	**1**	**2**	**14**		
Nine-banded armadillo	**68**	**1**	**5**		**11**	**1,699**
Lagomorphs (rabbits, hares)	**1,332**	**14**	**13**	**13**	**60**	**520,723**
Lagomorphs	16	2				
Hares	10		1		1	
Black-tailed jackrabbit	589	8	4	4	51	48,269
White-tailed jackrabbit	275	1	2	3	1	348,200
Antelope jackrabbit	2					
Snowshoe hare	2					
Rabbits	80		2	2	1	
Eastern cottontail	240	3	4	2	6	124,254
Desert cottontail	115			2		
Mountain cottontail	1					
Brush rabbit	1					
Marsh rabbit	1					
Rodents	**498**	**3**	**17**	**7**	**7**	**9,615**
North American beaver	4					
Prairie dogs, marmots	2					
Black-tailed prairie dog	104		2	2		
White-tailed prairie dog	6					
Gunnison's prairie dog	21		1	4		
Woodchuck	220	3	12		6	9,615
Yellow-bellied marmot	6					
Tree squirrels	4					

Table 18. Continued (page 27 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Fox squirrel	1					
American red squirrel	1					
Eastern gray squirrel	3					
Ground squirrels	9					
Piute ground squirrel	1					
California ground squirrel	14					
13-lined ground squirrel	2					
Richardson's g. squirrel	12			1		
New world rats	2					
Muskrat	53					
North American porcupine	29		2		1	
Coypu (nutria)	3					
Botta's pocket gopher	1					
Carnivores	**2,677**	**113**	**327**	**32**	**20,017**	**6,560,411**
Canids	6	2	2			
Coyote	987	74	233	10	14,559	5,141,401
Domestic/feral dog	59	16	31	1	559	520,259
Foxes	44	3	8		11	1,399
Red fox	322	6	33	1	364	79,176
Common gray fox	25	2	2		5	698
Kit fox	4					
Raccoon	207	5	8	9	4,396	76,650
White-nosed coati	1					
Skunks	12					
Striped skunk	917	2	5	11	3	
River otter	2	1				
American badger	8					
American mink	7					
Long-tailed weasel	2					
Least weasel	2					
Domestic/feral cat	53		3			
Bobcat	1	1				
Small Indian mongoose	13					
American black bear	3		1			
Brown bear	1	1			120	740,828
Bearded seal	1		1			

Table 18. Continued (page 28 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Artiodactyls	**1,553**	**1,273**	**652**	**116**	**330,878**	**82,929,860**
Deer	17	14	8		1,488	185,632
White-tailed deer	1,381	1,130	570	102	277,132	69,039,369
Mule deer	93	79	40	4	22,297	2,513,480
Axis deer	1		1			
Wapiti (elk)	12	12	6	2	11,660	9,924,372
Moose	6	5	5			
Caribou	3	2	2			
Cattle	12	12	8	4	9,215	656,221
Domestic sheep	1	1	1			
Pronghorn	10	9	6	2	5,298	391,013
Swine (pigs)	10	7	4	1	3,788	219,773
Peccaries	1					
Collared peccary	6	2	1	1		
Perissodactyls (horse)	**5**	**4**	**4**	**1**	**1,008**	**47,746**
Total known t. mammals	**6,667**	**1,409**	**1,020**	**183**	**351,981**	**90,070,054**
Total unknown t. mammal	**46**	**12**	**11**	**1**		
Total t. mammals[7]	**6,713**	**1,421**	**1,031**	**184**	**351,981**	**90,070,054**
Reptiles						
Reptiles (unknown type)	**1**					
Turtles	**557**	**1**	**6**	**9**	**1**	
Turtles (unknown species)	168		3			
Florida softshell turtle	17	1		1		
Common box turtle	41					
Common snapping turtle	72		2		1	
Diamondback terrapin	95			8		
Painted turtle	68					
Florida red-bellied cooter	3					
Gopher tortoise	59		1			
Alligator snapping turtle	4					
Coastal plain cooter	4					
Pond slider	14					
Eastern mud turtle	2					
Chicken turtle	1					
Striped mud turtle	3					

Table 18. Continued (page 29 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Ornate box turtle	2					
Spiny softshell turtle	2					
River cooter	1					
Northern map turtle	1					
Alligators, caimans	**37**	**2**	**3**		**3**	
American alligator	36	2	3		3	
Spectacled caiman	1					
Green iguana	63		6			
Snakes	**269**		**1**			
Snakes	42		1			
Gopher snake	138					
Northern water snake	4					
E. diamondback rattlesnake	2					
Water moccasin	2					
Eastern pine snake	1					
W. diamondback rattlesnake	5					
Prairie rattlesnake	3					
Western rat snake	6					
Plains garter snake	9					
Common kingsnake	5					
Western hognose snake	1					
Diamondback water snake	2					
Corn snake	3					
Eastern hognose snake	1					
California kingsnake	2					
Eastern rat snake	9					
Checkered garter snake	2					
Common garter snake	14					
Texas blind snake	1					
Lined snake	8					
Milk snake	2					
Western ribbon snake	2					
Mohave rattlesnake	1					
Western fox snake	1					
Eastern racer	1					
DeKay's brown snake	2					

Table 18. Continued (page 30 of 31)

Wildlife group or species[2]	36-year totals (1990-2025)					
	Number of reported strikes				Reported economic losses[4]	
	Total	With dam-age	With NEOF	With multiple animals[3]	Aircraft down time (hrs.)	Reported costs ($)
Total known reptiles	**926**	**3**	**16**	**9**	**4**	
Total unknown reptiles	**1**					
Total reptiles[8]	**927**	**3**	**16**	**9**	**4**	
Total known (all species)	**207,412**	**14,141**	**9,126**	**25,789**	**970,913**	**1,055,458,943**
Total (unknown species)	**136,144**	**9,144**	**6,580**	**11,338**	**268,480**	**216,993,945**
Grand total	**343,556**	**23,285**	**15,706**	**37,127**	**1,239,393**	**1,272,452,888[9]**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] The scientific (taxonomic) name and the mean and maximum (when available) body mass for each species are listed in Appendix D.

[3] More than 1 animal was struck by the aircraft.

Table 18. Continued (page 27 of 27)

[4] These reported economic losses by species and species groups should be considered as relative indices of losses and not as actual estimated losses. For commercial aviation, an estimated 20% of strikes were reported in the 1990s. More recent analyses estimated that strike reporting for all civil aircraft combined (commercial and general aviation) at Part 139 airports had improved to 39% in 2004-2008 and to 47% in 2009-2013 (Dolbeer 2015). Strike reporting for commercial aircraft only at Part 139 airports was an estimated 79% in 2004-2008 and 91% in 2009-2013; reporting of strikes with damage was estimated at 78% and 93% for these respective time periods. In addition, only about 60% of reported strikes identified the wildlife species (52%) or species group (9%) responsible, 1990-2025. Furthermore, of the 21,812 reports indicating damage to the aircraft, only 25% (5,395) also provided an estimate of repair costs, and only 40% (16,116) of the 40,647 strikes indicating an adverse effect estimated the downtime (see Tables 23, 24). Finally, even when cost estimates were provided, some reports were filed before aircraft damage had been fully assessed. See Tables 23 and 24 for a more detailed projection of actual economic losses.

[5] Of the 328,949 reported bird strikes, 165,430 (50%) identified the bird to exact species (a total of 665 species of birds of which 349 caused damage) and an additional 27,422 strikes (8%) identified the bird at least to species group (e.g., gull, hawk, duck). Exact species identification has improved from less than 20% in the early 1990s to 55% in 2025 (Figure 7).

Table 18. Continued (page 31 of 31)

[6] Of the 6,967 reported bat strikes, 4,500 (65%) identified the bat to exact species (59 species total of which 8 caused damage) and 2,466 (35%) identified the bat to species group (12 megabats [old world fruit bats] and 2,454 microbats [echo-locating bats]) of which 1,855 were microbats of unknown species, 210 were free-tailed bats (Molossidae) and 389 were vesper bats (Vespertilionidae). One foreign bat strike was classified as unknown bat (either megabat or microbat).

[7] Of the 6,713 reported terrestrial mammal strikes, 6,463 (96%) identified the mammal to exact species (a total of 58 species of which 26 caused damage), 204 (3 %) identified the mammal at least to species group, and 46 (<1%) were unknown species group.

[8] Of the 927 reported reptile strikes, 926 were identified at least to species group and 716 (77%) were identified to exact species (46 species total of which 2 caused damage).

[9] Reported costs of $1,272,452,888 include $1,108,013,287 in direct repair costs and $164,439,601 in other costs.

Table 19. Number of reported strikes, strikes with damage, and strikes involving multiple animals for the five most struck bird groups and three most struck terrestrial mammal groups, civil aircraft, U.S.[1], 1990-2025.

Species group[2]	Reported strikes		Strikes with damage		Strikes with >1 animal	
	36-year total	% of total known	36-year total	% of total known	36-year total	% of total known
Birds						
Pigeons, doves	25,603	13	754	6	3,617	14
Raptors[3]	23,067	12	2,736	22	821	3
Shorebirds	17,761	9	305	2	2,099	8
Gulls	15,884	8	1,800	14	2,772	11
Waterfowl	8,156	4	2,974	23	2,565	10
All other known	102,382	53	4,112	32	13,213	53
Total known	**192,853**	**100**	**12,681**	**100**	**25,087**	**100**
Total unknown	**136,096**		**9,131**		**11,337**	
Total birds	**328,949**		**21,812**		**36,424**	
Terrestrial mammals						
Carnivores	2,677	40	113	8	32	17
Artiodactyls	1,553	23	1,273	90	116	63
Lagomorphs	1,332	20	14	1	13	7
All other known	1,105	17	9	1	22	12
Total known	**6,667**	**100**	**1,409**	**100**	**183**	**100**
Total unknown	**46**		**12**		**1**	
Total Terr. Mammals	**6,713**		**1,421**		**184**	

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] See Table 18 for listing of species within each species group and Table 20 for the most frequently struck species.

[3] Hawks, eagles, vultures, falcons, and caracaras.

Table 20. The 33 species of birds identified most frequently as struck by civil aircraft in U.S., 1990-2025 and 2025 only. See Figure 14 for relation between mean body mass and percent of strikes causing damage for these 33 species in 2025.

	Strikes (1990-2025)[1]				Strikes (2025 only)[1]		
Rank	Bird species	Num-ber	% with damage		Bird species	Num-ber	% with damage
1	Mourning dove	17,908	48.8		Mourning dove	1,534	1.6
2	Barn swallow	11,722	5.3		Barn swallow	884	0.2
3	Killdeer	11,434	8.9		Killdeer	771	0.4
4	American kestrel	10,480	9.1		Horned lark	701	0.4
5	Horned lark	9,909	12.5		American kestrel	689	0.7
6	European starling	6,976	46.6		Eastern meadowlark	486	0.6
7	Eastern meadowlark	5,270	4.5		Cliff swallow	355	0.3
8	Rock pigeon	4,770	24.7		European starling	354	1.4
9	Red-tailed hawk	4,518	9.6		Rock pigeon	244	4.5
10	Cliff swallow	3,679	0.0		American robin	231	3.9
11	Western meadowlark	3,000	7.1		Chimney swift	222	0.5
12	American robin	2,782	12.7		Western meadowlark	212	2.4
13	Ring-billed gull	2,489	8.3		Red-tailed hawk	210	12.4
14	American barn owl	2,374	3.5		Swainson's thrush	155	3.9
15	Canada goose	2,301	6.6		Savannah sparrow	149	0.0
16	Herring gull	2,241	4.8		Common nighthawk	143	0.0
17	Chimney swift	2,072	0.0		Western cattle egret	140	4.3
18	Savannah sparrow	1,869	0.0		White-throated sparrow	130	1.5
19	Pacific golden-plover	1,655	0.0		Yellow-rumped warbler	128	0.8
20	Mallard	1,544	7.6		American barn owl	127	4.7
21	Common nighthawk	1,540	0.0		Hermit thrush	100	2.0
22	Tree swallow	1,386	0.0		Red-eyed vireo	95	1.1
23	Laughing gull	1,350	2.8		Ring-billed gull	94	1.1
24	Turkey vulture	1,336	7.7		Gray catbird	87	1.1
25	Western cattle egret	1,136	2.4		Cedar waxwing	87	4.6
26	Short-eared owl	1,058	1.6		Turkey vulture	86	40.7
27	Swainson's thrush	983	6.7		Short-eared owl	83	1.2
28	Yellow-rumped warbler	981	0.0		Canada goose	76	40.8
29	Bank swallow	962	0.0		Dark-eyed junco	76	1.3
30	Red-winged blackbird	914	0.0		Herring gull	72	12.5
31	White-throated sparrow	815	4.2		Mallard	71	18.3
32	American crow	794	2.4		Pacific golden-plover	69	2.9
33	Cedar waxwing	760	3.0		American pipit	69	0.0

[1] Actual number struck was higher for each species because only 50% and 55% of the bird strike reports from 1990-2025 and in 2025, respectively, identified the bird to species (an additional 8% and 4% of the reports, respectively, identified the bird to species group). As examples, the species of gull was not identified in 7,674 (48%) of 15,884 gull strikes reported from 1990-2025, and the species of vulture (turkey or black) was not identified in 433 (20%) of the 2,195 new-world vulture strikes (Table 18).

Table 21. Number of strikes to civil aircraft causing human fatality and number of fatalities by wildlife species, U.S.[1], 1990-2025.[2]

Species group	Number of strikes	Human fatalities
Birds	**24**	**51**
Raptors[3]	4	10
Pelicans[4]	3	9
Waterfowl[5]	5	16
Misc. birds[6]	2	3
Unknown bird	10	13
Terrestrial mammals	**1**	**1**
White-tailed deer	1	1
Total	**25**	**52**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] In addition, there were 300 strikes in which 384 humans received injuries (e.g., facial lacerations). Waterfowl (69 strikes, 80 injuries), vultures (43, 53), and deer (27, 38) were responsible for 171 (54%) of the injuries with identified species or species groups.

[3] Black vulture (1, 1); turkey vulture (2, 3); bald eagle (1, 4); red-tailed hawk (1, 8).

[4] American white pelican (2, 8); brown pelican (1, 1).

[5] Green-winged teal (1, 2); snow goose (1, 3); Canada goose (1, 2), Cackling goose (1,3).

[6] Rock pigeon (1,2); unidentified gull (1, 1).

Table 22. Number of civil aircraft lost (destroyed or damaged beyond repair) after striking wildlife by wildlife species group and aircraft mass category, U.S.[1], 1990-2025. See Figure 15 for number of lost aircraft by year, 1990-2025.

	Aircraft[2] mass category (Maximum take-off mass in kilograms)				Total aircraft lost	% of total
Wildlife species group	≤2,250	2,251-5,700	5,701-27,000	>27,000		
Birds	37	11	4	2	54	61
Terrestrial mammals	22	7	6	0	35	39
Total[3]	**59**	**18**	**10**	**2**	**89**	**100**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Fixed-wing aircraft = 77; Helicopters = 11; Drone = 1. Aircraft operators were business (48), private (34), commercial transport (5), government (2): 26 occurred en route.

[3] Fifty-one (57%) of the 89 wildlife strikes resulting in a destroyed aircraft occurred at U.S. general aviation airports; 25 (28%) occurred en-route.

Table 23. Number of reported wildlife strikes indicating damage, a negative effect-on-flight (NEOF), aircraft downtime, repair costs, and other costs; and the mean losses per report in hours of downtime and inflation-adjusted U.S. dollars, civil aircraft, U.S.[1], 1990-2025.

	Number of reports indicating:						Mean losses per report[2]		
Year	Damage	NEOF	Aircraft down time	Repair costs	Other costs		Down-time (hours)	Repair costs ($)	Other costs ($)
1990	373	144	60	33	16		56.4	283,314	81,329
1991	400	177	61	49	25		79.8	96,093	51,799
1992	364	207	82	51	28		110.6	137,492	6,918
1993	399	229	67	57	19		277.9	116,775	12,326
1994	459	255	103	73	29		388.4	100,563	120,088
1995	499	292	96	62	33		95.8	661,679	288,861
1996	503	336	143	86	39		138.2	110,861	33,175
1997	575	361	182	126	47		230.7	99,958	52,323
1998	587	385	204	134	53		120.0	265,283	38,133
1999	705	405	282	179	79		148.8	144,939	27,456
2000	765	444	351	206	94		193.1	128,259	148,480
2001	649	411	294	157	65		143.5	372,772	51,131
2002	670	437	383	165	63		135.6	199,008	84,085
2003	630	409	352	171	81		107.1	210,893	56,022
2004	631	395	325	213	92		166.4	137,904	29,769
2005	609	382	327	227	125		88.0	350,442	100,955
2006	603	372	334	172	102		116.5	281,171	17,485
2007	568	395	364	178	135		165.2	226,130	43,533
2008	527	346	371	156	141		116.2	154,589	18,363
2009	608	464	561	194	192		73.9	493,194	19,074
2010	604	413	526	174	165		66.5	170,544	18,019
2011	547	442	526	180	208		70.8	313,184	19,832
2012	627	447	689	228	263		75.4	144,459	11,081
2013	616	455	802	238	304		75.7	85,716	16,353
2014	592	504	718	210	278		61.5	182,981	13,936
2015	624	496	705	208	293		50.0	199,201	25,503
2016	599	496	578	151	221		63.7	89,534	16,138
2017	681	543	628	189	264		35.7	234,794	16,253
2018	725	590	637	168	298		53.1	77,644	10,215
2019	765	598	711	160	249		28.7	136,850	26,147
2020	493	449	482	113	189		37.9	129,714	10,075
2021	667	452	617	147	224		60.1	287,109	19,042
2022	702	601	640	116	177		40.9	199,411	97,336
2023	721	728	861	141	271		37.0	229,119	31,048
2024	823	777	976	149	299		35.3	217,847	12,551
2025	902	869	1078	134	346		31.4	151,369	13,771
Total	**21,812**	**15,706**	**16,116**	**5,395**	**5,507**		**1,238,907**	**1,108,013,287**	**164,439,601**
Mean	**606**	**436**	**448**	**150**	**153**		**76.9**	**205,378**	**29,860**

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Total downtime and $ losses reported for 1990-2025.

Table 24. Projected annual losses in aircraft downtime (hours) and in repair and other costs (inflation-adjusted U.S. dollars) from wildlife strikes with civil aircraft, U.S.[1], 1990-2025. Losses are projected from mean reported losses per incident (Table 23). (page 1 of 2).

Year	No. of adverse incidents[4]		Projected losses[2, 3]			
			Down-time (hours)	Repair costs (x $1 million)	Other costs (x $1 million)	Total costs (x $1 million)[5]
1990	430		24,231	122	35	157
1991	482		38,441	46	25	71
1992	486		53,742	67	3	70
1993	506		140,623	59	6	65
1994	576		223,740	58	69	127
1995	652		62,432	431	188	620
1996	681		94,128	76	23	98
1997	775		178,761	77	41	118
1998	803		96,336	213	31	244
1999	963		143,268	140	26	166
2000	1,102		212,764	141	164	305
2001	977		140,196	364	50	414
2002	1,080		146,451	215	91	306
2003	983		105,309	207	55	262
2004	944		157,041	130	28	158
2005	952		83,785	334	96	430
2006	928		108,072	261	16	277
2007	955		157,806	216	42	258
2008	886		102,919	137	16	153
2009	1,172		86,655	578	22	600
2010	1,116		74,210	190	20	210
2011	1,135		80,328	355	23	378
2012	1,317		99,360	190	15	205
2013	1,432		108,414	123	23	146
2014	1,442		88,654	264	20	284
2015	1,447		72,349	288	37	325
2016	1,317		83,923	118	21	139
2017	1,441		51,417	338	23	362
2018	1,583		84,038	123	16	139
2019	1,655		47,518	226	43	270
2020	1,120		42,502	145	11	157
2021	1,404		84,434	403	27	430
2022	1,569		64,230	313	153	466
2023	1,867		69,127	428	58	486
2024	2,102		74,129	458	26	484
2025	2,367		74,372	358	33	391
Total	**40,647**		**3,555,705**	**8,194**	**1,577**	**9,771**
Mean	**1,129**		**98,770**	**228**	**44**	**272**

Table 24. Continued (page 2 of 2)

[1] Includes strikes to U.S.-registered aircraft in foreign countries.

