

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



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STRUCTURES

Group Chair's Factual Report

February 10, 2026

TABLE OF CONTENTS

A	ACCIDENT.....	3
B	STRUCTURES GROUP.....	3
C	DETAILS OF THE INVESTIGATION	3
D	FACTUAL INFORMATION.....	4
1.0	BELL 206L COMPOSITE MAIN ROTOR BLADE SYSTEM DESCRIPTION	4
2.0	N216MH DAMAGE.....	5
2.1	Bird Strike Evidence.....	5
2.2	Main Rotor Red Blade Tip Damage.....	7
E	TESTS AND RESEARCH	8
1.0	HISTORY OF US FEDERAL BIRD STRIKE REQUIREMENTS AND RECOMMENDATIONS.....	8
1.1	Federal Aviation Administration (FAA) Code of Federal Regulations (CFR)	8
1.2	Historical NTSB Safety Recommendations	9
1.3	Historical Recommendations from Department of Agriculture	11
2.0	EUROPEAN UNION AVIATION SAFETY AGENCY (EASA) BIRD STRIKE REQUIREMENTS ..	13
3.0	ROTORCRAFT BIRD STRIKE HISTORIC DATA.....	16
3.1	National Data 1990-2024.....	16
3.2	Bird Strike History in New York	20
4.0	VHA 206L MAIN ROTOR BLADE HISTORICAL TIP STRIKES	23
4.1	Blade A041 - Unknown Origin Strike	23
4.2	Blade A149 - Vulture Strike.....	24
4.3	Blade A046 - Oak Tree Strike	25
4.4	Blade A012 - Tree/Branch Strike	26

ATTACHMENTS

- Attachment 1. FAA SAIB AIR-21-17R1
- Attachment 2. ARAC RBSWG Final Report
- Attachment 3. Explanatory Note to Decision 2021-016-R
- Attachment 4. NPA 2021-02

A ACCIDENT

Location: Jersey City, New Jersey
Date: April 10, 2025
Time: 1515 eastern daylight time
Helicopter: Bell 206L-4, registration N216MH

B STRUCTURES GROUP

Group Chair	Leani Benítez-Cardona National Transportation Safety Board Washington, DC
Group Member	Errol Jordheim National Transportation Safety Board Washington, DC
Group Member	Dan McCully Federal Aviation Administration Atlanta, GA
Group Member	Gary Howe Bell Textron, Inc. Hurst, TX
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C DETAILS OF THE INVESTIGATION

While enroute during a sightseeing tour the Bell 206L-4, N216MH had an inflight breakup, resulting in a separation of the main rotor and tail boom from the main fuselage. The group examined the helicopter wreckage on April 11-18, 2025 at the accident site followed by examinations on May 5-9, 2025 at the Bell Textron, Inc. facilities in Fort Worth, TX and on June 16-18, 2025 at the AMF Aviation facilities in Westfield, MA.

D FACTUAL INFORMATION

1.0 Bell 206L Composite Main Rotor Blade System Description

The composite structure of the Van Horn Aviation (VHA) Bell 206L main rotor blades are constructed using a combination of plane-weave (PW) pre-impregnated (prepreg) carbon-fiber with an epoxy resin, unidirectional (UD) prepreg carbon-fiber with an epoxy resin, G10 fiberglass epoxy laminate sheets, and structural foam core (Figure 1). The blade also incorporates tungsten tip balance weights, an internal fiberglass and tungsten balance weight receptacle in the outboard portion of the blade, and Inconel and nickel abrasion strips on the blade leading edge (Figure 2).

The main rotor blade is constructed by laying up the prepreg composite plies around the machined structural foam core with the nose weights, weight receptacle, and leading-edge abrasion strip in place prior to the cure cycle. The blade is then vacuum bagged, debulked, and co-cured as a single piece, meaning that there is no secondary bonding of any of the blade components.

The blade skin is constructed using PW carbon-fiber laminate and is continuous around the leading-edge radius under the abrasion strip. The upper and lower skin sections are joined at the trailing edge of the blade using a UD carbon-fiber laminate trailing edge strip. The trailing edge strip is installed in two pieces, with one piece spanning the main blade section, and a second smaller piece spanning the blade tip section. The upper and lower spar caps are constructed using UD carbon-fiber laminate with a 0 degree fiber orientation in the span-wise direction and spanning from the blade root to the start of the blade tip region. The blade has a tapered PW carbon-fiber composite doubler stack underneath the spar caps at the blade root to provide bearing strength for the hub attachment as well as local stiffness. The abrasion strip is installed in two pieces over the composite skin, with one piece spanning the main blade section, and the second piece spanning the tapered blade tip region. The nose weights reside directly behind the leading-edge skin and are continuous from the outboard edge of the doubler stack out to the start of the blade tip region.

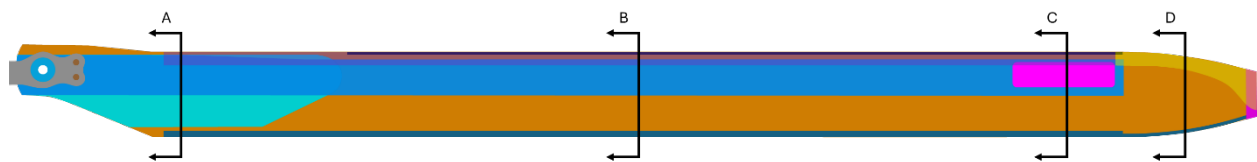


Figure 1. Main rotor blade layout with section cuts (modified VHA diagram)

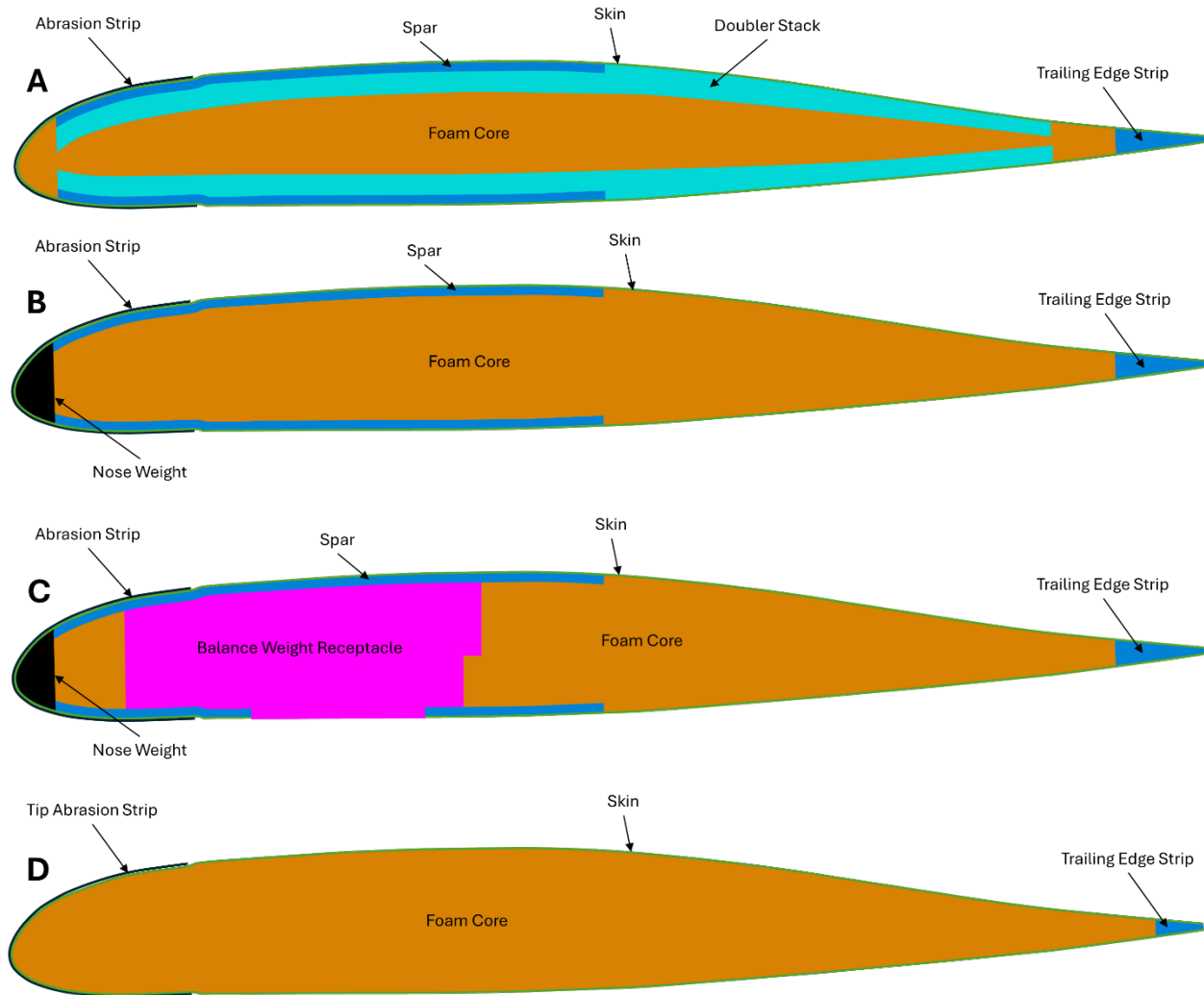


Figure 2. Main rotor blade section cuts at doubler stack region (A), mid-span (B), balance weight receptacle (C), and blade tip (D) (modified VHA diagrams)

2.0 N216MH Damage

2.1 Bird Strike Evidence

The helicopter was sampled for bird remnants on three different occasions: at the accident site, during the examination at the recovery facility, and at the NTSB Headquarters (main rotors only). A total of 126 samples were collected and sent for examination to the Smithsonian Institution's Feather Identification Lab, National Museum of Natural History (NMNH)¹ (Figure 3). Eight different species of birds were identified from these samples. After an expert ornithological assessment the list was refined to those species most likely to cause a catastrophic event (Figure 4). Evidence of a mix-species flock of Brant and Canada Geese was found on the horizontal stabilizer and main rotor blades. The bird wing collected near other helicopter debris

¹ See The Smithsonian Institution's Feather Identification Lab Report.

on a building rooftop was consistent with a Great Black-backed Gull (*Larus marinus*) (Figure 3). The damage to the bird wing was consistent with it being impacted by high-speed, flying debris from the helicopter during the break-up sequence.



Figure 3. Snare observed on the left horizontal stabilizer and left finlet (left), recovered wing next to Smithsonian Institution's Feather Identification Lab's specimen of Great Black-backed Gull (right)