[2] Values assume that all 40,647 reported strikes (mean = 1,129/year) indicating an adverse effect (see footnote 3) incurred similar amounts of damage and/or downtime and that these reports are all the adverse-effect strikes that occurred, 1990-2025.

[3] Strike reporting for commercial transport aircraft at Part 139 airports was an estimated 91% in 2009-2013; reporting of strikes with damage was estimated at 93% (Dolbeer 2015). Strike reporting for aircraft at General Aviation airports is lower (Dolbeer et al. 2008).

[4] Number of reports indicating one or more of the following: damage, negative effect on flight (NEOF), downtime, repair costs, other costs.

[5] Altringer et al. (2022) estimated that damaging wildlife strike events generate additional "spillover" costs of around $25 million (2020 US$) each year related to delays in subsequent flights.

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Figures

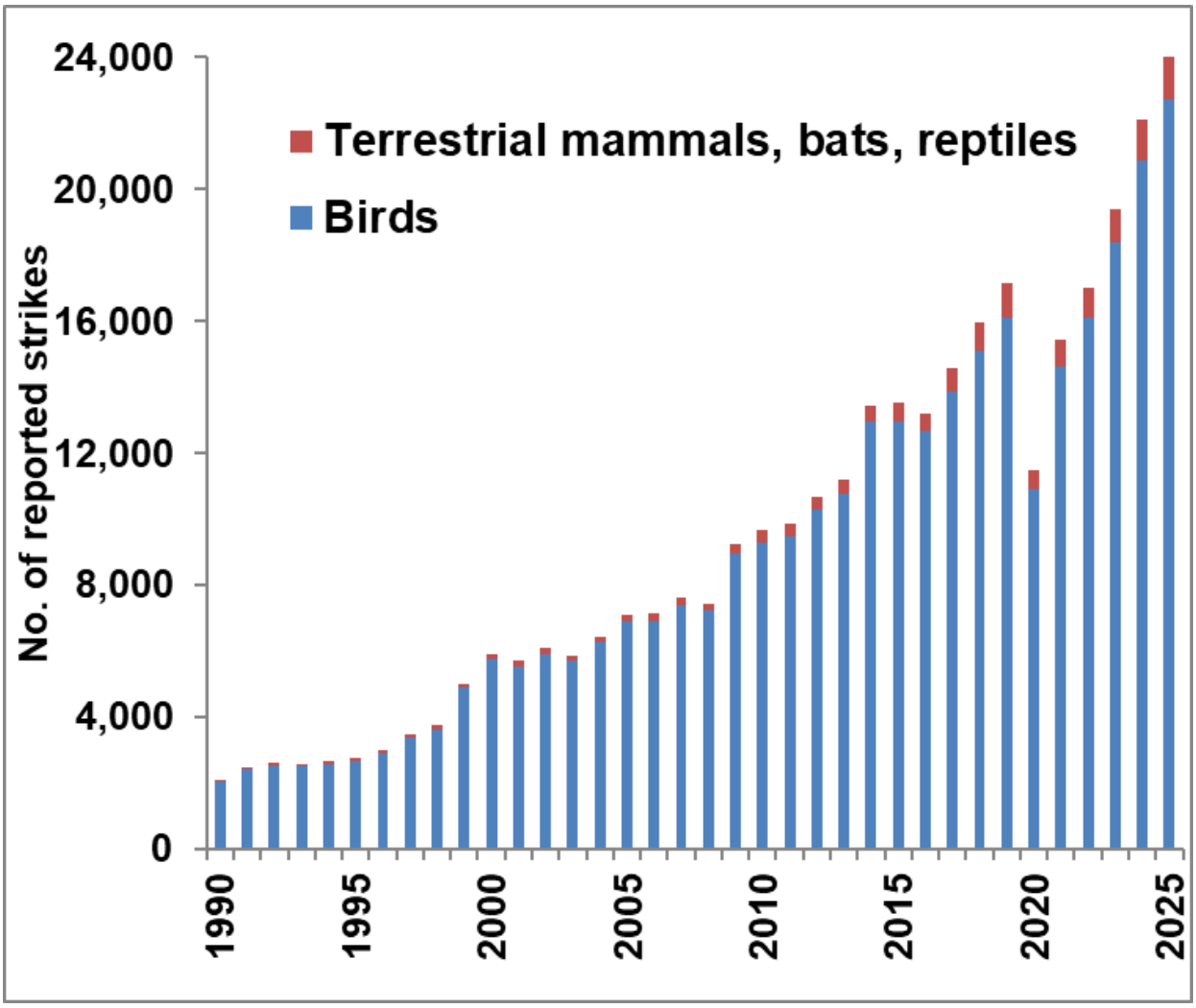
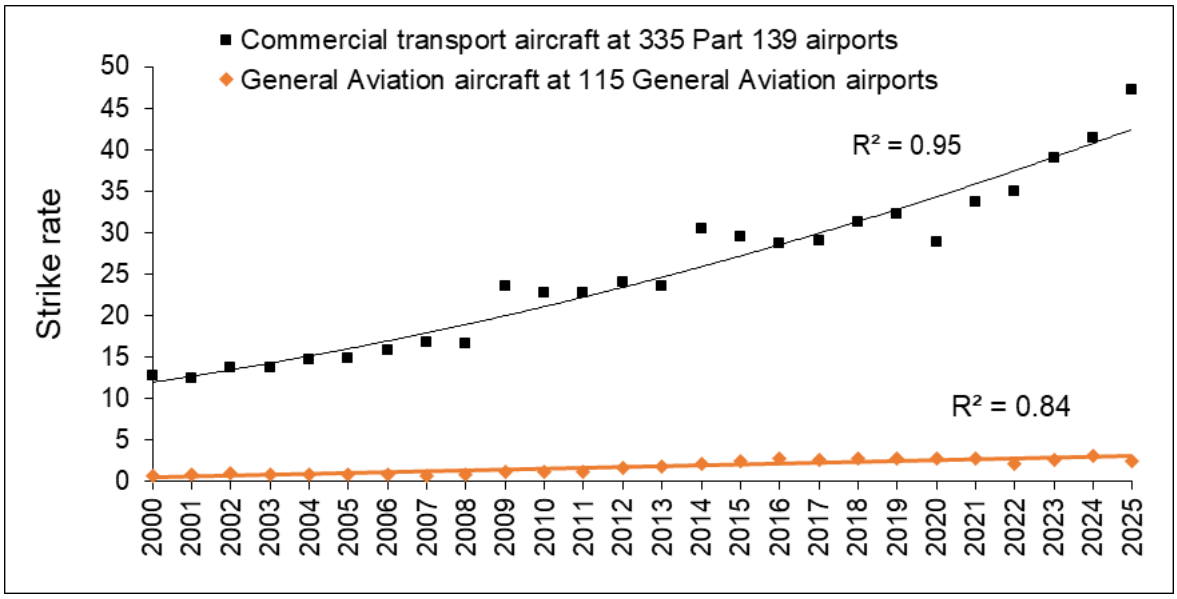


Figure 1. Number of reported wildlife strikes with civil aircraft, U.S., 1990-2025. The 337,882 strikes involved birds (323,355), terrestrial mammals (6,702), bats (6,898), and reptiles (927). An additional 5,674 strikes were reported for U.S.-registered aircraft in foreign countries for a total of 343,556 strikes (see Tables 1, 2, and 18).



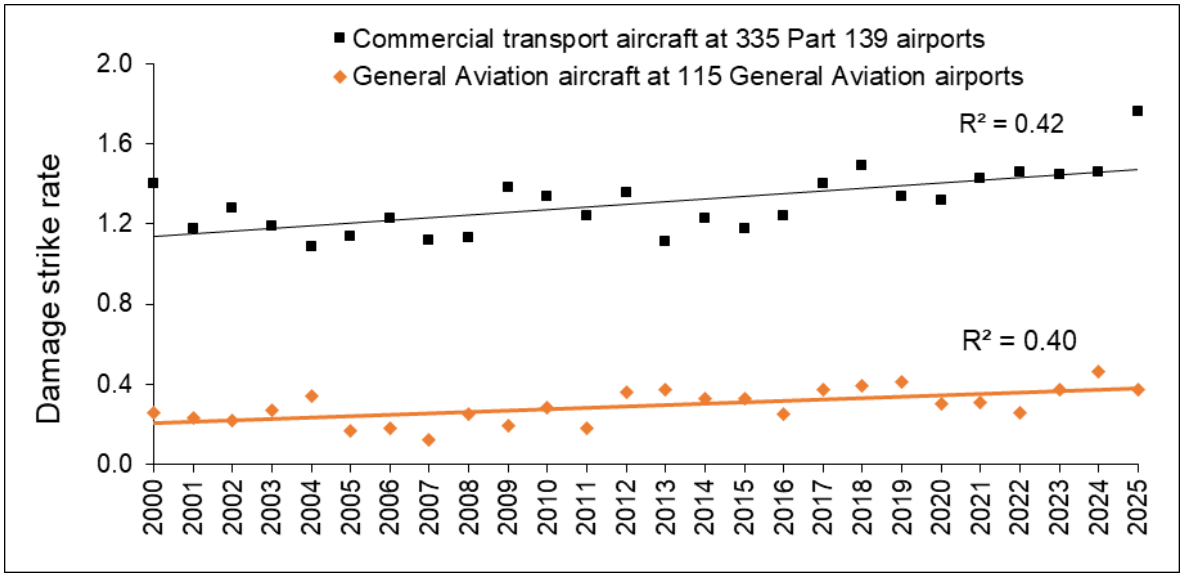
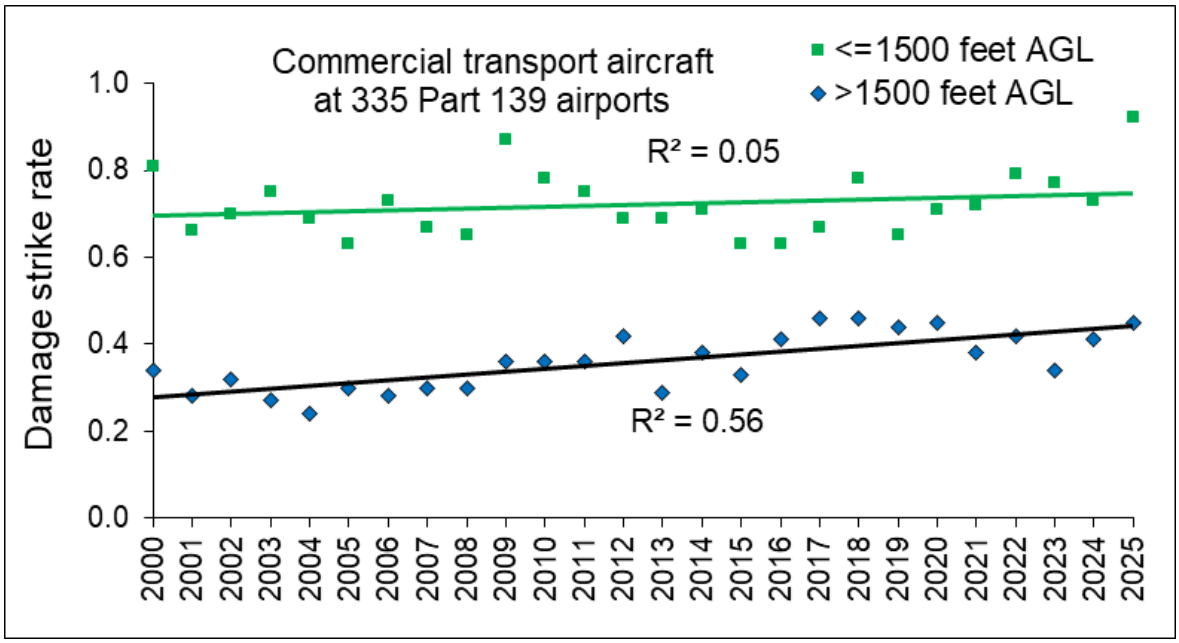


Figure 2. The strike rate and damage strike rate (number of reported strikes and damage strikes per 100,000 aircraft movements) for commercial (air carrier and air taxi service) transport aircraft at 335 Part 139-certificated airports and general aviation aircraft at 115 general aviation airports, U.S., 2000-2025. Strikes involving U.S.-registered aircraft in foreign countries are excluded. R^2 values greater than 0.15 and 0.24 indicate significant trends at the 0.05 and 0.01 levels of probability, respectively (Steele and Torrie 1960; see Tables 3 and 4 for complete data).



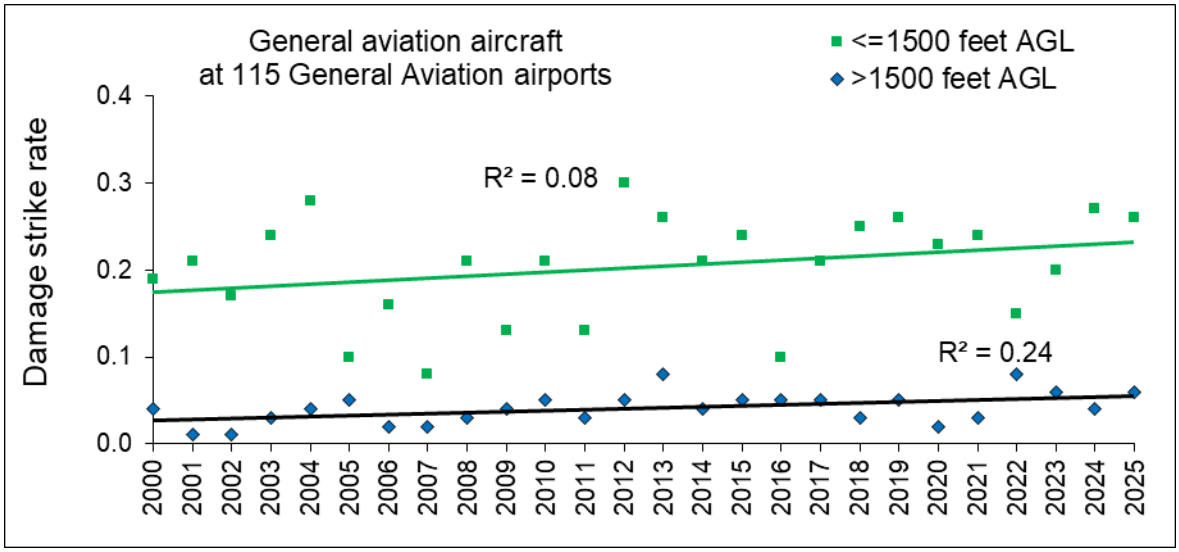


Figure 3. The damage strike rate (number of reported damaging strikes per 100,000 aircraft movements) with commercial transport aircraft at 335 Part 139-certificated airports (top graph) and general aviation aircraft at 115 general aviation airports (bottom graph) occurring at ≤ and >1,500 feet AGL(AGL) for all wildlife species, U.S., 2000-2025. Strikes with unknown height AGL and strikes involving U.S.-registered aircraft in foreign countries are excluded. R^2 values greater than 0.15 and 0.24 indicate significant trends at the 0.05 and 0.01 levels of probability, respectively (Steele and Torrie 1960).

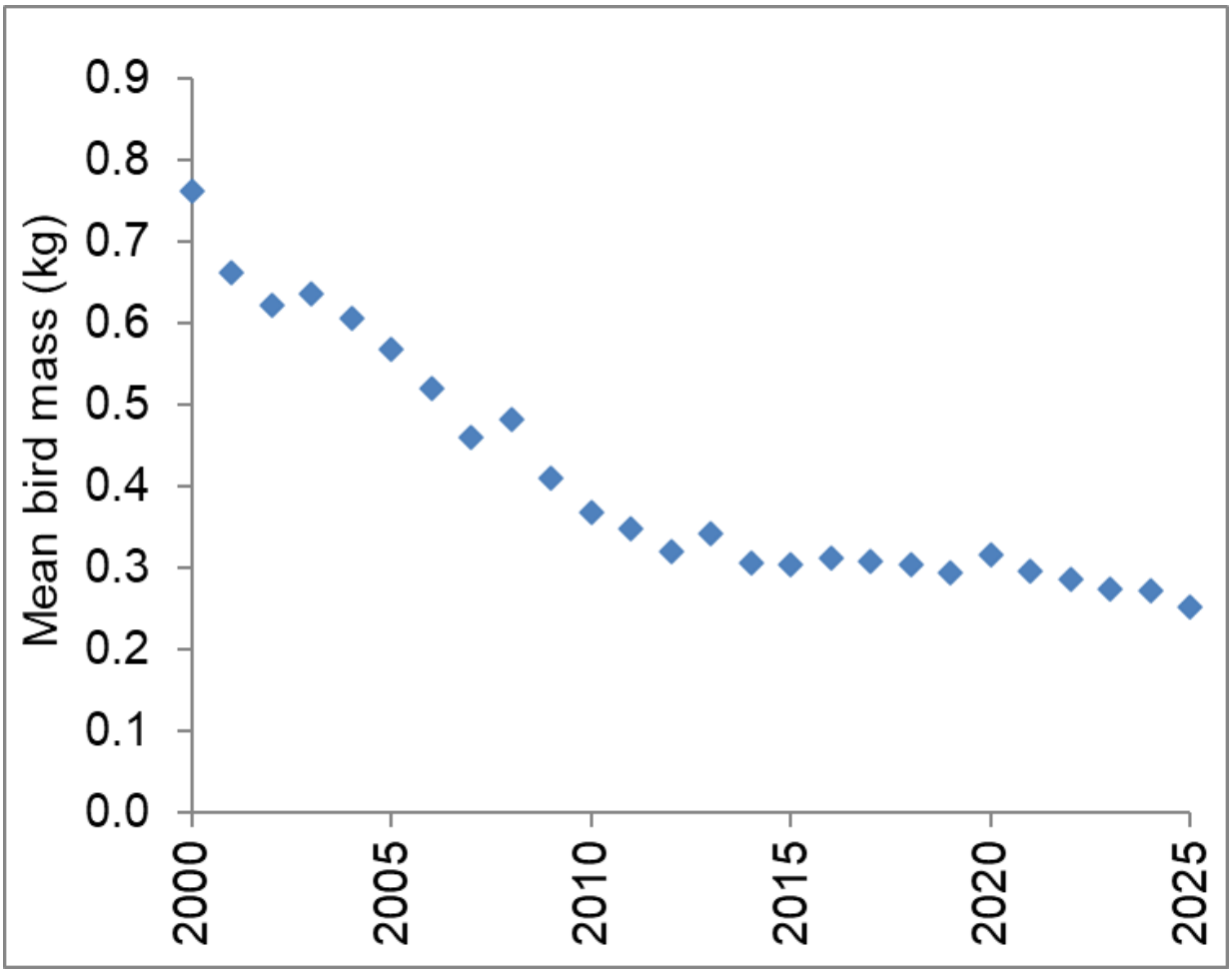


Figure 4. The mean body mass of birds reported as struck by civil aircraft in U.S. has declined by 67% from 2000 (0.76 kg) to 2025 (0.25 kg). This trend indicates that airports, pilots, and commercial transport aviation in general, are doing a better job of documenting all wildlife that are struck, many of which are small species that rarely cause damage. Means were calculated from all strikes in U.S. in which the bird was identified to species level. See Figure 13 for number of identified bird species struck each year and Table 18 and Appendix D for numbers struck and mean biomass by species.