VALIDATED BIRD EVIDENCE AT IMPACT POINTS ON HELICOPTER

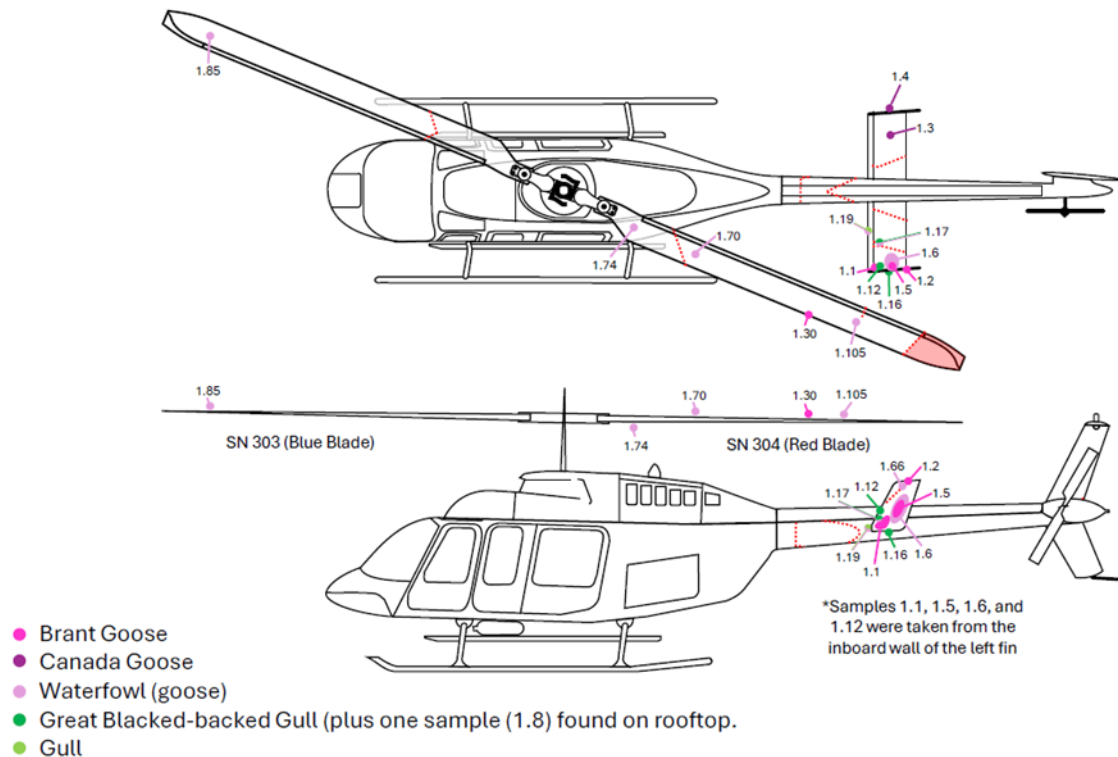


Figure 4. Validated Bird Evidence Sample Locations (provided by the Smithsonian Institution's Feather Identification Lab report Attachment 2)

Male and female samples of Brant Goose were collected from the helicopter rotor blades, left horizontal stabilizer, and left finlet. The samples for Canada Goose and Great Black-backed Gull were all female, with Canada Goose found on the right horizontal stabilizer and Great Black-backed Gull found on the left horizontal stabilizer. Bird weight is directly correlated with the severity of impact damage to aircraft in a bird strike event. The mean weight of a Brant Goose is 3.1 lbs. (male) and 2.7 lbs. (female). The mean weight of a female Canada Goose is 7.7 lbs. The mean weight of a female Great Black-backed Gull is 3.3 lbs.

2.2 Main Rotor Red Blade Tip Damage

Each main rotor blade is assigned a color, red or blue, to identify its position in the main rotor system. Complete red and blue blade damage can be found in NTSB Airworthiness Factual Report.

The red blade, part number 20633000-101 and serial number A304, remained attached to the main rotor assembly but was partially fractured. The full length of the

trailing edge had separated, allowing most of the foam core to separate from the blade. The trailing edge strip was not recovered. Abrasion strip damage from the leading edge to the trailing edge was found on the red blade at STA 202 (Figure 5). About 21 inches of the blade tip was missing including the tip abrasion strip and tip trailing edge strip. The blade skins were fractured chordwise immediately outboard of the main abrasion strip, transitioning to a 45 degree fracture immediately aft of the weight receptacle region. The separated blade tip was not recovered.



Figure 5. Red blade STA 202 damage

Both red and blue main rotor blades were retained and submitted to the NTSB Materials Laboratory for further examination².

E TESTS AND RESEARCH

1.0 History of US Federal Bird Strike Requirements and Recommendations

1.1 Federal Aviation Administration (FAA) Code of Federal Regulations (CFR)

14 CFR Part 27 dated July 14, 2025 provides Airworthiness Standards for Normal Category Rotorcraft. Currently, there are no bird strike certification requirements for this category.

14 CFR Part 29 dated July 14, 2025 provides Airworthiness Standards for Transport Category Rotorcraft. § 29.631 Bird Strike was originally established in 1996 and states the following:

² NTSB Materials Laboratory Factual Report.

The rotorcraft must be designed to ensure capability of continued safe flight and landing (for Category A³) or safe landing (for Category B⁴) after impact with a 2.2-lb (1.0 kg) bird when the velocity of the rotorcraft (relative to the bird along the flight path of the rotorcraft) is equal to V_{NE} or V_H (whichever is the lesser) at altitudes up to 8,000 feet. Compliance must be shown by tests or by analysis based on tests carried out on sufficiently representative structures of similar design.

1.2 Historical NTSB Safety Recommendations

On January 4, 2009, about 1409 central standard time, a dual-engine Sikorsky S-76C++ helicopter departed controlled flight and crashed into marshy terrain about 7 minutes after takeoff. Both pilots and six passengers on board were fatally injured, and one passenger was seriously injured. The helicopter was substantially damaged. The helicopter departed Lake Palourde Base Heliport in Amelia, Louisiana, enroute to the South Timbalier oil platform in the Gulf of Mexico⁵.

After this event, the NTSB issued 6 recommendations to the FAA on the topic of bird strike damage to rotorcraft on November 23, 2010. The 6 recommendations are summarized below.

1. SR A-10-138 - Issue a certification policy to require that operators of helicopters with windshields with demonstrated bird-strike resistance not be permitted to replace those windshields with ones that have not been demonstrated to be resistant to bird strikes.

The NTSB concurred with the FAA statement that this recommendation would require an amendment to 14 CFR Part 21.101(b), "Designation of Applicable Regulations" which would not be practical due to the time, difficulty, and potentially unpredictable results. Consequently, SR A-10-138 was classified CLOSED–RECONSIDERED on 6/11/2015.

2. SR A-10-139 - Evaluate the feasibility of retrofitting helicopters manufactured before 1996 with windshields that meet the current bird-strike requirements.

The NTSB was satisfied with the evaluation of the FAA that this recommendation would not be economically feasible. Consequently, SR A-10-139, was classified CLOSED–ACCEPTABLE ACTION on 9/20/2012.

³ Category A are typically rotorcraft with a maximum weight greater than 20,000 pounds and 10 or more passenger seats. Refer to 14 CFR Part 29 Subpart A § 29.1.

⁴ Category B are typically rotorcraft with a maximum weight of 20,000 pounds or less and nine or less passenger seats. Refer to 14 CFR 29 Subpart A § 29.1.

⁵ CEN09MA117 - Sikorsky S-76C Birdstrike.

3. SR A-10-140 - Evaluate the feasibility of requiring manufacturers to equip new helicopters, built under the old certification requirements, with windshields that meet the current bird-strike requirements.

The NTSB was satisfied with the evaluation of the FAA that this recommendation would not be economically feasible. Consequently, SR A-10-139, was classified CLOSED–ACCEPTABLE ACTION on 9/20/2012.

4. SR A-10-141 - Require helicopter manufacturers to develop helicopter-specific guidance (based on the helicopter's demonstrated capability to withstand a specific level of bird-strike impact energy) that will assist pilots in devising precautionary helicopter operational strategies for minimizing the severity of helicopter damage sustained during a bird strike, should one occur, when operating in areas of known bird activity.

The NTSB was satisfied with the publication of Special Airworthiness Information Bulletin (SAIB) AIR-21-17⁶, "Rotorcraft Bird Strike Protection and Mitigation," on 9/13/2021. Consequently, SR A-10-141 was classified CLOSED--ACCEPTABLE ALTERNATE ACTION on 10/21/2022.

5. SR A-10-146 - Update the 14 CFR Part 29 transport-category helicopter bird-strike standards so that they are consistent with the latest military and civilian bird-strike database information and trends in bird populations.

The NTSB recognized the FAA's efforts to inform operators about strategies that can reduce the potential for a bird strike and minimize the severity of helicopter damage sustained during a bird strike are positive; however, those actions were not an acceptable alternative to the regulatory changes recommended in SR A-10-146. Therefore, SR A-10-146 was classified CLOSED UNACCEPTABLE ACTION on 10/21/2022.

6. SR A-10-147 - Revise 14 CFR Part 27 to specify a bird weight and velocity of impact that the helicopter must withstand and still be able to land safely and that the windshield must withstand without penetration. Consider current military and civilian bird-strike database information and trends in bird populations in drafting this revision.

The NTSB recognized the FAA's efforts to inform operators about strategies that can reduce the potential for a bird strike and minimize the severity of helicopter damage sustained during a bird strike are positive; however, those actions were not an acceptable alternative to

⁶ See Attachment 1 - FAA SAIB AIR-21-17R1.

the regulatory changes recommended in SR A-10-147. Therefore, SR A-10-147 was classified CLOSED UNACCEPTABLE ACTION on 10/21/2022.

1.3 Historical Recommendations from Department of Agriculture

The “Rotorcraft bird strike working group (RBSWG) recommendations to the aviation rulemaking advisory committee (ARAC)”⁷ report from November 10, 2017, last revised on May 8, 2019, is a comprehensive analysis of the reported bird strikes to rotorcraft from 1990 to 2015. The group analyzed wildlife, the bird strike events, and historical trends to provide recommendations for regulations with the intent of reducing the number of events and improving their survivability.

The RBSWG report stated:

As of the beginning of 2017, Part 27 normal category rotorcraft comprise approximately 94% of rotorcraft operating in the U.S. based on data analyzed during this study. Bird strike data from the FAA’s National Wildlife Strike Database (NWSD) indicates about 75% of reported bird strikes from 1990-2013 involved normal category rotorcraft. These percentages suggest that an absence of bird strike protective requirements for normal category rotorcraft presents a risk for most U.S. rotorcraft.

According to the RBSWG report, bird strikes increased by 57% since 2009 and over 700% since the early 2000s for rotorcraft⁸. Additionally, the report found that rotorcraft are more vulnerable to bird strikes than fixed-wing aircraft due to their operating profiles, including lower altitudes and off-airfield environments. In contrast with airplanes, for rotorcraft, two-thirds of the recorded bird strikes occurred during the enroute phase, with 8-9% during approach and 9-10% during climb.

The RBSWG report included the following recommendations for the FAA. The FAA included some of the recommendations from the NTSB and RBSWG into SAIB AIR-21-17R1 dated October 3, 2023⁷. SAIBs are informational only, not mandatory. Refer to the RBSWG report for the complete recommendations.

1. Part 27 Normal Category: The RBSWG proposes the following new airworthiness standard, 14 CFR § 27.631 for newly type certificated Part 27 normal category rotorcraft. The RBSWG does not recommend implementing bird strike regulations

⁷ See Attachment 2 - ARAC RBSWG Final Report.

⁸ The RBSWG report clarifies that the likely reason for increased reporting after 2009 was two significant bird strike events that occurred early in 2009: the January 4th fatal crash of N748P, PHI Sikorsky S-76C++ outside Morgan City, Louisiana and the January 15th US Airways Flight 1549 Airbus A320-214 that ditched in the Hudson River adjacent to Manhattan Island, New York.

via § 27.2 (Special retroactive requirements) for newly manufactured normal category rotorcraft.

The rotorcraft with a maximum passenger seats of 6 to 9 must be designed to ensure capability of safe landing after impact upon the windshield with a 2.2-lb (1.0-kg) bird when the velocity of the rotorcraft (relative to the bird along the flight path of the rotorcraft) is equal to V_{NE} or V_H (whichever is the lesser) at altitudes up to 8,000 feet. Compliance must be shown by tests or by analysis based on tests carried out on sufficiently representative structures of similar design.

2. Part 29 Transport Category: The RBSWG recommends keeping the current regulation for newly type certificated Part 29 transport category rotorcraft. The RBSWG proposes the following addition to airworthiness standard, 14 CFR § 29.2 (Special retroactive requirements) for newly manufactured transport category rotorcraft.