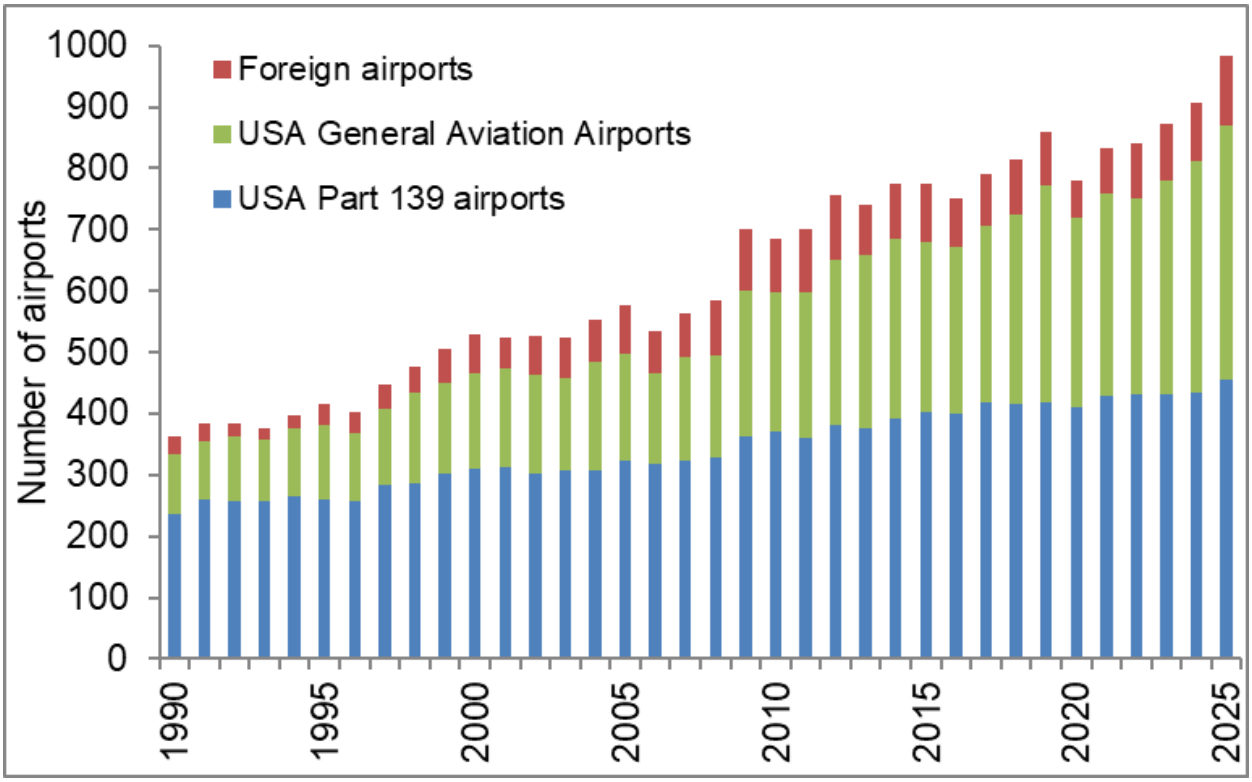


Figure 5. Number of Part 139-certificated airports and general aviation (GA) airports in U.S. with reported wildlife strikes and number of foreign airports at which strikes were reported for U.S.-registered civil aircraft, 1990-2025. Strikes were reported from 2,417 U.S. airports (513 Part 139-certificated, 1,904 GA) and 351 foreign airports in 113 countries, 1990-2025 (Table 8).

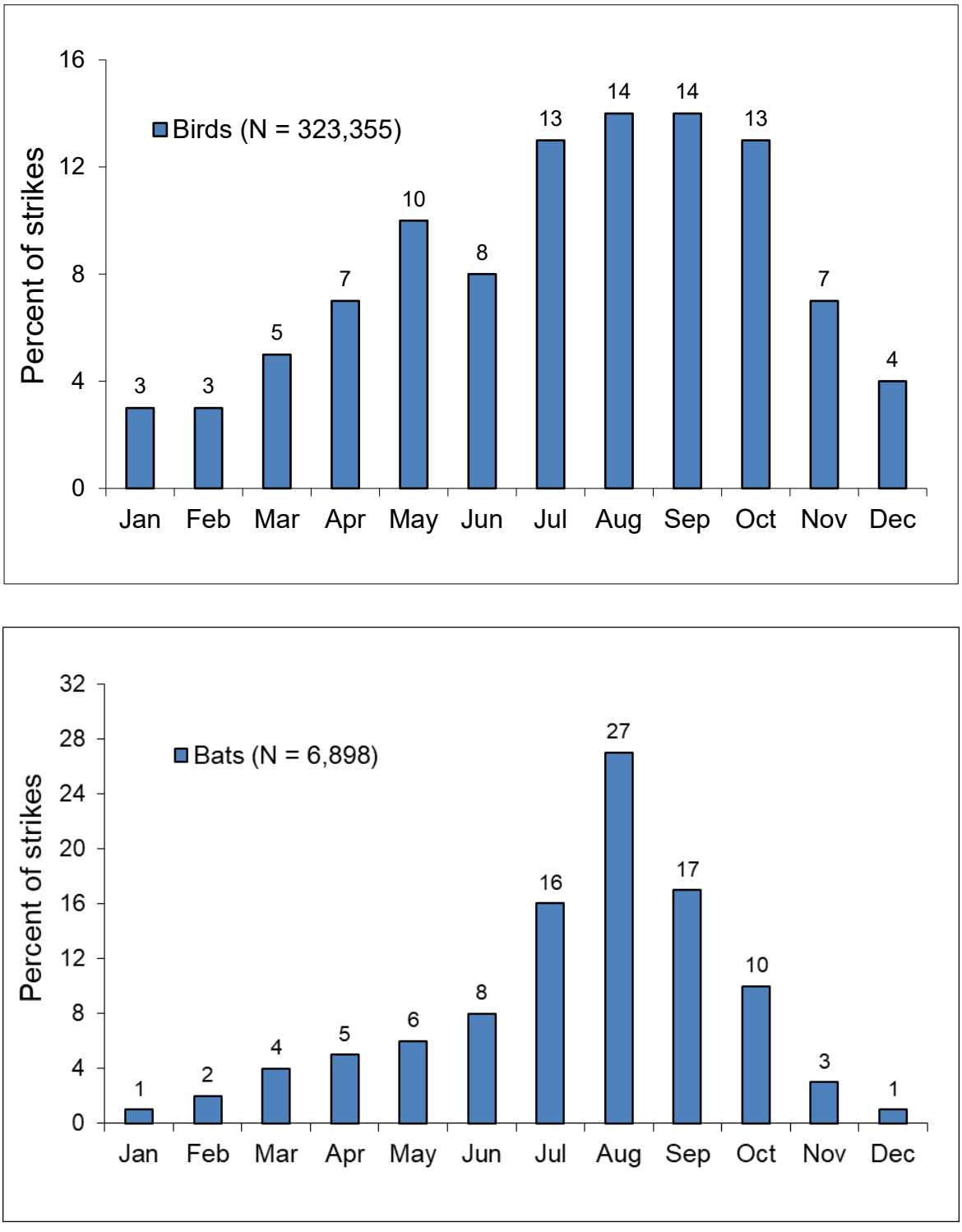
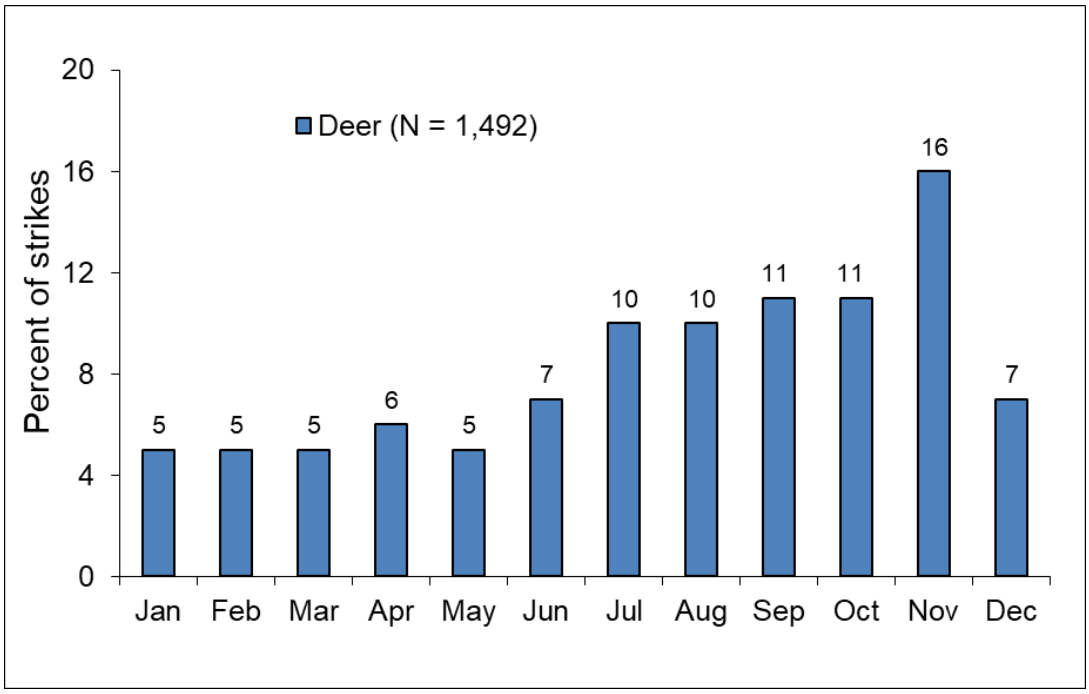


Figure 6. Percentage of reported bird (top graph) and bat (bottom graph) strikes with civil aircraft by month, U.S., 1990-2025. In addition, 927 strikes with reptiles were reported, of which 57% occurred in May-July. Strikes reported for U.S.-registered aircraft in foreign countries were excluded.



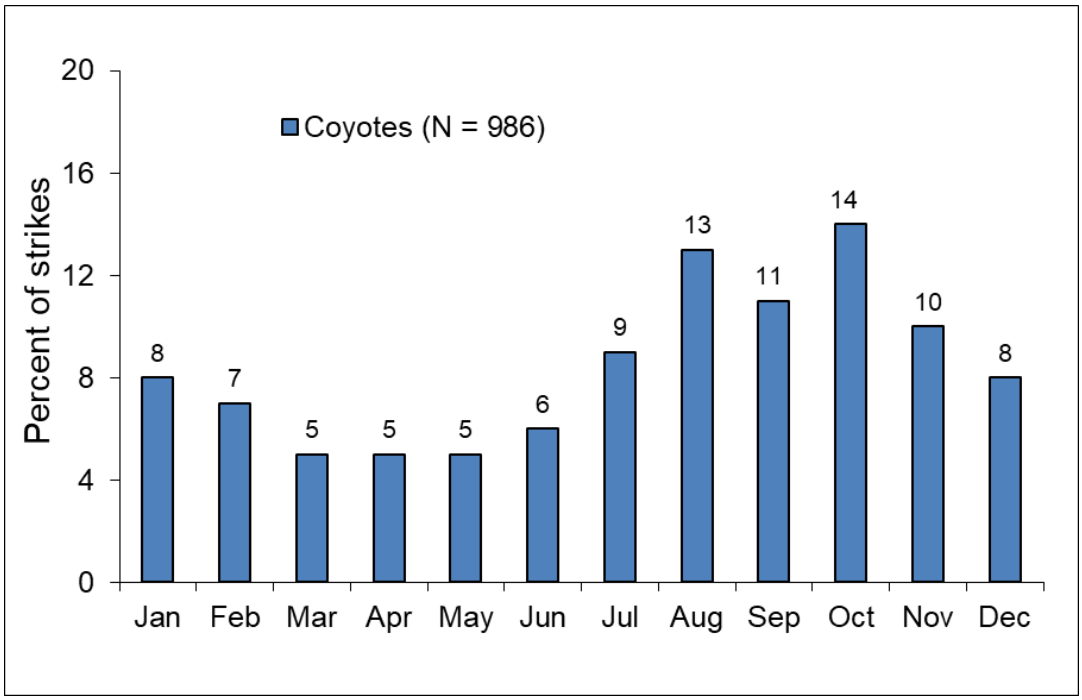


Figure 7. Percentage of reported deer (top graph) and coyote (bottom graph) strikes with civil aircraft by month, U.S., 1990-2025. One deer and 1 coyote strike reported for U.S.-registered aircraft in foreign countries were excluded. Deer (1,381 white-tailed, 93 mule, 1 axis, 17 unidentified to species) and coyotes are the most frequently struck terrestrial mammals (Table 18). Biondi et al. (2011) provide a more detailed analysis of deer strikes with civil aircraft in the U.S.; Ball et al. (2021) summarize data on mammal strikes worldwide.

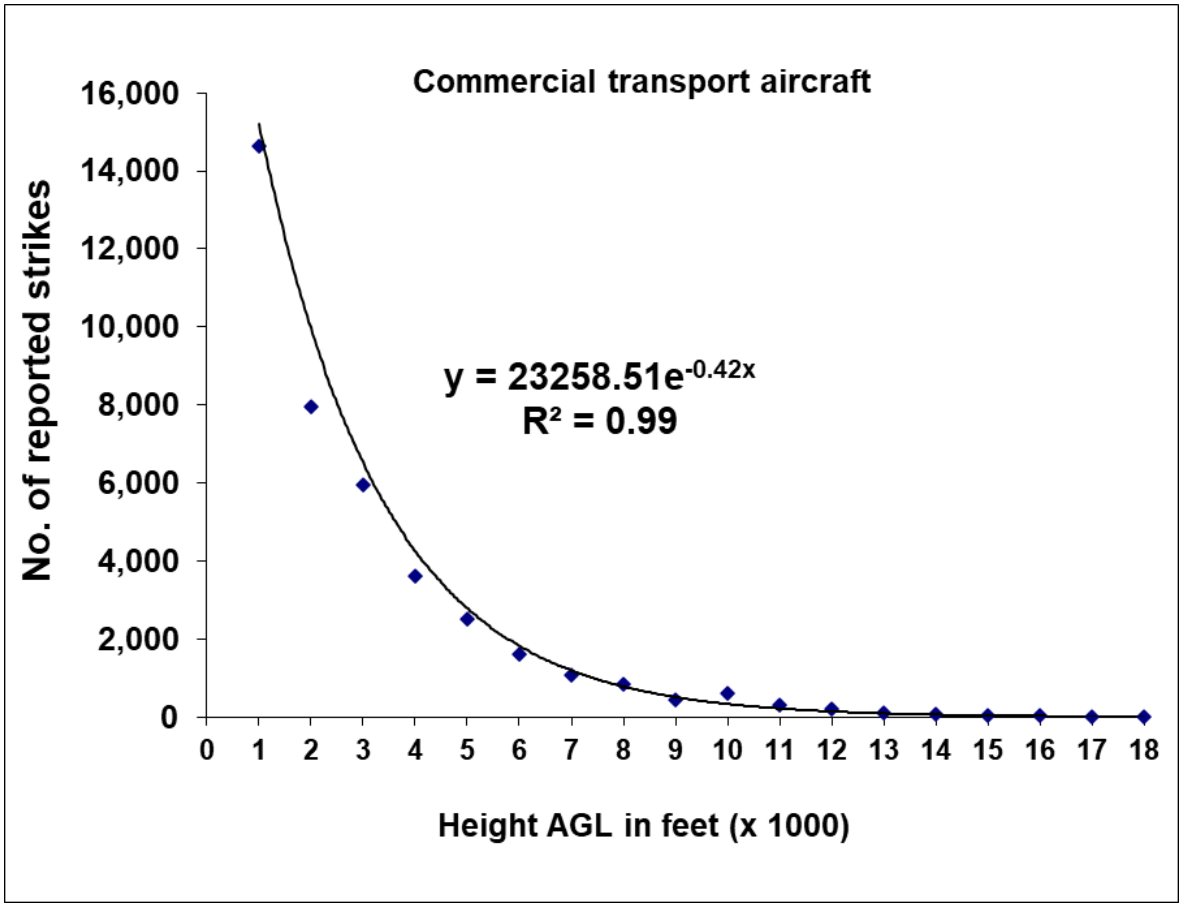
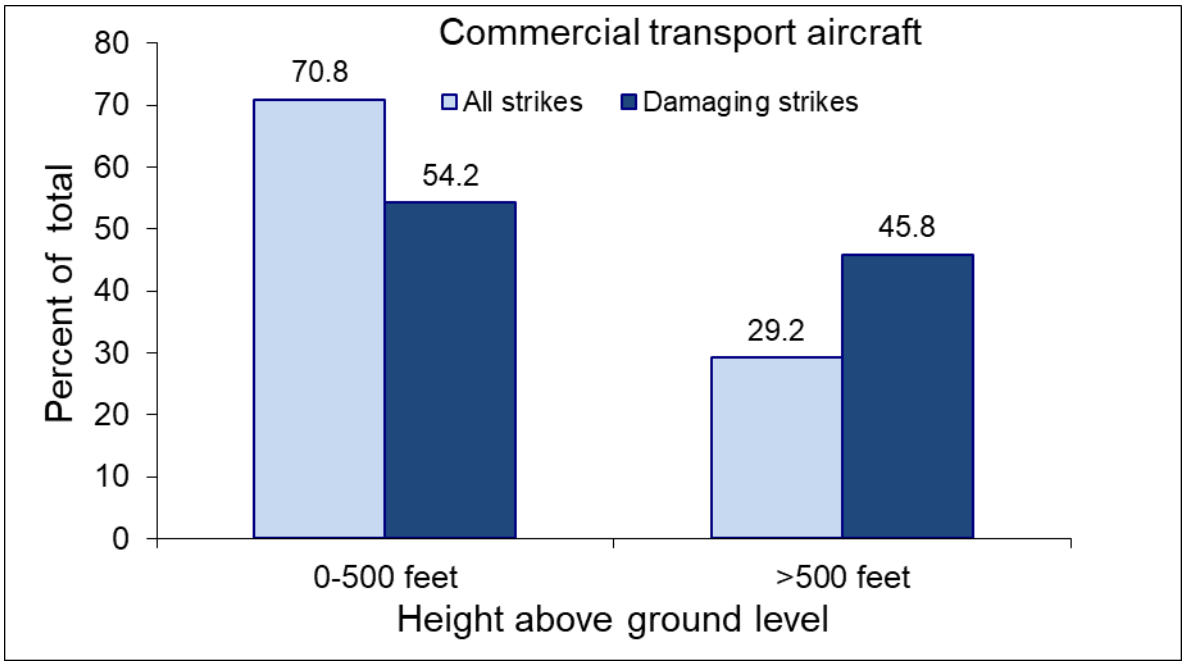


Figure 8. Number of reported bird strikes with commercial transport aircraft in U.S. by 1,000-foot height intervals AGL from 501—1,500 feet (interval 1) to 17,501—18,500 feet (interval 18), 1990-2025. This graph excludes strikes at ≤500 feet and strikes with rotorcraft. Above 500 feet, the number of reported strikes declined consistently by 35% for each 1,000-foot gain in height. The exponential equation explained 99% of the variation in number of strikes by 1,000-foot intervals from 501 to 18,500 feet. See Table 11 for sample sizes.