For each rotorcraft manufactured after January 1st, 2030,

- (a) with maximum passenger seats of 15 or more, each applicant must show compliance to 14 CFR § 29.631.*
 - (b) with maximum passenger seats of 10 to 14, each applicant must show compliance to 14 CFR § 29.631 applied only to the windshield and flight critical equipment/components forward of the main rotor mast that could prevent continued safe flight and landing for Category A or a safe landing for Category B rotorcraft.*
3. The RBSWG recommends a policy that encourages upgrading existing rotorcraft and/or implementing bird strike safety procedures for all rotorcraft operators.
 4. The RBSWG recommends that rotorcraft original equipment manufacturers (OEMs), or third-parties with Parts Manufacturer Approval (PMA), develop and certify optional retrofit kits, particularly bird strike resistant (BSR) windshields, for each rotorcraft model type delivered after 1996 (when 14 CFR § 29.631 became effective with Amendment 29-40) that achieves an equivalent level of protection as the corresponding newly type certificated rotorcraft.
 5. The RBSWG recommends that policy and guidance material be developed for windshield penetration requirements, temperature range requirements during bird strike test, guidance on the effect of shock pulse to critical equipment, and guidelines on substantiation techniques for compliance with bird strike requirements.

6. The RBSWG further recommends that guidance be developed for operators to implement bird strike safety procedures which include reduced airspeed when practical, increased altitude as quickly as possible and practical, utilization of personal protective equipment (PPE), and the utilization of taxi and/or landing lights.
7. The RBSWG also recommends that a CAUTION be posted in all Rotorcraft Flight Manuals (RFMs) stating the following.

CAUTION: Operating rotorcraft in areas of high concentrations of birds or flocking birds increases likelihood of a damaging bird strike as airspeed increases and altitude AGL decreases. When operating the rotorcraft at lower altitudes during takeoff and climb-out, the rotorcraft should be operated at lower airspeeds to decrease the likelihood and severity of a potential bird strike. Though regional differences exist during spring and fall migration periods, operating a rotorcraft at altitudes below 2,500 feet AGL may increase the likelihood of a damaging bird strike.

8. The RBSWG recommends that air carriers and general aviation operators, working with the Flight Standards District Office (FSDO) Safety Programs and Flight Service Briefing, should identify and publish known locations and probability of bird concentrations.
9. The RBSWG recommends that research in non-traditional means of bird strike protection be accelerated.
10. Due to the sizable growth rate in the population of larger and medium size bird species, the United States Department of Agriculture (USDA) is encouraged to continue management of large and medium birds near airports in the U.S.

2.0 European Union Aviation Safety Agency (EASA) Bird Strike Requirements

On December 17, 2021, EASA published Amendment 9 to Certification Specification (CS)-27 (Small Rotorcraft) which introduced CS 27.631 'Bird strike' to ensure safe landing after a bird strike on the windshield of rotorcraft with six or more passenger seats. Paragraph 27.631 bird strike states the following:

Rotorcraft with six or more passenger seats must be designed to ensure a safe landing after a strike upon the windshield by a 1.0-kg (2.2-lb) bird when the velocity of the rotorcraft relative to the bird along the flight path of the rotorcraft is equal to V_{NE} or V_H 'True Airspeed' (TAS), whichever is less, at altitudes up to 2 438 m (8 000 ft). The applicant must demonstrate compliance through tests, or analysis based on tests that are carried out on sufficiently representative structures of similar design.

An associated Acceptable Means of Compliance (AMC) (AMC1 27.631) to support the application of CS 27.631⁹ was also released with Amendment 9 to CS-27. AMC 27.631 bird strike states the following:

- (a) *To demonstrate the remaining capability of the rotorcraft after a single bird strike, the applicant should evaluate the parts of the rotorcraft as follows:*
 - (1) *the windshield directly in front of the occupants and its supporting frame should be capable of withstanding a bird strike without penetration; and*
 - (2) *any systems and equipment (including their controls) that are essential to ensure a safe landing and are installed near the windshield and its supporting frame should remain operative in case of shock loads resulting from a bird strike.*

Note: the capability to withstand multiple bird strikes is only evaluated for engines as specified under CS-E 800 'Bird Strike and Ingestion'.

- (b) *For the demonstration under point (a), the altitude range within which the velocity V_H is evaluated should be defined and should not exceed 2 438 m (8 000 ft).*

CS 27.631 'Bird Strike' came out of Rulemaking Task (RMT).0726 from the European Plan for Aviation Safety (EPAS) 2021-2025 and was derived from CS 29.631 'Bird Strike' which is applicable to Large Rotorcraft¹⁰. Paragraph 29.631 bird strike states:

The rotorcraft must be designed to ensure a continued safe flight and landing (for Category A) or a safe landing (for Category B) after a strike with a 1.0-kg (2.2-lb) bird when the velocity of the rotorcraft relative to the bird along the flight path of the rotorcraft is equal to V_{NE} or V_H 'True Airspeed' (TAS), whichever is less, at altitudes up to 2 438 m (8 000 ft). The applicant must demonstrate compliance through tests, or analysis based on tests that are carried out on sufficiently representative structures of similar design.

An associated AMC (AMC 29.631) to support the application of CS 29.631 bird strike states the following:

This AMC supersedes AC 29.631 of Federal Aviation Administration (FAA) Advisory Circular (AC) 29 2C. The applicant should consider this AMC to demonstrate compliance with CS 29.631.

- (a) *To demonstrate the remaining capability of the rotorcraft after a single bird strike, the applicant should evaluate the following parts of the rotorcraft:*

⁹ See Attachment 3 - EASA Explanatory Note to ED Decision 2021/016/R.

¹⁰ See Attachment 4 - Notice of Proposed Amendment (NPA) 2021-02, RMT.0726 - Subtask 1.

- (1) *the windshield directly in front of the occupants and its supporting frame, which should be capable of withstanding a bird strike without penetration; and*
- (2) *other exposed structures, systems, and equipment, particularly flight control surfaces (including the main and tail rotors) and any exposed flight control system components.*
 - (i) *The applicant should make a final selection of the areas to be evaluated based on a comprehensive hazard analysis of the following:*
 - (A) *the damage to the structures, equipment, or systems that are exposed to the trajectory of the bird, based on conservative assumptions; and*
 - (B) *the criticalities of those exposed items and their capability to ensure a continued safe flight and landing (for Category A) or a safe landing (for Category B).*
 - (ii) *When performing the hazard analysis, the applicant should consider the following effects of a bird strike:*
 - (A) *direct effects to ensure the integrity of the structures and the functionality of the systems or equipment (also considering shock loads) that are critical for a continued safe flight and landing (for Category A) or a safe landing (for Category B), as applicable; and*
 - (B) *induced effects to examine the possible consequences of pieces ejected from the structures, systems, or equipment that are struck by a bird on other structures, systems, and equipment.*

Note: the capability to withstand multiple bird strikes is only evaluated for engines as specified under CS-E 800 'Bird Strike and Ingestion'.

- (b) *For the demonstration under point (a), the altitude range within which the velocity V_H is evaluated should be defined and should not exceed 2 438 m (8 000 ft).*

CS 27.631 'Bird Strike' was developed in response to an observed upward trend in bird strikes to rotorcraft that resulted in bird penetration into the cockpit. The upward trend in rotorcraft bird strike occurrences since 2009 was confirmed by EASA's occurrence database (Figure 6). Additionally, EASA cited the following reports and studies to support their safety risk assessment:

- EASA/Atkins, *Bird Strike Damage & Windshield Bird Strike*, Final Report, 5078609-rep-03, Version 1.1;
- ICAO Electronic Bulletin, *2008-2015 Wildlife Strike Analysis (IBIS)*, EB 2017/25, 12 May 2017;

- FAA, *Rotorcraft Bird Strike Working Group Recommendations to the Aviation Rulemaking Advisory Committee (ARAC)*, Revision B, 8 May 2019; and
- *Wildlife Strikes to Civil Aircraft in the United States 1990-2005*, Cleary, Dolbeer, & Wright, June 2006.

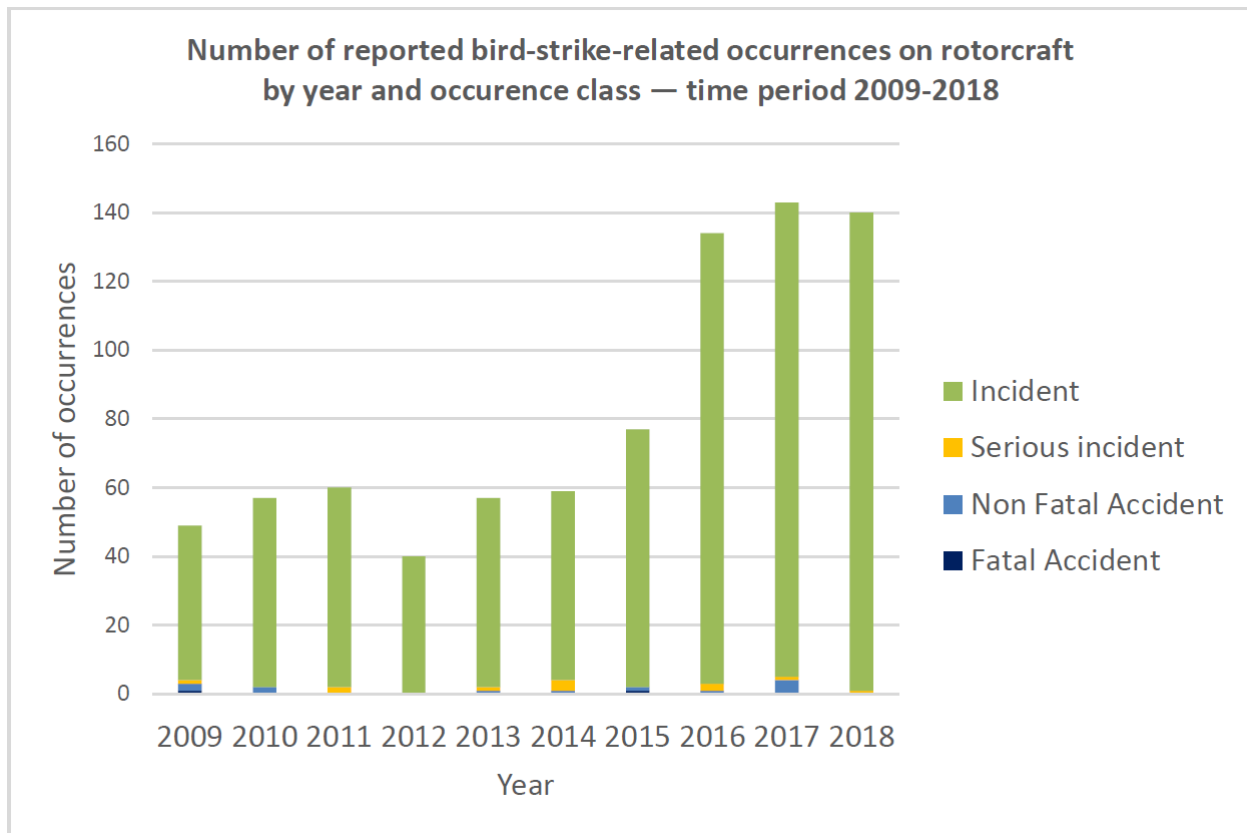


Figure 6. Rotorcraft bird strike occurrences in EASA's occurrence database 2009-2018 (Figure from NPA 2021-02 - Rotorcraft occupant safety in the event of a bird strike)

3.0 Rotorcraft Bird Strike Historic Data

3.1 National Data 1990-2024

Dr. Richard A. Dolbeer, science advisor of Wildlife Services to the USDA Airport Wildlife Hazards Program provided the following data for bird strikes involving civil rotorcraft by body mass of bird in the USA. From 1990 to 2024, 4,902 strikes involving birds and civil rotorcraft were reported to the FAA NWSD¹¹. The mean body mass of the species involved in the strike could be determined for 4,007

¹¹ Dolbeer, R. A., M. J. Begier, P. R. Miller, J. R. Weller, and W. Major. 2025. *Wildlife strikes to civil aircraft in the United States, 1990-2024*

of the strike events. Table 1 and Figure 7 show the distribution and trends of strikes involving birds with mean body masses ≤ 2.2 lbs and > 2.2 lbs, between 1990-2024.