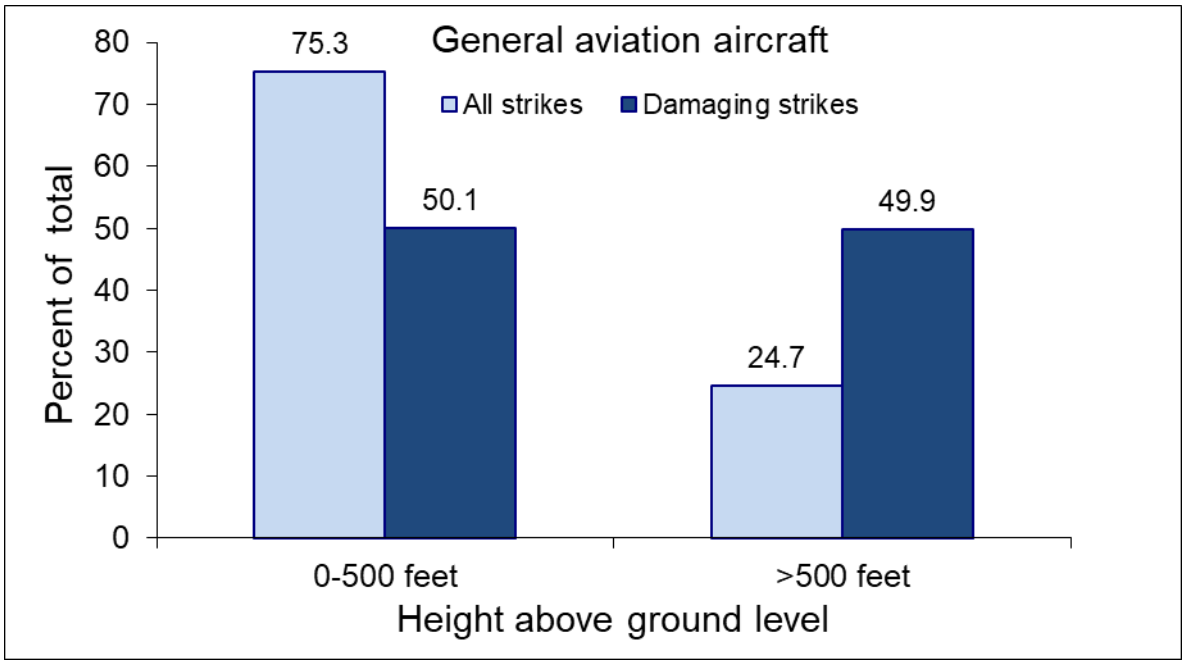


Figure 9. Percentages of total strikes and total damaging strikes occurring at 500 feet or less and above 500 feet for commercial transport (top graph) and general aviation (bottom graph) aircraft in U.S., 1990-2025. See Tables 11 and 12 for sample sizes.

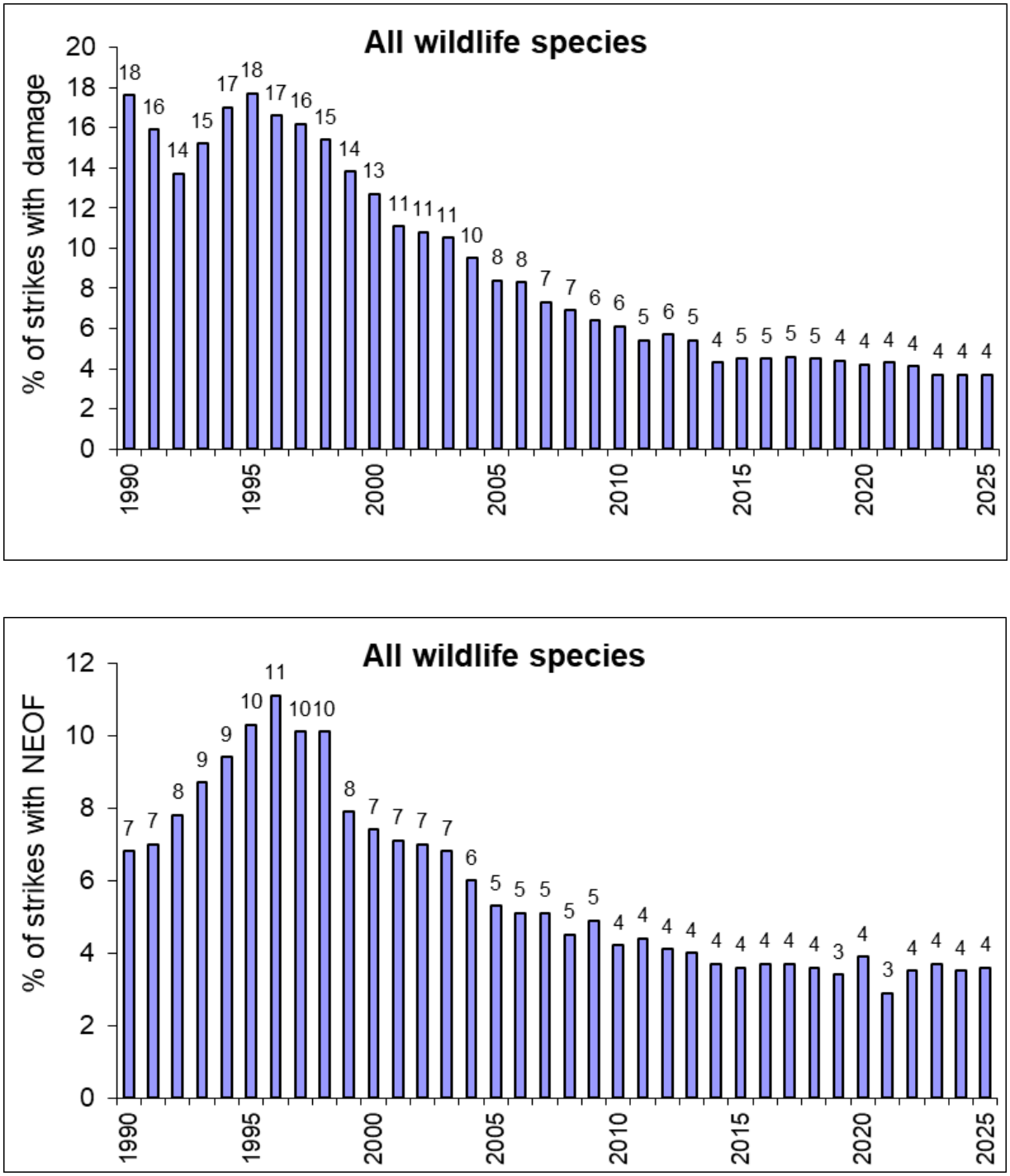


Figure 10. Percentage of reported strikes that indicated damage to the civil aircraft (top graph) or a negative effect-on-flight (NEOF, bottom graph), U.S., 1990-2025. See Tables 1, 14, and 15 for sample sizes and classifications of damage and negative effects-on-flight.

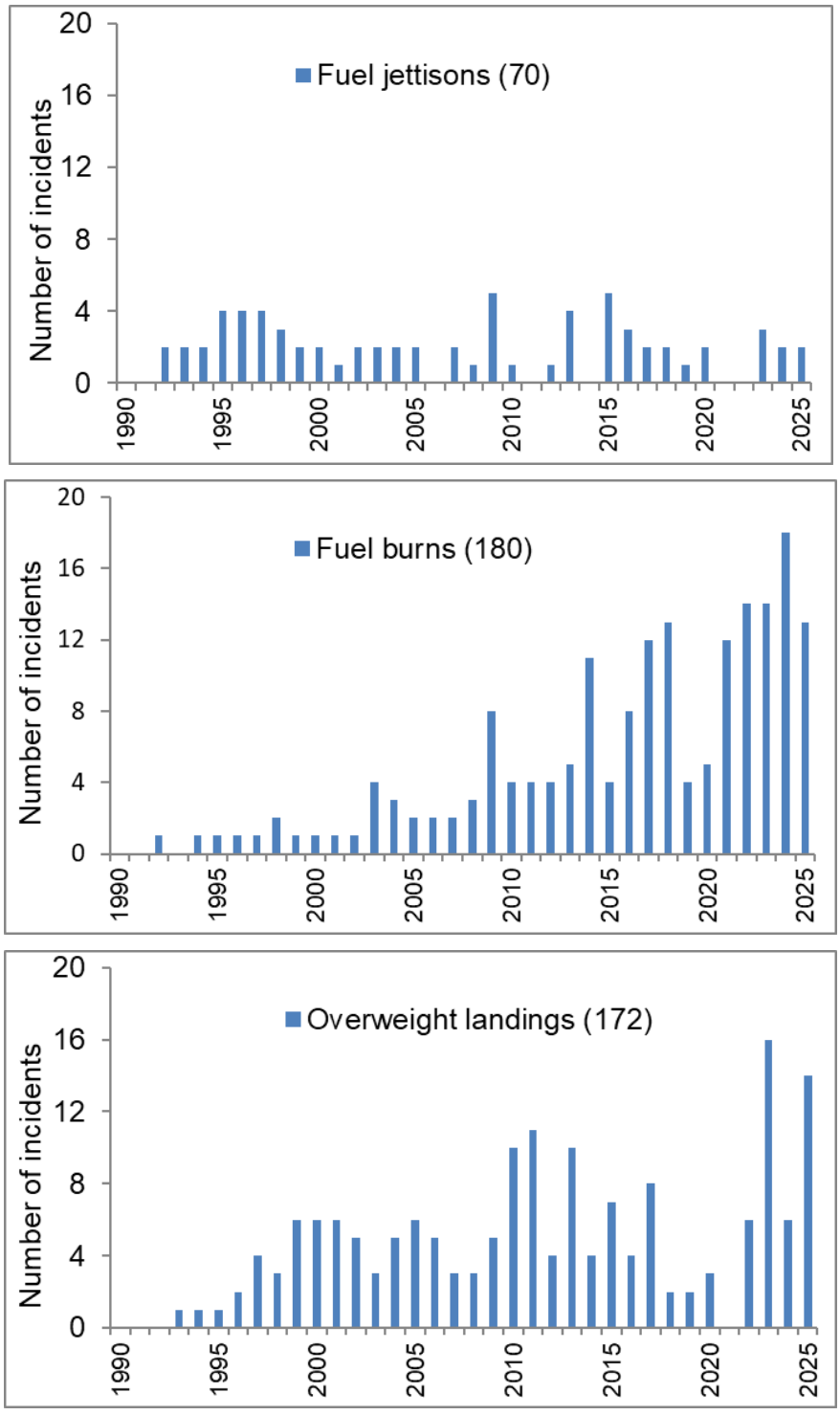


Figure 11. Number of reported incidents where pilot made an emergency or precautionary landing after striking wildlife during departure in which fuel was jettisoned or burned (circling pattern) to lighten aircraft weight or in which an overweight (greater than maximum landing weight) landing was made (no fuel jettison or burn), U.S. civil aircraft, 1990-2025. See Table 16 for details on aircraft involved and amount of fuel jettisoned.

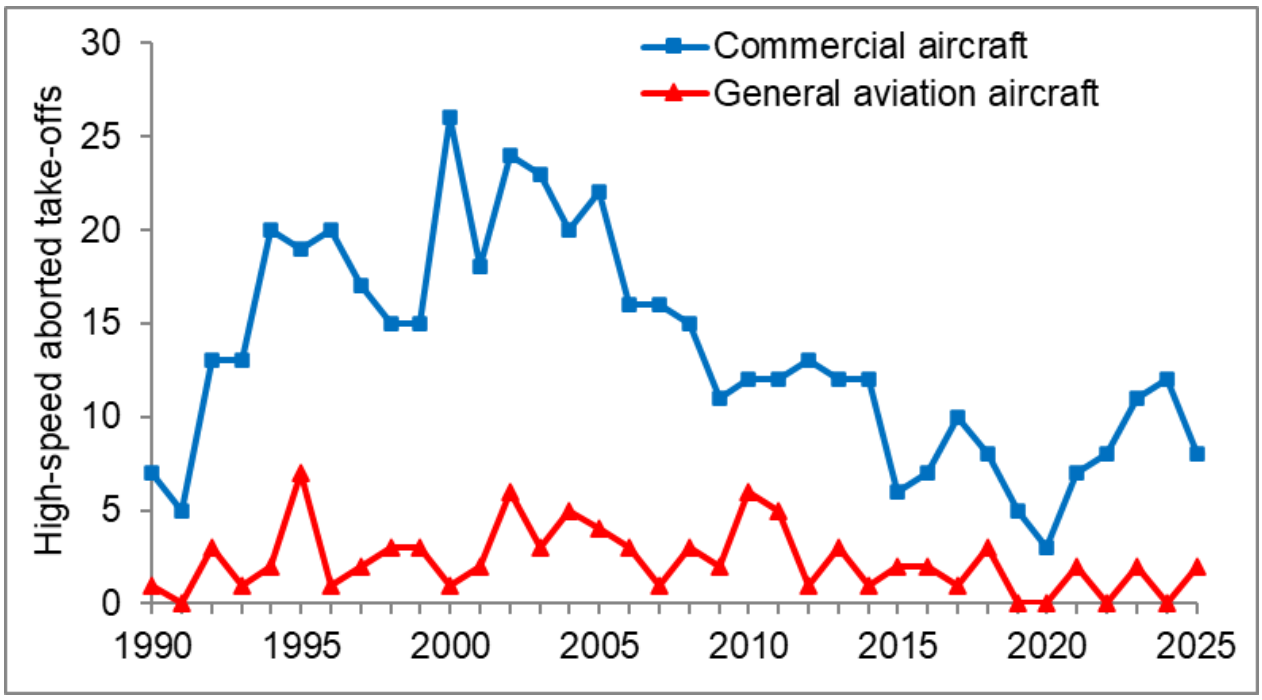


Figure 12. Number of reported incidents in which pilot made a high-speed aborted take-off (≥100 knots) after striking or observing wildlife during take-off run, U.S. civil aircraft, 1990-2025. See Table 17 for classification of aborted take-offs by indicated airspeed.

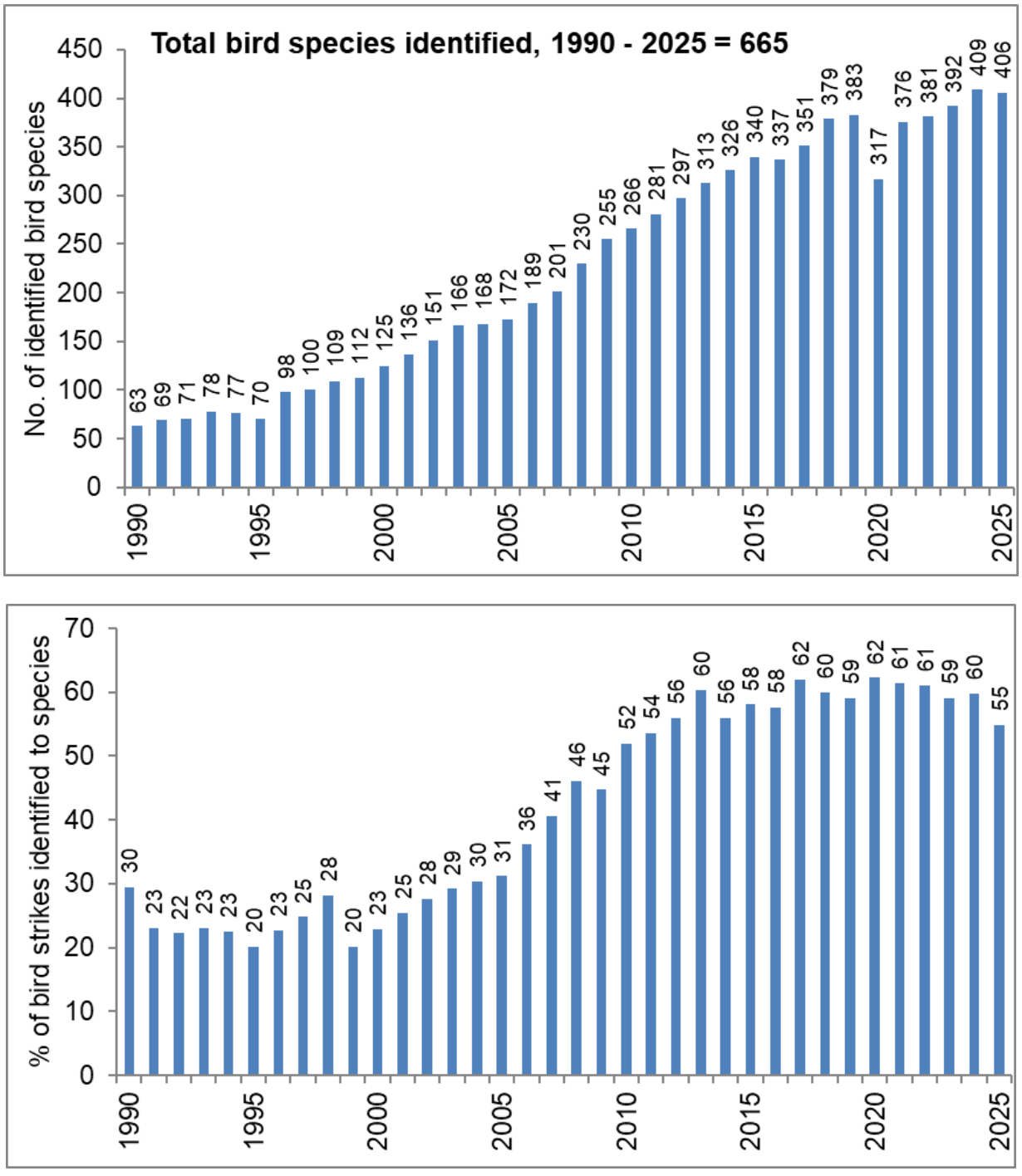


Figure 13. In 2025, 406 bird species were identified as struck by civil aircraft (top graph); the bird was identified to species level in 55% of reported strikes (bottom graph). From 1990 through 2025, 665 species of birds, 58 species of terrestrial mammals, 59 species of bats, and 46 species of reptiles (828 species total) have been identified. See Tables 1 and 18 and Appendix D for sample sizes and list of species.

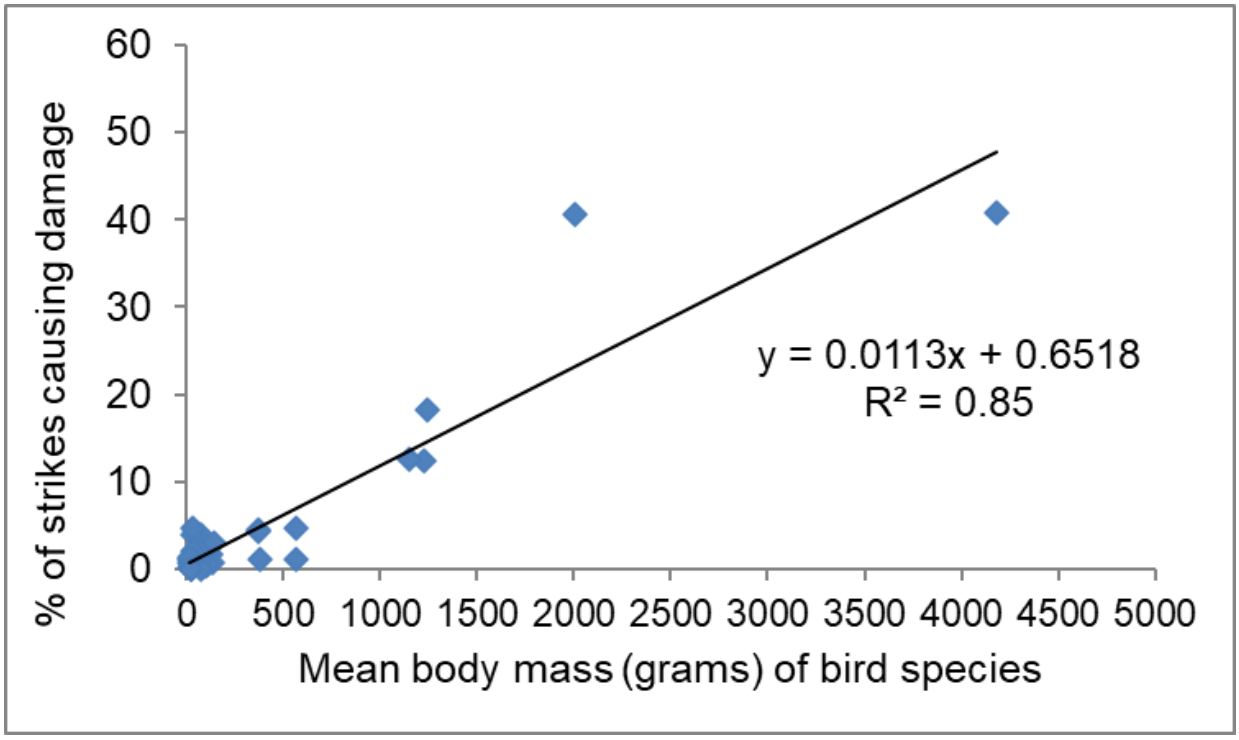


Figure 14. Relation between mean body mass (Dunning 2008) and likelihood of a strike causing damage to aircraft for the 33 species of birds most frequently identified as struck by civil aircraft in U.S., 2025 (Table 20). The linear regression equation explained 85% of the variation in the likelihood of damage among the 33 species. For every 100-gram increase in body mass, there was a 1.13% increase in the likelihood of damage.

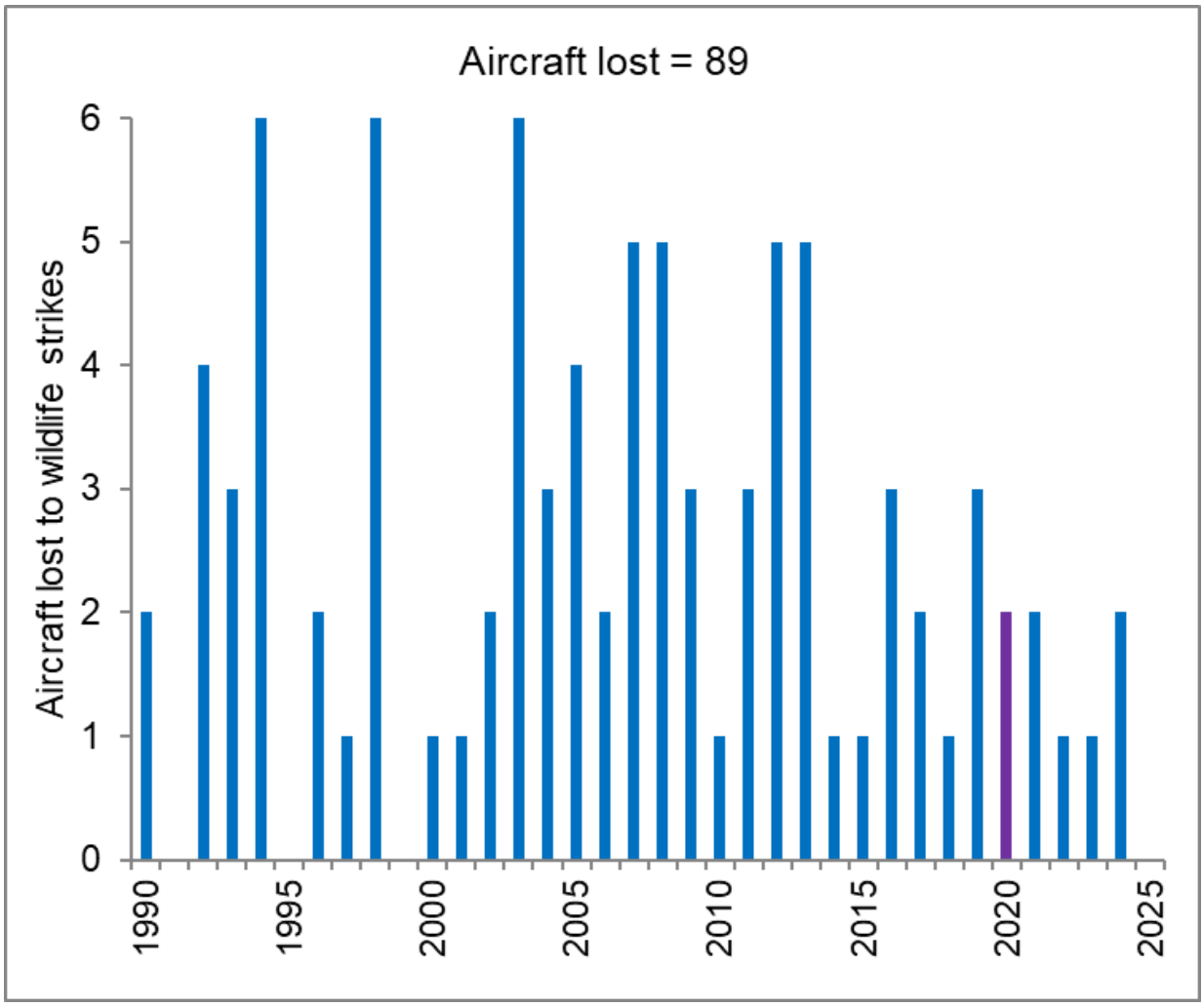


Figure 15. Number of civil aircraft destroyed or damaged beyond repair after striking wildlife, U.S., 1990-2025. From 1990-2025, 89 aircraft have been lost. See Table 22 for wildlife species groups associated with these events. The graph includes 1 unmanned aerial vehicle (drone) destroyed in 2020 after being attacked by a bald eagle during a shoreline erosion survey on Lake Michigan.

APPENDIX A.

Selected significant wildlife strikes to U.S. civil aircraft, 2025

The U.S. Department of Agriculture, through an interagency agreement with the Federal Aviation Administration, compiles a database of all reported wildlife strikes to U.S. civil aircraft and to foreign carriers experiencing strikes in the U.S. From 1990 through 2025, 343,556 strike reports from 2,417 U.S. airports, 351 foreign airports in 113 countries, and en route events have been entered in the database (19,187 strikes from 870 U.S. airports and 342 strikes from 114 foreign airports in 62 countries in 2025), Tables 1, 8; Figure 5). The following 12 examples from the database in 2025 are presented to show the serious impact that strikes by birds or other wildlife can have on aircraft. These examples demonstrate the widespread and diverse nature of the problem. The examples are not intended to highlight or criticize individual airports because, as documented above, strikes have occurred on almost every airport in the U.S. Some of the strike examples reported here occurred off airport property during approach, departure or en route. For more information on wildlife strikes or to report a strike, visit *www.birdstrike.org* and *http://wildlife.faa.gov*. (page 1 of 4)

Date	Aircraft	Airport/ location	Phase of flight	Effect on flight	Damage	Wildlife species	Comments from report
01/02/2025	CRJ 100/200	Greenville Mid-Delta Airport (MS)	Approach (3,000 feet AGL)	None	Radome, nose	Greater white-fronted goose	Struck multiple Greater white-fronted geese on final approach at 13-miles from Greenville Mid-Delta Airport (Mississippi). The radome and nose were damaged; the wing also was struck. Bird remains ingested into engine #1. The aircraft landed safely. Species identified by Smithsonian Feather Lab.

Appendix A (page 2 of 4)

Date	Aircraft	Airport/ location	Phase of flight	Effect on flight	Damage	Wildlife species	Comments from report
02/13/2025	A-220	Vero Beach Municipal Airport (FL)	Approach (30 feet AGL)	None	Engine #2 cowling	Sandhill crane	Aircraft struck the bird on landing flare over the approach end of runway. Dent in the outer, lower edge of the cowling at the front of Engine #2. There were some feathers inside of the engine, but the bird does not appear to have been ingested into Engine.
03/01/2025	B-767-300	Newark Liberty International Airport (NJ)	Climb (750 feet AGL)	Engine shutdown, precautionary landing, engine fire	Engine #1, engine #2, tail	Canada goose	Birds ingested in both engines which resulted in engine #2 fire and engine shut down. The aircraft diverted back to KEWR for an emergency landing. A 4-foot piece of engine was found in nearby NJ Turnpike maintenance yard by PAPD and NJ State police. The strike was captured on airport cameras. Species Identified by Smithsonian Feather Lab.
04/13/2025	B-737-800	Denver International (CO)	Take-off Run	Precautionary landing	Engine #2	White-tailed jackrabbit	Jackrabbit was ingested into the engine. Passenger reported a loud bang and a significant vibration followed by backfires coming from engine with fireballs behind. Substantial damage.
05/07/2025	PA-28	Seneca County Airport (OH)	Climb	Precautionary landing	Fuselage	White-tailed deer	Landed with student pilot, retracted flaps, applied power and accelerated to rotation when deer crossed in front of aircraft. The deer was too close to avoid and was struck with the propeller on the right side of the aircraft and lower firewall. The deer was dragged under the fuselage and pulled the airplane to the right. Reported repair cost = $101,400.

Appendix A (page 3 of 4)

Date	Aircraft	Airport/ location	Phase of flight	Effect on flight	Damage	Wildlife species	Comments from report
06/16/2025	EMB-170	Missoula International Airport (MT)	Take-off run	None	Engine #2	California gull	At least 6 birds were struck. Smithsonian Feather Lab identified the species as California gull. Aircraft was reported out of service for 24 hours with $500,000 in repairs costs.
07/04/2025	Learjet-31	Burke Lakefront (OH)	Climb (100 feet AGL)	Precautionary landing	Engine #2	European starling	A Medical transport aircraft sustained a damaging bird strike on initial climb. The pilot made a precautionary landing at the departure airport. The aircraft suffered strikes to the nose, left wing, right wing and #2 engine with ingestion. Damage resulted in a dented ring on the intake of the #2 engine. The Operations agent collected 15 European starlings from runway.
08/24/2025	EMB-170	20 miles KECP (FL)	Enroute (13,000 feet AGL)	Precautionary landing	Radome, Nose, Engine #2 Cowling, Fuselage	Blue-winged teal	Damage to the radome, engine #2 cowling, and fuselage. Smithsonian Feather ID Lab identified the species as Blue-winged teal.
09/08/2025	C-172	4.5 miles from Nut Tree Airport (CA)	Enroute (900 feet AGL)	Precautionary landing, aircraft controls effected	Wing	Turkey vulture	Bird strike occurred during a training maneuver. Heard a loud impact, the aircraft yawed to the right and a vibration was noted throughout the airframe. Diverted to KDWA for inspection; then ferried back to KVCB without incident. The right leading wing edge had a dent with wrinkling and paint scuffing. No skin penetration was observed.

Appendix A (page 4 of 4)

Date	Aircraft	Airport/ location	Phase of flight	Effect on flight	Damage	Wildlife species	Comments from report
10/02/2025	DA-40	Troy Municipal Airport (AL)	Landing roll	Engine shutdown	Propeller	Swine	The aircraft sustained a damaged propeller and engine shutdown. Pilot initially thought It was a small black bear, but airport personnel believed it was more likely a wild hog. The animal was not located on airport property. Night.
11/12/2025	C-172	Venice Municipal Airport (FL)	Approach (1,000 feet AGL)	Approach	Windshield	Turkey vulture	A bird hit the propeller and penetrated the windshield into the cockpit. The instructor took control of the aircraft and made an immediate short approach to land on the runway. Minor scratches to the crew. Awaiting final time out of service. Repair costs are estimated at $3,000.
12/23/2025	EMB-170	Sacramento International (CA)	Climb (400 feet AGL)	Precautionary landing	Engine #2	Mallard	The aircraft conducted a precautionary landing. The containment case was damaged, and 22 fan blades were damaged. Smithsonian Feather Lab identified species as Mallard. Time out of service estimated at 96 hours.

APPENDIX B.

Reporting a strike and identifying species of wildlife struck

Pilots, airport operations, aircraft maintenance personnel, and anyone else having knowledge of a strike should report the incident to the FAA Wildlife Strike Database (http://wildlife.faa.gov) using the electronic FAA Form 5200-7. Form 5200- 7 should be printed for each report that has remains submitted to the Smithsonian for identification.

It is important to include as much information as possible on FAA Form 5200-7. All reports are carefully screened to identify duplicate reports prior to entry in the database. Multiple reports of the same incident are combined and often provide a more complete record of the strike event than would be possible if just one report was filed.

The National Museum of Natural History, Smithsonian Institution, has the 3rd largest bird collection in the world with over 640,000 specimens. The collection has representatives of about 85% of the more than 10,000 known species in the world's avifauna.

The identification of the exact species struck (e.g., ring-billed gull, Canada goose, mallard, mourning dove, red-tailed hawk, red fox as opposed to gull, goose, duck, dove, hawk, or fox), is particularly important. This species information is critical for biologists developing wildlife risk management programs at airports and for engineers working on airworthiness standards because a problem that cannot be measured or defined cannot be solved. Bird strike remains that cannot be identified by airport personnel can often be identified by a local biologist trained in ornithology or by sending feathers, photographs and other remains to the Smithsonian Institution Feather Identification Lab:

Material sent via Courier Service (e.g., UPS, FedEx, DHL):	**Material sent via U.S. Postal Service:**
Feather Identification Lab Smithsonian Institution NMNH E600, MRC 116 1000 Constitution Ave, NW Washington, D.C. 20560-0116 (label package “safety investigation material”) Phone # 202-633-0801	Feather Identification Lab Smithsonian Institution, NMNH E600, MRC 116 P.O. Box 37012 Washington, D.C. 20013-7012

Whenever possible, send whole feathers as the diagnostic microscopic characteristics are often found in the downy barbules at the feather base. Wing feathers, as well as breast

and tail feathers, should be sent whenever possible (e.g., Dove et al. 2025*a, b*). Beaks and feet are also useful diagnostic materials. Even blood smears can provide material for DNA analysis (Dove et al. 2008). Do not send entire bird carcasses through the mail! However, photographs of the intact carcass or carcass remains (e.g., wing, head), which can be uploaded to the on-line 5200-7 when filing a strike report, can be useful supplemental documentation. Photographs should include a reference marker (e.g., ruler, coin) to gauge size of the carcass or body part.

Guidelines for Collecting Bird Strike Material

- Always include any feather material available.
- Include the printed report (FAA 5200-7) with the QR code in the upper right corner. This is necessary for tracking samples through the lab.
- Always secure remains in re-sealable plastic bag, put bird remains (samples) from different impact points in separate bags.

Feathers:

- Whole Bird - Pluck a variety of feathers (breast, back, wing, tail)
- Partial Bird - Collect a variety of feathers with color or pattern
- Feathers only - Send all material available. Do not cut feathers from the bird (downy part at the base of the feathers is needed). Do not use any sticky substance (no tape or glue).

Tissue/blood ("Snarge"):

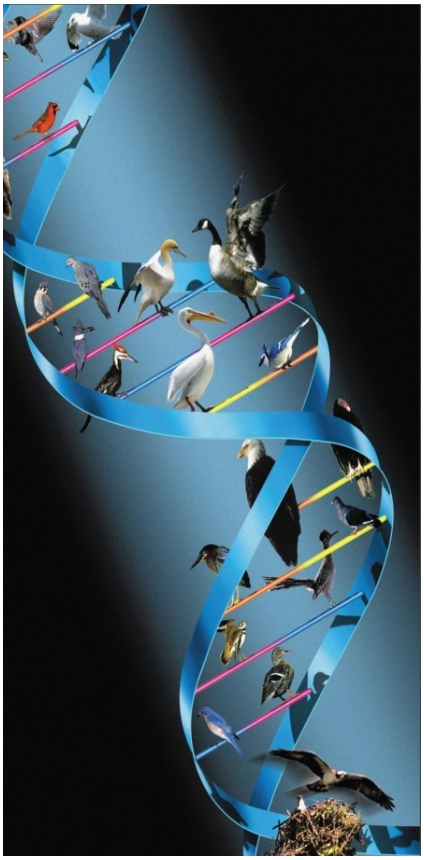
- Dry material - Scrape or wipe off into a clean re-closeable bag or wipe area with pre-packaged alcohol wipe or spray with alcohol to loosen material then wipe with clean cloth/gauze. (Do not use water, bleach, or other cleansers; they destroy DNA.)
- Fresh material - Wipe area with alcohol wipe and/or clean cloth/gauze or apply fresh tissue/blood to an FTA® DNA collecting card.

Additional information on sending bird remains to the Smithsonian is available at https://www.faa.gov/airports/airport_safety/wildlife/smithsonian/.

Cases Processed by Feather Lab in FY 2025

The number of bird strike cases involving civil aircraft processed by the Smithsonian Feather Identification Lab in FY 2025 was 7,408 with 8,059 separate identifications (some cases involved samples from multiple impact points). This compares to 6,742 cases with 7,290 separate identifications in FY 2024, and 5,525 cases with 6,029 separate identifications in FY 2023 (Dove et al. 2025*b*). In addition, the Lab processed 3,316 cases involving 4,361 identifications for the U.S. Air Force and 1,380 cases involving 1,557 identifications for the U.S. Navy in FY 2024. DNA methods (Dove et al. 2008, Luttrell et al. 2020) were used exclusively in 49% of the identifications, whereas morphological methods (microscopy and whole feather comparisons) were the sole source for 23% of the identifications. Morphology and DNA methods were used in various combinations in 23% of identifications. Photographs alone were used for 5% of the identifications, and as supplementary evidence in many other cases.

Scientists at the Smithsonian Feather Lab use a combination of forensic methods, including mitochondrial DNA analysis, to determine the species of birds, bats, and other wildlife involved in strikes with civil and military aircraft. Photo, J. Tiller, Smithsonian.



Appendix C.

Trends and characteristics of reported bird strikes with medical transport helicopters, U.S., 1990-2025

Dolbeer (2026) provided a comprehensive analysis of wildlife strikes involving civil helicopters in the U.S. and the implications for Advanced Air Mobility operations involving electric-powered aircraft. This Appendix exams a subset of that data analysis involving medical transport helicopters.

There were 2,750 bird strikes reported from 1990 – 2025, including a record 295 strikes in 2025, that involved medical transport helicopters (Figure C1). The determination that these were medical transport helicopters was based on remarks in the strike reports.

Eighty percent of the strikes occurred en route (Table C1) compared to only 3% of strikes involving birds for all aircraft types (Table 10). This is because medical transport helicopters typically fly in the “bird rich” zone of 500-2,000 feet AGL which is considerably lower than most fixed-wing aircraft fly. The mean height AGL for en route strikes involving medical transport helicopters was 1,546 feet (N = 1,832 reports).

Seventy-nine percent of the strikes occurred at night (Table C2) compared to only 30% of strikes involving birds for all aircraft types (Table 9). This is because the missions for medical transport helicopters often require night-time flights. Forty-three percent of medical transport helicopter strikes were reported in September-October (Figure C2), which are peak months for night-time migration by birds in North America.