Birds identified as having a mean body mass ≤ 2.2 lbs resulted in 86% (3452 of 4007) of strikes while birds identified as having mean body mass > 2.2 lbs resulted in 14% (555 of 4007) of strikes to civil rotorcraft. 28% (153 of 555) of strikes with birds identified as having a mean body mass > 2.2 lbs resulted in substantial damage or destruction of the aircraft compared to 4% (149 of 3,452) of strikes with birds identified as having a mean body mass ≤ 2.2 lbs. Of the total events that resulted in destroyed rotorcraft or substantial damage, 45% (149 of 334) were strikes with birds identified as having a mean body mass ≤ 2.2 lbs and 46% (153 of 334) were strikes with birds identified as having a mean body mass > 2.2 lbs.

Table 1. Damage level for bird strikes involving civil rotorcraft by body mass of bird, USA, 1990-2024. Provided by USDA Airport Wildlife Hazards Program Wildlife Services.

Bird body mass (lbs)	Damage level			Total
	None	Minor or unknown level	Substantial or destroyed	
≤ 2.2	2,966	337	149	3,452
> 2.2	225	177	153	555
Unknown	786	77	32	895
Total	3,977	591	334	4,902

The data was broken down year over year starting in 1990 to 2024 and by body mass of the birds (Figure 7). The data shows a significant trend of increased reports of bird strike events with rotorcraft. The increase is significantly larger for birds identified as having a mean body mass ≤ 2.2 lbs. For this category, reports remained constant, under 50, from 1990 to 2008, spiked to about 100 in 2009 and to about 200 in 2011 where they remained until 2024 when they increased to over 250. Reporting of strikes with birds identified as having a mean body mass > 2.2 lbs also increased year over year at steady rate going from less than 5 in 1990 to less than 30 in 2024 with a maximum of about 35 in 2020.

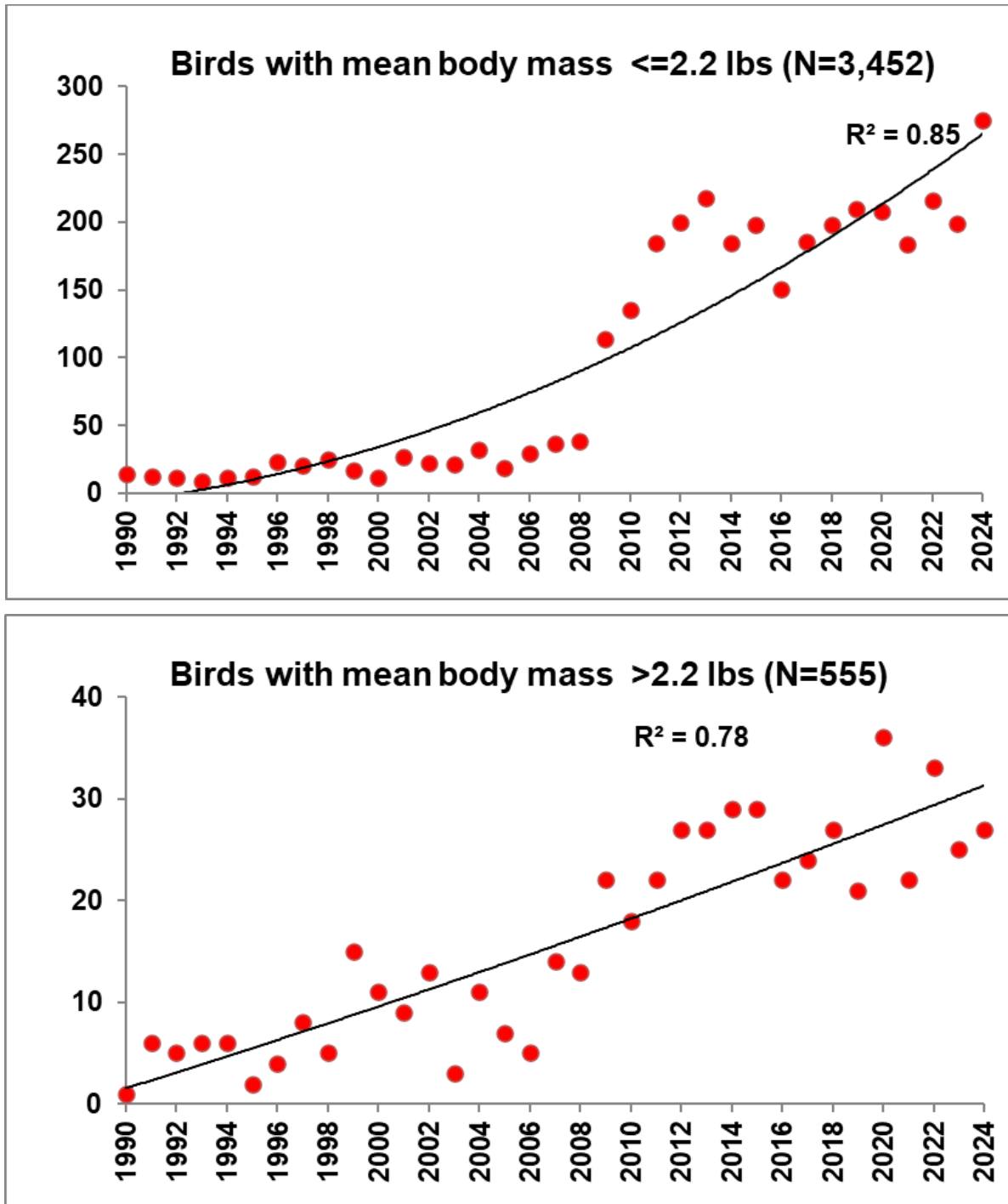


Figure 7. Reported strikes involving civil rotorcraft and birds with mean body mass ≤ 2.2 lbs (top graph) and > 2.2 lbs (bottom graph), USA, 1990-2024. Provided by USDA Airport Wildlife Hazards Program Wildlife Services.