Regarding damage, 14% of bird strikes involving medical transport aircraft reported damage (Table C3) compared to 6 % of strikes involving birds for all aircraft types (Table 14). This is likely related to less stringent bird-strike certification standards for helicopter components compared to fixed-wing transport aircraft (Dolbeer 2026) and to the fact that 80% of the strikes occurred en route. The mean speed recorded for en route strikes was 117 knots (N = 1,695, Table C1)

Table C1. Phase of flight for bird strikes involving medical helicopters, U.S., 1990–2025.

Phase of flight	Number of strikes	% of total known
Take-off/climb	175	6.6
En Route[1]	2,117	80.0
Approach/landing	336	12.7
Taxi/parked	13	0.5
Local	5	0.2
Total known	**2,646**	**100.0**
Unknown	**104**	
Total	**2,750**	

[1]The mean height AGL for en route strikes involving medical transport helicopters was 1,548 feet (N = 1,823 reports). The mean speed for en route strikes was 117 knots (N = 1,695 reports).

Table C2. Time of day for bird strikes involving medical helicopters, U.S., 1990–2025.

Time of day	Number of strikes	% of total known
Dawn	23	0.9
Day	457	17.8
Dusk	63	2.5
Night	2,024	78.8
Total known	**2,567**	**100.0**
Unknown	**183**	
Total	**2,750**	

Table C3. Number of medical transport helicopters with reported damage resulting from bird strikes, U.S., 1990-2025.

Damage category[1]	36-year total	% of total[4]
None	**2,293**	**83.4**
Unknown	**76**	**2.8**
Damage	**381**	**13.9**
Minor	120	4.4
Uncertain level	110	4.0
Substantial	149	5.4
Destroyed	2	0.1
Total	**2,750**	**100.0**

[1] See Table 14 for explanation of damage levels.

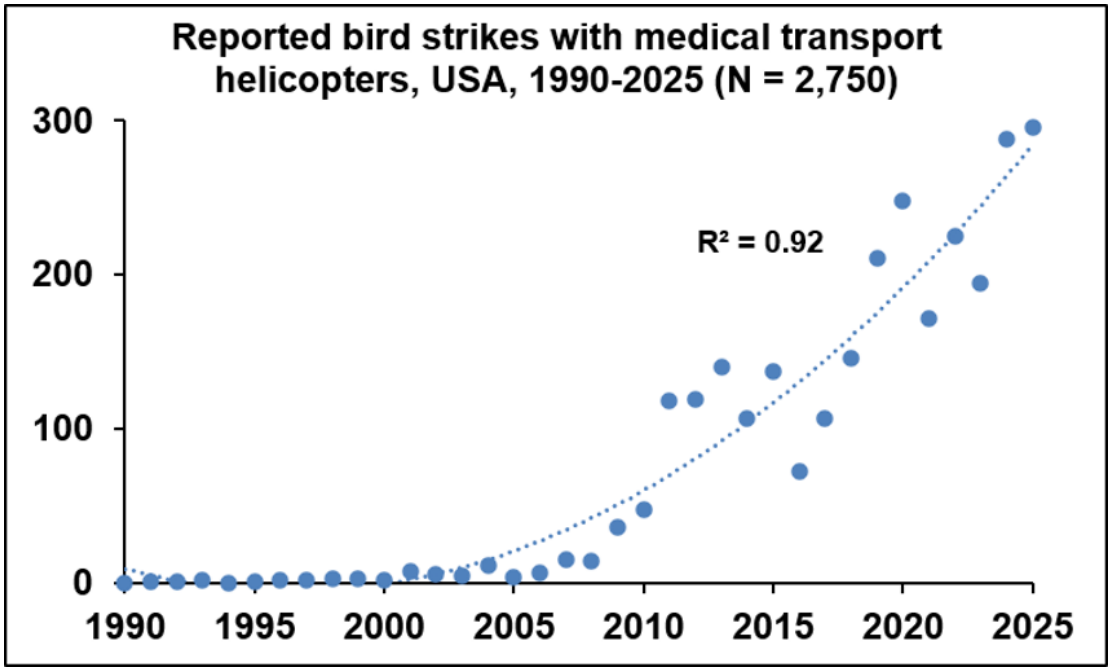


Figure C1. A record 295 bird strikes involving medical transport helicopters was reported in 2025.

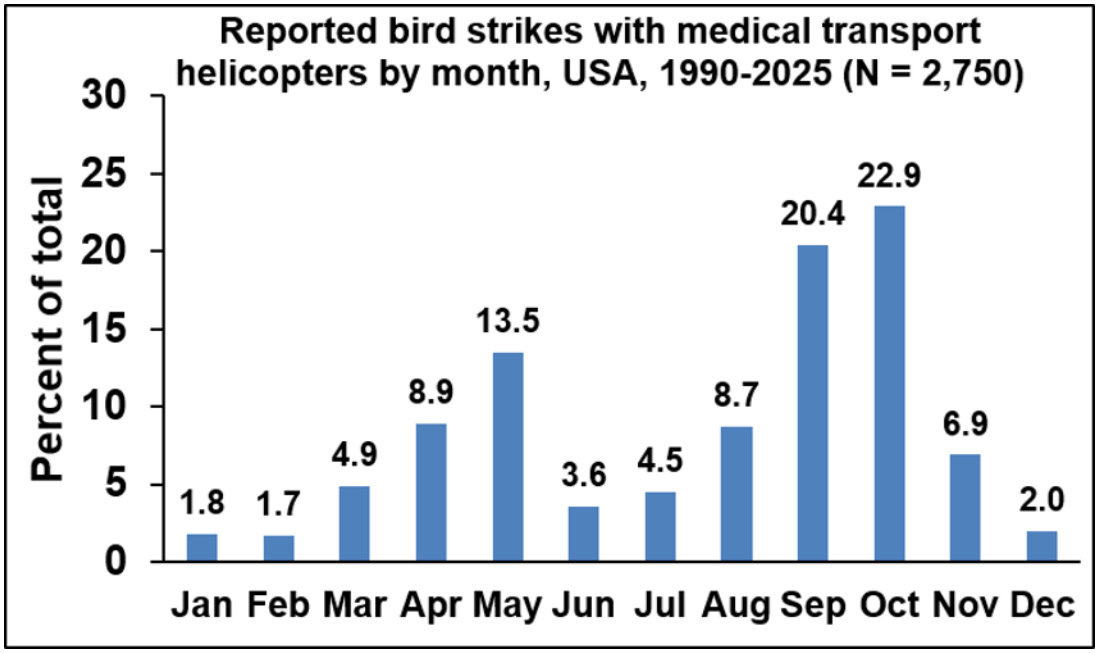


Figure C2. Forty three percent of bird strikes with medical transport helicopters occurred during September–October which are peak months for bird migration in North America.

Appendix D.

Scientific Names and Body Masses for the 828 Identified Wildlife Species Struck by Civil Aircraft in U.S. or by U.S.-Registered Aircraft in Foreign Countries, 1990-2025[1] (page 1 of 17).

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
	Flying mammals (bats)			
1	African yellow bat	Scotophilus dinganii	25	25
2	Alvarez's mastiff bat	Molossus alvarezi	25	30
3	Angolan free-tailed bat	Mops condylurus	23	
4	Antillean fruit-eating bat	Brachyphylla cavernarum	45	
5	Big brown bat	Eptesicus fuscus	14	
6	Big free-tailed bat	Nyctinomops macrotis	30	
7	Black mastiff bat	Molossus rufus	65	70
8	Brazilian free-tailed bat	Tadarida brasiliensis	15	
9	Broad-eared bat	Nyctinomops laticaudatus	11	14
10	Brown flower bat	Erophylla bombifrons	19	21
11	California myotis	Myotis californicus	4	5
12	Cape serotine	Laephotis capensis	7	10
13	Common pipistrelle	Pipestrellus pipistrellus	6	8
14	Cuban flower bat	Phyllonycteris poeyi	22	29
15	Eastern red bat	Lasiurus borealis	14	
16	Eastern small-footed myotis	Myotis leibii	7	
17	Egyptian free-tailed bat	Tadarida aegyptiaca	17	21
18	Evening bat	Nycticeius humeralis	14	
19	Florida bonneted bat	Eumops floridanus	40	55
20	Fringed myotis	Myotis thysanodes	9	10
21	Gray bat	Myotis grisescens	12	16
22	Gray sac-winged bat	Balantiopteryx plicata	7	
23	Grey-headed flying fox	Pteropus poliocephalus	700	1,000
24	Hispaniolan mastiff bat	Molossus verrilli	18	20
25	Hoary bat	Lasiurus cinereus	35	
26	Indian flying fox	Pteropus giganteus	1,100	1,600
27	Indian pipistrelle	Pipistrellus coromandra	11	13
28	Indiana bat	Myotis sodalis	6	10
29	Jamaican fruit bat	Artibeus jamaicensis	50	60
30	Kelaart's pipistrelle	Pipistrellus ceylonicus	4	5
31	Kuhl's pipistrelle	Pipistrellus kuhlii	6	
32	Leschenault's rousette	Rousettus leschenaulti	100	100
33	Lesser bulldog bat	Noctilio albiventris	30	44
34	Little brown bat	Myotis lucifugus	8	
35	Little red flying fox	Pteropus scapulatus	400	
36	Long-eared myotis	Myotis evotis	8	
37	Long-legged myotis	Myotis volans	8	10
38	Mauritian tomb bat	Taphozous mauritianus	36	
39	Naked-rumped tomb bat	Taphozous nudiventris	34	
40	Northern yellow bat	Lasiurus intermedius	17	20
41	Pacific flying fox	Pteropus tonganus	1,000	1,500
42	Pallas's long-tongued bat	Glossophaga soricina	10	12
43	Pallas's mastiff bat	Molossus molossus	13	
44	Peters's short-nosed fruit bat	Cynopterus luzoniensis	36	45
45	Pocketed free-tailed bat	Nyctinomops femorosacca	14	
46	Seminole bat	Lasiurus seminolus	11	
47	Silver-haired bat	Lasionycteris noctivagans	9	

Appendix D. Continued (page 2 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
48	Sinaloan mastiff bat	Molossus sinaloae	24	28
49	Sooty mustached bat	Pteronotus quadridens	5	
50	Southeastern myotis	Myotis austroriparius	7	8
51	Spotted bat	Euderma maculatum	18	20
52	Tri-colored bat	Perimyotis subflavus	5	
53	Wagner's bonneted bat	Eumops glaucinus	40	47
54	Western mastiff bat	Eumops perotis	57	73
55	Western pipistrelle	Parastrellus hesperus	5	6
56	Western red bat	Lasiurus blossevillii	13	15
57	Western small-footed myotis	Myotis ciliolabrum	5	7
58	Western yellow bat	Lasiurus xanthinus	12	
59	Yuma myotis	Myotis yumanensis	6	7
	Terrestrial mammals			
1	American badger	Taxidea taxus	12,000	
2	American black bear	Ursus americanus	135,000	200,000
3	American mink	Mustela vison	1,000	1,300
4	American red squirrel	Tamiasciurus hudonsonicus	300	400
5	Antelope jackrabbit	Lepus alleni	4,000	5,900
6	Axis deer	Axis axis	90,000	110,000
7	Bearded seal	Erignathus barbatus	315,000	430,000
8	Black-tailed jackrabbit	Lepus californicus	2,268	
9	Black-tailed prairie dog	Cynomys ludovicianus	1,050	1,400
10	Bobcat	Lynx rufus	9,600	18,300
11	Brown bear	Ursus arctos	217,000	400,000
12	Brush rabbit	Sylvilagus bachmani	800	917
13	California ground squirrel	Otospermophilus beecheyi	500	750
14	Caribou	Rangifer arcticus	119,297	
15	Cattle	Bos taurus	753,430	
16	Collared peccary	Pecari tajacu	20,412	
17	Common gray fox	Urocyon cinereoargenteus	4,536	
18	Coyote	Canis latrans	15,876	
19	Coypu (nutria)	Myocaster coypus	6,000	17,000
20	Desert cottontail	Sylvilagus audubonii	1,247	
21	Domestic sheep	Ovis aries	100,000	160,000
22	Domestic/feral cat	Felis catus	4,309	
23	Domestic/feral dog	Canis familiaris	34,927	
24	Eastern cottontail	Sylvilagus floridanus	1,361	
25	Eastern gray squirrel	Sciurus carolinensis	500	600
26	Fox squirrel	Sciurus niger	800	1,000
27	Gunnison's prairie dog	Cynomys gunnisoni	816	1,350
28	Horse	Equus caballus	1,147,608	
29	Kit fox	Vulpes macrotis	2,000	2,700
30	Least weasel	Mustela nivalis	100	250
31	Long-tailed weasel	Mustela frenata	260	300
32	Marsh rabbit	Sylvilagus palustris	1,600	2,000
33	Moose	Alces alces	389,189	
34	Mountain cottontail	Sylvilagus nuttallii	900	1,000
35	Mule deer	Odocoileus hemionus	92,000	
36	Muskrat	Ondatr zibethicus	1,361	
37	Nine-banded armadillo	Dasypus novemcinctus	5,670	
38	North American beaver	Castor canadensis	20,000	

Appendix D. Continued (page 3 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
39	North American porcupine	Erethizon dorsatum	8,618	
40	Piute ground squirrel	Urocitellus mollis	500	
41	Pronghorn	Antilocapra americana	46,721	
42	Raccoon	Procyon lotor	10,660	
43	Red fox	Vulpes fulva	5,670	
44	Richardson's ground squirrel	Urocitellus richardsonii	500	750
45	River otter	Lutra canadensis	7,938	
46	Small Indian mongoose	Herpestes javanicus	650	
47	Snowshoe hare	Lepus americanus	1,300	1,800
48	Striped skunk	Mephitis mephitis	4,536	
49	Swine (pigs)	Sus scrofa	199,584	
50	Thirteen-lined ground squirrel	Ictidomys tridecemlineatus	500	700
51	Virginia opossum	Didelphus virginianus	4,990	
52	Wapiti (elk)	Cervis elaphus	317,520	
53	White-nosed coati	Nasua narica	9,072	
54	White-tailed deer	Odocoileus virginianus	88,000	
55	White-tailed jackrabbit	Lepus townsendii	3,402	
56	White-tailed prairie dog	Cynomys leucurus	1,000	1,136
57	Woodchuck	Marmota monax	3,402	
58	Yellow-bellied marmot	Marmota flaviventris	5,000	
	Reptiles			
1	Alligator snapping turtle	Macrochelys temminckii	75,000	100,000
2	American alligator	Alligator mississippie	136,080	
3	California kingsnake	Lampropeltis californiae	1,000	1,500
4	Checkered garter snake	Thamnophis marcianus	60	122
5	Chicken turtle	Deirochelys reticularia	800	
6	Coastal plain cooter	Pseudemys floridana	3,000	3,500
7	Common box turtle	Terrapene carolina	350	
8	Common garter snake	Thamnophis sirtalis	150	
9	Common kingsnake	Lampropeltis getula	1,000	1,500
10	Common snapping turtle	Chelydra serpentina	9,979	
11	Corn snake	Pantherophis guttatus	900	
12	DeKay's brown snake	Storeria dekayi	75	120
13	Diamondback terrapin	Malaclemys terrapin	455	
14	Diamondback water snake	Nerodia rhombifer	400	600
15	E. diamondback rattlesnake	Crotalus adamanteus	2,300	4,900
16	Eastern hognose snake	Heterodon platirhinos	100	120
17	Eastern mud turtle	Kinosternon subrubrum	207	291
18	Eastern pine snake	Pituophis melanoleucus	1,000	
19	Eastern racer	Coluber constrictor	556	667
20	Eastern rat snake	Pantherophis alleghaniensis	800	1,274
21	Florida red-bellied cooter	Pseudemys nelsoni	4,000	
22	Florida softshell turtle	Apalone ferox	6,650	43,000
23	Gopher snake	Pituophis catenifer	2,300	4,500
24	Gopher tortoise	Gopherus polyphemus	4,000	4,500
25	Green iguana	Iguana iguana	5,000	
26	Lined snake	Tropidoclonion lineatum	50	
27	Milk snake	Lampropeltis triangulum	225	1,000
28	Mohave rattlesnake	Crotalus scutulatus	4,000	9,000
29	Northern map turtle	Graptemys geographica	1,600	2,500
30	Northern water snake	Nerodia sipedon	1,361	1,814

Appendix D. Continued (page 4 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
31	Ornate box turtle	Terrapene ornata	310	431
32	Painted turtle	Chrysemys picta	350	
33	Plains garter snake	Thamnophis radix	300	400
34	Pond slider	Trachemys scripta	1,000	
35	Prairie rattlesnake	Crotalus viridis	1,000	
36	River cooter	Pseudemys concinna	2,000	5,000
37	Spectacled caiman	Caiman crocodilus	20,000	40,000
38	Spiny softshell turtle	Apalone spinifera	4,000	10,000
39	Striped mud turtle	Kinosternon baurii	203	
40	Texas blind snake	Leptotyphlops dulcis	50	
41	Water moccasin	Agkistrodon piscivorus	580	4,600
42	W. diamondback rattlesnake	Crotalus atrox	1,500	6,700
43	Western fox snake	Pantherophis ramspotti	1,000	
44	Western hognose snake	Heterodon nasicus	350	500
45	Western rat snake	Pantherophis obsoletus	1,000	2,500
46	Western ribbon snake	Thamnophis proximus	150	
	Birds			
1	Acadian flycatcher	Empidonax virescens	13	14
2	African collared dove	Streptopelia roseogrisea	155	172
3	African silverbill	Euodice cantans	12	14
4	Alder flycatcher	Empidonax alnorum	13	15
5	Allen's hummingbird	Selasphorus sasin	3	4
6	Alpine swift	Tachymarptis melba	104	120
7	American avocet	Recurvirostra americana	307	382
8	American barn owl	Tyto furcata	566	
9	American bittern	Botaurus lentiginosus	706	1,072
10	American black duck	Anas rubripes	1,400	1,800
11	American coot	Fulica americana	724	848
12	American crow	Corvus brachyrhynchos	538	
13	American golden-plover	Pluvialis dominica	154	166
14	American goldfinch	Spinus tristis	13	17
15	American goshawk	Astur atricapillus	1,137	1,364
16	American kestrel	Falco sparverius	132	
17	American oystercatcher	Haematopus palliatus	638	720
18	American pipit	Anthus rubescens	22	26
19	American redstart	Setophaga ruticilla	8	10
20	American robin	Turdus migratorius	79	112
21	American tree sparrow	Spizelloides arborea	19	28
22	American white pelican	Pelecanus erythrorhynchos	6,329	8,000
23	American wigeon	Mareca americana	792	1,036
24	American woodcock	Scolopax minor	219	278
25	Anhinga	Anhinga anhinga	1,235	
26	Anna's hummingbird	Calypte anna	5	6
27	Antillean nighthawk	Chordeiles gundlachii	50	
28	Antillean palm swift	Tachornis phoenicobia	10	11
29	Arctic tern	Sterna paradisaea	110	127
30	Ash-throated flycatcher	Myiarchus cinerascens	28	38
31	Australian pelican	Pelecanus conspicillatus	5,505	6,800
32	Baird's sandpiper	Calidris bairdii	44	
33	Baird's sparrow	Centronyx bairdii	18	20
34	Bald eagle	Haliaeetus leucocephalus	5,350	6,400

Appendix D. Continued (page 5 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
35	Baltimore oriole	Icterus galbula	34	39
36	Band-rumped storm-petrel	Hydrobates castro	45	54
37	Band-tailed pigeon	Patagioenas fasciata	398	515
38	Bank swallow	Riparia riparia	14	19
39	Bare-eyed pigeon	Patagioenas corensis	273	283
40	Barn swallow	Hirundo rustica	19	
41	Barred owl	Strix varia	801	1,051
42	Barrow's goldeneye	Bucephala islandica	1,130	1,314
43	Bar-tailed godwit	Limosa lapponica	332	400
44	Bay-breasted warbler	Setophaga castanea	12	14
45	Bell's sparrow	Artemisiospiza belli	15	17
46	Bell's vireo	Vireo bellii	9	10
47	Belted kingfisher	Megaceryle alcyon	148	215
48	Bewick's wren	Thryomanes bewickii	10	12
49	Bicknell's thrush	Catharus bicknelli	28	37
50	Black drongo	Dicrurus macrocercus	48	59
51	Black francolin	Francolinus francolinus	482	566
52	Black kite	Milvus migrans	870	920
53	Black noddy	Anous minutus	116	130
54	Black phoebe	Sayornis nigricans	20	22
55	Black redstart	Phoenicurus ochruros	17	20
56	Black skimmer	Rynchops niger	349	392
57	Black swift	Cypseloides niger	46	53
58	Black tern	Chlidonias niger	65	74
59	Black turnstone	Arenaria melanocephala	135	169
60	Black vulture	Coragyps atratus	2,159	
61	Black-and-white warbler	Mniotilta varia	11	13
62	Black-bellied plover	Pluvialis squatarola	250	283
63	Black-bellied whistling-duck	Dendrocygna autumnalis	796	950
64	Black-billed cuckoo	Coccyzus erythropthalmus	51	65
65	Black-billed magpie	Pica hudsonia	189	209
66	Blackburnian warbler	Setophaga fusca	10	
67	Black-capped chickadee	Poecile atricapillus	11	13
68	Black-chinned hummingbird	Archilochus alexandri	4	5
69	Black-crowned night heron	Nycticorax nycticorax	810	1,014
70	Black-crowned sparrow lark	Eremopterix nigriceps	14	16
71	Black-faced bunting	Emberiza spodocephala	20	24
72	Black-footed albatross	Phoebastria nigripes	3,400	4,300
73	Black-headed grosbeak	Pheucticus melanocephalus	48	
74	Black-headed gull	Chroicocephalus ridibundus	284	327
75	Black-legged kittiwake	Rissa tridactyla	421	525
76	Black-necked stilt	Himantopus mexicanus	170	202
77	Blackpoll warbler	Setophaga striata	12	13
78	Black-throated blue warbler	Setophaga caerulescens	11	12
79	Black-throated gray warbler	Setophaga nigrescens	9	10
80	Black-throated green warbler	Setophaga virens	9	10
81	Black-throated sparrow	Amphispiza bilineata	14	16
82	Blue grosbeak	Passerina caerulea	28	41
83	Blue jay	Cyanocitta cristata	88	101
84	Blue-and-white swallow	Pygochelidon cyanoleuca	10	11
85	Blue-billed white tern	Gygis candida	111	139

Appendix D. Continued (page 6 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
86	Blue-black grassquit	Volatinia jacarina	10	12
87	Blue-crowned parakeet	Thectocercus acuticaudatus	168	176
88	Blue-gray gnatcatcher	Polioptila caerulea	6	7
89	Blue-headed vireo	Vireo solitarius	15	17
90	Blue-tailed bee-eater	Merops philippinus	34	38
91	Bluethroat	Luscinia svecica	18	26
92	Blue-winged teal	Spatula discors	380	
93	Blue-winged warbler	Vermivora cyanoptera	9	10
94	Boat-tailed grackle	Quiscalus major	206	239
95	Bobolink	Dolichonyx oryzivorus	34	
96	Bohemian waxwing	Bombycilla garrulus	56	69
97	Bonaparte's gull	Chroicocephalus philadelphia	222	
98	Bonin petrel	Pterodroma hypoleuca	176	220
99	Brandt's cormorant	Urile penicillatus	2,570	2,682
100	Brant	Branta bernicla	1,370	1,790
101	Brewer's blackbird	Euphagus cyanocephalus	67	73
102	Brewer's sparrow	Spizella breweri	11	
103	Broad-tailed hummingbird	Selasphorus platycercus	4	
104	Broad-winged hawk	Buteo platypterus	490	
105	Bronze mannikin	Spermestes cucullata	9	12
106	Brown booby	Sula leucogaster	1,360	
107	Brown creeper	Certhia americana	8	10
108	Brown noddy	Anous stolidus	189	232
109	Brown pelican	Pelecanus occidentalis	3,702	
110	Brown thrasher	Toxostoma rufum	69	89
111	Brown-crested flycatcher	Myiarchus tyrannulus	44	54
112	Brown-headed cowbird	Molothrus ater	49	57
113	Brown-throated parakeet	Eupsittula pertinax	84	102
114	Budgerigar	Melopsittacus undulatus	29	
115	Buff-breasted sandpiper	Calidris subruficollis	69	78
116	Bufflehead	Bucephala albeola	473	551
117	Bullock's oriole	Icterus bullockii	38	43
118	Burrowing owl	Athene cunicularia	156	
119	Bushtit	Psaltriparus minimus	5	6
120	Cackling goose	Branta hutchinsii	2,180	
121	Cactus wren	Campylorhynchus brunneicapillus	39	47
122	California gull	Larus californicus	841	1,045
123	California quail	Callipepla californica	186	230
124	California towhee	Melozone crissalis	54	61
125	Calliope hummingbird	Selasphorus calliope	3	3
126	Canada goose	Branta canadensis	4,181	4,727
127	Canada jay	Perisoreus canadensis	76	82
128	Canada warbler	Cardellina canadensis	10	12
129	Canvasback	Aythya valisineria	1,252	1,600
130	Cape May warbler	Setophaga tigrina	10	13
131	Caribbean martin	Progne dominicensis	40	42
132	Carolina chickadee	Poecile carolinensis	10	
133	Carolina wren	Thryothorus ludovicianus	21	27
134	Carrion crow	Corvus corone	570	
135	Caspian tern	Hydroprogne caspia	655	782
136	Cassin's finch	Haemorhous cassinii	27	38

Appendix D. Continued (page 7 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
137	Cassin's sparrow	Peucaea cassinii	19	24
138	Cassin's vireo	Vireo cassinii	15	21
139	Cave swallow	Petrochelidon fulva	24	
140	Cedar waxwing	Bombycilla cedrorum	33	40
141	Cerulean warbler	Setophaga cerulea	9	10
142	Chestnut munia	Lonchura atricapilla	13	14
143	Chestnut-collared longspur	Calcarius ornatus	20	22
144	Chestnut-sided warbler	Setophaga pensylvanica	10	11
145	Chihuahuan meadowlark	Sturnella lilianae	112	131
146	Chimney swift	Chaetura pelagica	24	30
147	Chipping sparrow	Spizella passerina	12	15
148	Chuck-will's-widow	Antrostomus carolinensis	109	188
149	Chukar	Alectoris chukar	541	580
150	Cinnamon teal	Spatula cyanoptera	383	470
151	Clapper rail	Rallus crepitans	290	314
152	Clark's grebe	Aechmophorus clarkii	1,341	1,685
153	Clark's nutcracker	Nucifraga columbiana	137	
154	Clay-colored sparrow	Spizella pallida	11	15
155	Cliff swallow	Petrochelidon pyrrhonota	22	27
156	Collared plover	Anarhynchus collaris	28	35
157	Common chaffinch	Fringilla coelebs	22	29
158	Common cuckoo	Cuculus canorus	117	
159	Common eider	Somateria mollissima	2,218	2,895
160	Common gallinule	Gallinula galeata	339	493
161	Common goldeneye	Bucephala clangula	1,120	1,329
162	Common grackle	Quiscalus quiscula	120	142
163	Common ground dove	Columbina passerina	37	
164	Common gull	Larus canus	432	552
165	Common loon	Gavia immer	5,460	6,130
166	Common merganser	Mergus merganser	1,709	2,054
167	Common murre	Uria aalge	1,066	1,202
168	Common myna	Acridotheres tristis	127	140
169	Common nighthawk	Chordeiles minor	79	
170	Common pauraque	Nyctidromus albicollis	53	
171	Common poorwill	Phalaenoptilus nuttallii	50	
172	Common raven	Corvus corax	1,097	
173	Common ringed plover	Charadrius hiaticula	65	75
174	Common snipe	Gallinago gallinago	113	153
175	Common swift	Apus apus	38	43
176	Common tern	Sterna hirundo	120	145
177	Common waxbill	Estrilda astrild	9	11
178	Common wood-pigeon	Columba palumbus	490	614
179	Common yellowthroat	Geothlypis trichas	10	12
180	Connecticut warbler	Oporornis agilis	13	16
181	Cooper's hawk	Accipiter cooperii	529	588
182	Corn crake	Crex crex	169	202
183	Costa's hummingbird	Calypte costae	3	5
184	Couch's kingbird	Tyrannus couchii	39	
185	Crested caracara	Caracara plancus	1,220	1,355
186	Curve-billed thrasher	Toxostoma curvirostre	81	94
187	Dark-billed cuckoo	Coccyzus melacoryphus	54	67

Appendix D. Continued (page 8 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
188	Dark-eyed junco	Junco hyemalis	19	24
189	Dickcissel	Spiza americana	28	
190	Double-crested cormorant	Nannopterum auritum	2,089	
191	Double-striped thick-knee	Hesperoburhinus bistriatus	787	
192	Downy woodpecker	Dryobates pubescens	28	29
193	Dunlin	Calidris alpina	60	
194	Dusky flycatcher	Empidonax oberholseri	10	11
195	Dusky thrush	Turdus eunomus	74	88
196	Eared dove	Zenaida auriculata	136	155
197	Eared grebe	Podiceps nigricollis	422	521
198	Eastern bluebird	Sialia sialis	28	38
199	Eastern cattle egret	Ardea coromanda	372	512
200	Eastern kingbird	Tyrannus tyrannus	43	55
201	Eastern meadowlark	Sturnella magna	112	131
202	Eastern phoebe	Sayornis phoebe	20	23
203	Eastern screech-owl	Megascops asio	194	235
204	Eastern towhee	Pipilo erythrophthalmus	41	47
205	Eastern whip-poor-will	Antrostomus vociferus	57	
206	Eastern wood-pewee	Contopus virens	14	15
207	Egyptian goose	Alopochen aegyptiaca	1,873	2,100
208	Elegant tern	Thalasseus elegans	260	325
209	Emperor goose	Anser canagicus	2,370	
210	Eurasian buzzard	Buteo buteo	969	1,364
211	Eurasian collared dove	Streptopelia decaocto	152	184
212	Eurasian coot	Fulica atra	902	1,200
213	Eurasian curlew	Numenius arquata	869	1,050
214	Eurasian kestrel	Falco tinnunculus	201	260
215	Eurasian moorhen	Gallinula chloropus	415	493
216	Eurasian siskin	Spinus spinus	14	19
217	Eurasian skylark	Alauda arvensis	43	51
218	Eurasian wigeon	Mareca penelope	819	1,073
219	European golden-plover	Pluvialis apricaria	214	260
220	European goldfinch	Carduelis carduelis	16	20
221	European robin	Erithacus rubecula	18	22
222	European starling	Sturnus vulgaris	88	100
223	Evening grosbeak	Coccothraustes vespertinus	60	72
224	Ferruginous hawk	Buteo regalis	1,776	2,047
225	Field sparrow	Spizella pusilla	13	15
226	Fish crow	Corvus ossifragus	300	332
227	Flammulated owl	Psiloscops flammeolus	66	96
228	Fork-tailed storm-petrel	Hydrobates furcatus	54	68
229	Forster's tern	Sterna forsteri	149	173
230	Fox sparrow	Passerella iliaca	35	39
231	Franklin's gull	Leucophaeus pipixcan	280	335
232	Gadwall	Mareca strepera	968	1,250
233	Gambel's quail	Callipepla gambelii	170	207
234	Garden warbler	Sylvia borin	18	25
235	Glaucous gull	Larus hyperboreus	1,855	2,060
236	Glaucous-winged gull	Larus glaucescens	1,180	
237	Glossy ibis	Plegadis falcinellus	663	768
238	Golden eagle	Aquila chrysaetos	4,627	5,280

Appendix D. Continued (page 9 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
239	Golden-crowned kinglet	Regulus satrapa	6	8
240	Golden-crowned sparrow	Zonotrichia atricapilla	32	
241	Golden-fronted woodpecker	Melanerpes aurifrons	85	99
242	Golden-winged warbler	Vermivora chrysoptera	10	11
243	Grasshopper sparrow	Ammodramus savannarum	18	
244	Gray catbird	Dumetella carolinensis	35	44
245	Gray flycatcher	Empidonax wrightii	12	14
246	Gray francolin	Ortygornis pondicerianus	274	
247	Gray heron	Ardea cinerea	1,443	2,073
248	Gray kingbird	Tyrannus dominicensis	47	69
249	Gray partridge	Perdix perdix	418	483
250	Gray vireo	Vireo vicinior	13	15
251	Gray-breasted martin	Progne chalybea	43	48
252	Gray-cheeked thrush	Catharus minimus	33	45
253	Gray-crowned rosy-finch	Leucosticte tephrocotis	25	
254	Gray-headed chickadee	Poecile cinctus	11	13
255	Gray-tailed tattler	Tringa brevipes	127	160
256	Great black-backed gull	Larus marinus	1,829	2,272
257	Great blue heron	Ardea herodias	2,480	
258	Great cormorant	Phalacrocorax carbo	3,240	
259	Great crested flycatcher	Myiarchus crinitus	32	40
260	Great crested grebe	Podiceps cristatus	738	813
261	Great egret	Ardea alba	935	
262	Great frigatebird	Fregata minor	1,662	
263	Great gray owl	Strix nebulosa	1,267	1,700
264	Great horned owl	Bubo virginianus	1,555	2,046
265	Great kiskadee	Pitangus sulphuratus	74	
266	Greater Antillean grackle	Quiscalus niger	94	100
267	Greater prairie chicken	Tympanuchus cupido	933	1,200
268	Greater roadrunner	Geococcyx californianus	376	538
269	Greater sage-grouse	Centrocercus urophasianus	3,190	
270	Greater scaup	Aythya marila	1,054	1,316
271	Greater spotted eagle	Clanga clanga	2,678	
272	Greater white-fronted goose	Anser albifrons	3,000	
273	Greater yellowlegs	Tringa melanoleuca	153	
274	Great-tailed grackle	Quiscalus mexicanus	222	253
275	Green heron	Butorides virescens	212	
276	Greenish warbler	Phylloscopus trochiloides	9	11
277	Green-tailed towhee	Pipilo chlorurus	30	37
278	Green-winged teal	Anas crecca	364	454
279	Gull-billed tern	Gelochelidon nilotica	170	184
280	Gyrfalcon	Falco rusticolus	1,752	2,000
281	Hairy woodpecker	Dryobates villosus	79	
282	Hammond's flycatcher	Empidonax hammondii	11	13
283	Harlequin duck	Histrionicus histrionicus	610	680
284	Harris's hawk	Parabuteo unicinctus	1,047	1,203
285	Harris's sparrow	Zonotrichia querula	37	
286	Hawaiian duck	Anas wyvilliana	644	
287	Hawaiian goose	Branta sandvicensis	2,165	3,050
288	Hawaiian hawk	Buteo solitarius	606	
289	Hawaiian petrel	Pterodroma sandwichensis	434	500

Appendix D. Continued (page 10 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
290	Heermann's gull	Larus heermanni	500	643
291	Helmeted guineafowl	Numida meleagris	1,350	
292	Hermit thrush	Catharus guttatus	30	36
293	Hermit warbler	Setophaga occidentalis	10	13
294	Herring gull	Larus argentatus	1,147	1,775
295	Hooded crow	Corvus cornix	570	
296	Hooded merganser	Lophodytes cucullatus	680	879
297	Hooded oriole	Icterus cucullatus	24	33
298	Hooded warbler	Setophaga citrina	11	13
299	Horned grebe	Podiceps auritus	453	528
300	Horned lark	Eremophila alpestris	32	
301	Horned puffin	Fratercula corniculata	556	
302	House finch	Haemorhous mexicanus	21	26
303	House sparrow	Passer domesticus	28	35
304	Hudsonian godwit	Limosa haemastica	289	
305	Hume's short-toed lark	Calandrella acutirostris	21	23
306	Iceland gull	Larus glaucoides	1,021	1,100
307	Inca dove	Columbina inca	48	57
308	Indian silverbill	Euodice malabarica	12	14
309	Indigo bunting	Passerina cyanea	15	19
310	Island canary	Serinus canaria	24	30
311	Japanese white-eye	Zosterops japonicus	11	
312	Java sparrow	Lonchura oryzivora	25	28
313	Kentish plover	Anarhynchus alexandrinus	42	58
314	Kentucky warbler	Geothlypis formosa	14	17
315	Killdeer	Charadrius vociferus	101	121
316	King rail	Rallus elegans	415	
317	Kirtland's warbler	Setophaga kirtlandii	14	16
318	Ladder-backed woodpecker	Dryobates scalaris	34	41
319	Lanceolated warbler	Locustella lanceolata	11	
320	Lapland longspur	Calcarius lapponicus	28	35
321	Lappet-faced vulture	Torgos tracheliotus	6,969	8,500
322	Lark bunting	Calamospiza melanocorys	38	52
323	Lark sparrow	Chondestes grammacus	29	33
324	Laughing gull	Leucophaeus atricilla	327	371
325	Lawrence's goldfinch	Spinus lawrencei	11	14
326	Lawrence's warbler	Vermivora chrysoptera X cyanoptera	10	11
327	Laysan albatross	Phoebastria immutabilis	3,310	4,100
328	Lazuli bunting	Passerina amoena	16	20
329	Least bittern	Botaurus exilis	86	
330	Least flycatcher	Empidonax minimus	10	12
331	Least sandpiper	Calidris minutilla	24	26
332	Least tern	Sternula antillarum	49	62
333	LeConte's sparrow	Ammospiza leconteii	13	16
334	Lesser black-backed gull	Larus fuscus	880	1,000
335	Lesser goldfinch	Spinus psaltria	10	12
336	Lesser nighthawk	Chordeiles acutipennis	50	64
337	Lesser scaup	Aythya affinis	850	1,050
338	Lesser whitethroat	Sylvia curruca	12	18
339	Lesser yellowlegs	Tringa flavipes	78	96
340	Lilac-crowned parrot	Amazona finschi	302	312

Appendix D. Continued (page 11 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
341	Limpkin	Aramus guarauna	1,080	1,270
342	Lincoln's sparrow	Melospiza lincolnii	17	19
343	Little blue heron	Egretta caerulea	364	
344	Little owl	Athene noctua	164	193
345	Little swift	Apus affinis	25	30
346	Little tern	Sternula albifrons	57	63
347	Loggerhead kingbird	Tyrannus caudifasciatus	44	52
348	Loggerhead shrike	Lanius ludovicianus	48	59
349	Long-billed curlew	Numenius americanus	642	689
350	Long-billed dowitcher	Limnodromus scolopaceus	109	119
351	Long-billed thrasher	Toxostoma longirostre	68	
352	Long-eared owl	Asio otus	337	409
353	Long-tailed duck	Clangula hyemalis	932	
354	Long-tailed jaeger	Stercorarius longicaudus	307	444
355	Louisiana waterthrush	Parkesia motacilla	20	23
356	MacGillivray's warbler	Geothlypis tolmiei	10	13
357	Magnificent frigatebird	Fregata magnificens	1,704	
358	Magnolia warbler	Setophaga magnolia	8	10
359	Mallard	Anas platyrhynchos	1,246	1,580
360	Marbled godwit	Limosa fedoa	391	454
361	Marbled murrelet	Brachyramphus marmoratus	220	269
362	Mariana kingfisher	Todiramphus albicilla	83	102
363	Marsh wren	Cistothorus palustris	12	14
364	McKay's bunting	Plectrophenax hyperboreus	55	62
365	Meadow pipit	Anthus pratensis	18	23
366	Medium egret	Ardea intermedia	516	562
367	Merlin	Falco columbarius	218	281
368	Mississippi kite	Ictinia mississippiensis	311	339
369	Mitred parakeet	Psittacara mitratus	249	275
370	Monk parakeet	Myiopsitta monachus	120	
371	Morelet's seedeater	Sporophila morelleti	9	12
372	Mottled duck	Anas fulvigula	1,043	1,241
373	Mountain bluebird	Sialia currucoides	30	
374	Mountain chickadee	Poecile gambeli	12	15
375	Mourning dove	Zenaida macroura	123	
376	Mourning warbler	Geothlypis philadelphia	12	14
377	Mugimaki flycatcher	Ficedula mugimaki	12	14
378	Muscovy duck	Cairina moschata	2,858	
379	Mute swan	Cygnus olor	11,800	14,300
380	Nacunda nighthawk	Chordeiles nacunda	159	188
381	Nanday parakeet	Aratinga nenday	128	141
382	Nashville warbler	Leiothlypis ruficapilla	8	10
383	Nelson's sparrow	Ammospiza nelsoni	17	20
384	Neotropic cormorant	Nannopterum brasilianum	1,393	1,550
385	Newell's shearwater	Puffinus newelli	323	358
386	Northern bobwhite	Colinus virginianus	178	
387	Northern cardinal	Cardinalis cardinalis	44	52
388	Northern flicker	Colaptes auratus	128	143
389	Northern fulmar	Fulmarus glacialis	649	773
390	Northern gannet	Morus bassanus	3,067	3,610
391	Northern harrier	Circus hudsonius	515	661

Appendix D. Continued (page 12 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
392	Northern hawk owl	Surnia ulula	340	454
393	Northern house wren	Troglodytes aedon	11	13
394	Northern lapwing	Vanellus vanellus	226	317
395	Northern mockingbird	Mimus polyglottos	49	56
396	Northern parula	Setophaga americana	9	10
397	Northern pintail	Anas acuta	1,006	1,245
398	Northern pygmy-owl	Glaucidium gnoma	73	87
399	N. rough-winged swallow	Stelgidopteryx serripennis	16	18
400	Northern saw-whet owl	Aegolius acadicus	131	
401	Northern shoveler	Spatula clypeata	636	908
402	Northern shrike	Lanius borealis	63	81
403	Northern waterthrush	Parkesia noveboracensis	16	20
404	Olivaceous elaenia	Elaenia mesoleuca	17	20
405	Olive sparrow	Arremonops rufivirgatus	23	30
406	Olive-backed pipit	Anthus hodgsoni	21	26
407	Olive-sided flycatcher	Contopus cooperi	32	42
408	Olive-throated parakeet	Eupsittula nana	77	84
409	Orange-crowned warbler	Leiothlypis celata	9	12
410	Orchard oriole	Icterus spurius	19	28
411	Oriental plover	Anarhynchus veredus	98	
412	Oriental turtle dove	Streptopelia orientalis	238	323
413	Osprey	Pandion haliaetus	1,568	1,900
414	Ovenbird	Seiurus aurocapilla	19	21
415	Pacific golden-plover	Pluvialis fulva	140	168
416	Pacific loon	Gavia pacifica	1,830	2,450
417	Pacific wren	Troglodytes pacificus	9	12
418	Painted bunting	Passerina ciris	13	19
419	Pallid swift	Apus pallidus	42	50
420	Palm warbler	Setophaga palmarum	10	13
421	Parasitic jaeger	Stercorarius parasiticus	478	604
422	Pearly-eyed thrasher	Margarops fuscatus	104	138
423	Pectoral sandpiper	Calidris melanotos	98	
424	Pelagic cormorant	Urile pelagicus	2,072	2,440
425	Peregrine falcon	Falco peregrinus	977	1,194
426	Philadelphia vireo	Vireo philadelphicus	12	13
427	Philippine collared dove	Streptopelia dusumieri	153	174
428	Philippine duck	Anas luzonica	891	977
429	Picazuro pigeon	Columba picazuro	279	402
430	Pied-billed grebe	Podilymbus podiceps	474	568
431	Pigeon guillemot	Cepphus columba	530	
432	Pileated woodpecker	Dryocopus pileatus	308	328
433	Pine grosbeak	Pinicola enucleator	56	62
434	Pine siskin	Spinus pinus	13	15
435	Pine warbler	Setophaga pinus	12	17
436	Pin-tailed snipe	Gallinago stenura	113	180
437	Piping plover	Charadrius melodus	55	64
438	Prairie falcon	Falco mexicanus	908	1,133
439	Prairie warbler	Setophaga discolor	8	11
440	Prothonotary warbler	Protonotaria citrea	14	
441	Purple finch	Haemorhous purpureus	23	28
442	Purple gallinule	Porphyrio martinicus	257	

Appendix D. Continued (page 13 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
443	Purple heron	Ardea purpurea	1,112	1,150
444	Purple martin	Progne subis	54	
445	Purple sandpiper	Calidris maritima	68	85
446	Pygmy nuthatch	Sitta pygmaea	11	
447	Rainbow lorikeet	Trichoglossus moluccanus	133	169
448	Red avadavat	Amandava amandava	10	10
449	Red crossbill	Loxia curvirostra	41	48
450	Red knot	Calidris canutus	148	206
451	Red phalarope	Phalaropus fulicarius	62	
452	Red-bellied woodpecker	Melanerpes carolinus	73	
453	Red-billed pigeon	Patagioenas flavirostris	281	308
454	Red-breasted merganser	Mergus serrator	1,135	1,317
455	Red-breasted nuthatch	Sitta canadensis	10	12
456	Red-breasted sapsucker	Sphyrapicus ruber	58	
457	Red-crested cardinal	Paroaria coronata	40	44
458	Red-crowned amazon	Amazona viridigenalis	316	345
459	Reddish egret	Egretta rufescens	614	869
460	Red-eyed vireo	Vireo olivaceus	17	21
461	Red-footed booby	Sula sula	1,223	
462	Redhead	Aythya americana	1,118	1,320
463	Red-headed woodpecker	Melanerpes erythrocephalus	72	91
464	Red-legged kittiwake	Rissa brevirostris	377	489
465	Red-legged partridge	Alectoris rufa	540	547
466	Red-masked parakeet	Psittacara erythrogenys	151	
467	Red-naped sapsucker	Sphyrapicus nuchalis	45	55
468	Red-necked grebe	Podiceps grisegena	1,023	1,270
469	Red-necked phalarope	Phalaropus lobatus	39	
470	Red-necked stint	Calidris ruficollis	27	31
471	Redpoll	Acanthis flammea	13	15
472	Red-shouldered hawk	Buteo lineatus	670	774
473	Red-tailed hawk	Buteo jamaicensis	1,224	
474	Red-tailed tropicbird	Phaethon rubricauda	659	
475	Red-throated loon	Gavia stellata	1,486	1,923
476	Red-vented bulbul	Pycnonotus cafer	46	59
477	Red-wattled lapwing	Vanellus indicus	181	230
478	Redwing	Turdus iliacus	61	80
479	Red-winged blackbird	Agelaius phoeniceus	65	72
480	Ring-billed gull	Larus delawarensis	566	650
481	Ring-necked duck	Aythya collaris	730	1,180
482	Ring-necked pheasant	Phasianus colchicus	1,317	1,861
483	Rock pigeon	Columba livia	369	
484	Rock ptarmigan	Lagopus muta	550	640
485	Rock sandpiper	Calidris ptilocnemis	106	130
486	Rock wren	Salpinctes obsoletus	17	
487	Rook	Corvus frugilegus	489	560
488	Roseate spoonbill	Platalea ajaja	1,490	1,800
489	Roseate tern	Sterna dougallii	112	128
490	Rose-breasted grosbeak	Pheucticus ludovicianus	42	51
491	Rose-ringed parakeet	Psittacula krameri	119	134
492	Ross's goose	Anser rossii	1,640	2,040
493	Rough-legged hawk	Buteo lagopus	1,065	1,660

Appendix D. Continued (page 14 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
494	Royal tern	Thalasseus maximus	470	
495	Ruby-crowned kinglet	Corthylio calendula	7	7
496	Ruby-throated hummingbird	Archilochus colubris	3	4
497	Ruddy duck	Oxyura jamaicensis	629	
498	Ruddy ground dove	Columbina talpacoti	47	57
499	Ruddy turnstone	Arenaria interpres	138	
500	Ruffed grouse	Bonasa umbellus	566	
501	Rufous hummingbird	Selasphorus rufus	4	5
502	Rufous-necked wood rail	Aramides axillaris	292	327
503	Rufous-tailed robin	Larvivora sibilans	17	20
504	Rusty blackbird	Euphagus carolinus	64	80
505	Sabine's gull	Xema sabini	198	214
506	Saffron finch	Sicalis flaveola	20	23
507	Sage thrasher	Oreoscoptes montanus	44	50
508	Sagebrush sparrow	Artemisiospiza nevadensis	19	22
509	Sanderling	Calidris alba	51	
510	Sandhill crane	Antigone canadensis	4,800	
511	Sandwich tern	Thalasseus sandvicensis	208	238
512	Savannah sparrow	Passerculus sandwichensis	21	
513	Say's phoebe	Sayornis saya	21	24
514	Scaled quail	Callipepla squamata	191	234
515	Scaly-breasted munia	Lonchura punctulata	14	15
516	Scaly-naped pigeon	Patagioenas squamosa	312	388
517	Scarlet tanager	Piranga olivacea	28	34
518	Scissor-tailed flycatcher	Tyrannus forficatus	39	
519	Seaside sparrow	Ammospiza maritima	24	29
520	Sedge wren	Cistothorus stellaris	8	9
521	Semipalmated plover	Charadrius semipalmatus	47	57
522	Semipalmated sandpiper	Calidris pusilla	28	
523	Sharp-shinned hawk	Accipiter striatus	174	208
524	Sharp-tailed grouse	Tympanuchus phasianellus	953	1,090
525	Sharp-tailed sandpiper	Calidris acuminata	74	92
526	Short-billed dowitcher	Limnodromus griseus	116	154
527	Short-billed gull	Larus brachyrhynchus	409	459
528	Short-eared owl	Asio flammeus	378	475
529	Short-tailed hawk	Buteo brachyurus	480	710
530	Siberian sand-plover	Anaryhnchus mongolus	64	71
531	Smith's longspur	Calcarius pictus	28	32
532	Snow bunting	Plectrophenax nivalis	42	56
533	Snow goose	Anser caerulescens	2,744	
534	Snowy egret	Egretta thula	371	
535	Snowy owl	Bubo scandiacus	2,279	2,951
536	Snowy plover	Anarhynchus nivosus	42	58
537	Solitary sandpiper	Tringa solitaria	48	65
538	Song sparrow	Melospiza melodia	21	23
539	Song thrush	Turdus philomelos	69	89
540	Sooty tern	Onychoprion fuscatus	175	224
541	Sora	Porzana carolina	75	126
542	South American snipe	Gallinago paraguaiae	113	145
543	Southern lapwing	Vanellus chilensis	327	426
544	Speckled pigeon	Columba guinea	352	371

Appendix D. Continued (page 15 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
545	Spotted dove	Streptopelia chinensis	159	194
546	Spotted flycatcher	Muscicapa striata	16	21
547	Spotted sandpiper	Actitis macularius	40	60
548	Spotted thick-knee	Burhinus capensis	423	450
549	Spotted towhee	Pipilo maculatus	39	46
550	Sprague's pipit	Anthus spragueii	26	30
551	Spruce grouse	Falcipennis canadensis	492	513
552	Spur-winged lapwing	Vanellus spinosus	192	
553	Stilt sandpiper	Calidris himantopus	61	68
554	Sulphur-bellied flycatcher	Myiodynastes luteiventris	47	57
555	Summer tanager	Piranga rubra	30	34
556	Surf scoter	Melanitta perspicillata	1,148	
557	Surfbird	Calidris virgata	216	251
558	Swainson's hawk	Buteo swainsoni	1,109	1,367
559	Swainson's thrush	Catharus ustulatus	30	36
560	Swainson's warbler	Limnothlypis swainsonii	19	20
561	Swallow-tailed kite	Elanoides forficatus	442	510
562	Swamp sparrow	Melospiza georgiana	16	19
563	Tennessee warbler	Leiothlypis peregrina	9	14
564	Thick-billed kingbird	Tyrannus crassirostris	56	59
565	Thick-billed longspur	Rhynchophanes mccownii	27	
566	Townsend's solitaire	Myadestes townsendi	33	39
567	Townsend's warbler	Setophaga townsendi	9	11
568	Tree pipit	Anthus trivialis	25	29
569	Tree swallow	Tachycineta bicolor	21	26
570	Tricolored blackbird	Agelaius tricolor	68	79
571	Tricolored heron	Egretta tricolor	415	
572	Tropical kingbird	Tyrannus melancholicus	37	43
573	Tropical mockingbird	Mimus gilvus	58	66
574	Trumpeter swan	Cygnus buccinator	11,900	14,500
575	Tufted titmouse	Baeolophus bicolor	22	26
576	Tundra swan	Cygnus columbianus	7,200	
577	Turkey vulture	Cathartes aura	2,006	
578	Upland sandpiper	Bartramia longicauda	164	218
579	Varied thrush	Ixoreus naevius	80	100
580	Vaux's swift	Chaetura vauxi	17	21
581	Veery	Catharus fuscescens	32	37
582	Vega gull	Larus vegae	1,147	1,385
583	Vermilion Flycatcher	Pyrocephalus rubinus	14	16
584	Vesper sparrow	Pooecetes gramineus	27	
585	Violet-green swallow	Tachycineta thalassina	14	16
586	Virginia rail	Rallus limicola	84	124
587	Virginia's warbler	Leiothlypis virginiae	8	11
588	Warbling vireo	Vireo gilvus	14	18
589	Wedge-tailed eagle	Aquila audax	3,800	4,750
590	Wedge-tailed shearwater	Ardenna pacifica	388	510
591	Western barn owl	Tyto alba	370	
592	Western bluebird	Sialia mexicana	27	32
593	Western cattle egret	Ardea ibis	372	512
594	Western flycatcher	Empidonax difficilis	11	14
595	Western grebe	Aechmophorus occidentalis	1,429	1,826

Appendix D. Continued (page 16 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
596	Western gull	Larus occidentalis	1,136	
597	Western house-martin	Delichon urbicum	15	20
598	Western kingbird	Tyrannus verticalis	40	44
599	Western marsh harrier	Circus aeruginosus	814	1,030
600	Western meadowlark	Sturnella neglecta	112	
601	Western sandpiper	Calidris mauri	29	
602	Western screech-owl	Megascops kennicottii	236	305
603	Western tanager	Piranga ludoviciana	28	35
604	Western wood-pewee	Contopus sordidulus	13	15
605	Whimbrel	Numenius phaeopus	404	459
606	Whiskered tern	Chlidonias hybrida	90	110
607	White ibis	Eudocimus albus	1,036	1,261
608	White stork	Ciconia ciconia	3,571	4,400
609	White-bellied sea-eagle	Haliaeetus leucogaster	3,300	3,900
610	White-breasted nuthatch	Sitta carolinensis	21	23
611	White-crested elaenia	Elaenia albiceps	15	18
612	White-crowned pigeon	Patagioenas leucocephala	253	
613	White-crowned sparrow	Zonotrichia leucophrys	29	39
614	White-eyed vireo	Vireo griseus	11	14
615	White-faced ibis	Plegadis chihi	697	807
616	White-fronted Swift	Cypseloides storeri	40	40
617	White-rumped sandpiper	Calidris fuscicollis	49	
618	White's thrush	Zoothera aurea	104	130
619	White-tailed hawk	Geranoaetus albicaudatus	928	
620	White-tailed kite	Elanus leucurus	346	
621	White-tailed tropicbird	Phaethon lepturus	367	
622	White-throated sparrow	Zonotrichia albicollis	24	30
623	White-throated swift	Aeronautes saxatalis	32	36
624	White-tufted grebe	Rollandia rolland	424	450
625	White-winged crossbill	Loxia leucoptera	26	
626	White-winged dove	Zenaida asiatica	153	187
627	White-winged scoter	Melanitta deglandi	1,917	2,128
628	White-winged swallow	Tachycineta albiventer	18	21
629	White-winged tern	Chlidonias leucopterus	54	66
630	Whooping crane	Grus americana	5,826	6,356
631	Wild turkey	Meleagris gallopavo	7,800	10,400
632	Willet	Tringa semipalmata	283	327
633	Willow flycatcher	Empidonax traillii	14	16
634	Willow ptarmigan	Lagopus lagopus	613	
635	Wilson's phalarope	Phalaropus tricolor	68	85
636	Wilson's plover	Anarhynchus wilsonia	55	80
637	Wilson's snipe	Gallinago delicata	128	156
638	Wilson's warbler	Cardellina pusilla	7	7
639	Winter wren	Troglodytes hiemalis	9	12
640	Wood duck	Aix sponsa	681	907
641	Wood sandpiper	Tringa glareola	73	130
642	Wood stork	Mycteria americana	2,702	2,780
643	Wood thrush	Hylocichla mustelina	53	76
644	Worm-eating warbler	Helmitheros vermivorum	15	17
645	Wrentit	Chamaea fasciata	15	18
646	Yellow bittern	Botaurus sinensis	94	120

Appendix D. Continued (page 17 of 17)

#	Common name	Scientific name	Body mass (grams)	
			Mean	Max
647	Yellow rail	Coturnicops noveboracensis	61	70
648	Yellow warbler	Setophaga petechia	10	12
649	Yellow-bellied flycatcher	Empidonax flaviventris	12	16
650	Yellow-bellied sapsucker	Sphyrapicus varius	50	62
651	Yellow-billed cuckoo	Coccyzus americanus	64	85
652	Yellow-billed magpie	Pica nuttalli	174	189
653	Yellow-breasted chat	Icteria virens	25	28
654	Yellow-browed warbler	Phylloscopus inornatus	7	8
655	Yellow-chevroned parakeet	Brotogeris chiriri	62	68
656	Yellow-crowned night heron	Nyctanassa violacea	716	
657	Yellow-fronted canary	Crithagra mozambica	13	16
658	Yellow-headed blackbird	Xanthocephalus xanthocephalus	80	86
659	Yellow-headed caracara	Milvago chimachima	329	
660	Yellow-legged gull	Larus michahellis	1,275	1,500
661	Yellow-rumped warbler	Setophaga coronata	12	15
662	Yellow-throated vireo	Vireo flavifrons	18	21
663	Yellow-throated warbler	Setophaga dominica	10	11
664	Zebra dove	Geopelia striata	57	62
665	Zenaida dove	Zenaida aurita	156	205

[1] Body masses for birds from Dunning (2008). Body masses for mammals and reptiles from miscellaneous sources. See Table 18 for number of reported strikes, 1990-2025.