Figure 8 shows the same data but limited to events that resulted in substantial damage or destruction of the rotorcraft. Both graphs show year over year increase in reported strikes that resulted in substantial damage or destroyed rotorcraft for birds ≤ 2.2 lbs and birds > 2.2 lbs for the period of 1990-2024.

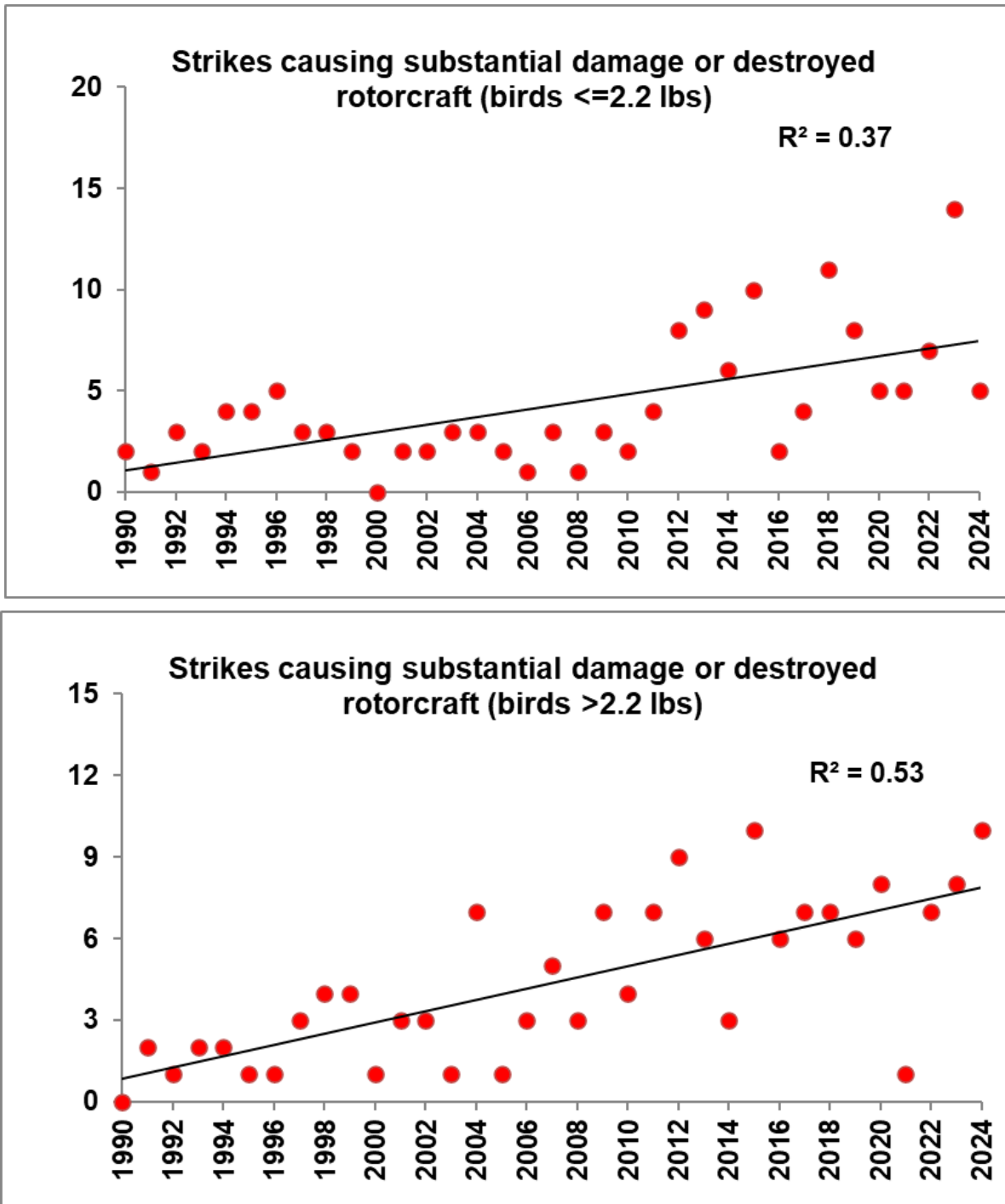


Figure 8. Civil rotorcraft destroyed or substantial damaged after striking birds with mean body mass ≤ 2.2 lbs (top graph) and >2.2 lbs (bottom graph), USA, 1990-2024. Provided by United States Department of Agriculture Airport Wildlife Hazards Program Wildlife Services.

3.2 Bird Strike History in New York City

The Smithsonian Institution's Feather Identification Lab report¹ includes information on the commonality of Brant Geese, Canada Geese, and Great Black-backed Gull in the area around New York City (NYC) airports. It states the following:

For Brant Geese:

The FAA Wildlife Strike Database has records of 17 Brant strikes at NYC airports (LGA, JFK, EWR) from 2020 to 2025 with 3 occurring so far [December 11] in 2025. April and October are the months with the most strikes at these 3 airports. Brant Geese may comingle in flocks with Canada Geese but are typically not the dominant species in a mixed flock and usually represent few birds in a larger flock of Canada Geese. Brant are migratory in the New York City area and are gathering and moving around in preparation to migrate north to breed in April.

For Canada Geese:

This species is common in the NYC area and sightings were reported all along the Hudson River in April 2025. The FAA Wildlife Strike Database has records of 36 Canada Goose strikes at NYC airports (LGA, JFK, EWR) from 2020 to 2025 with 5 occurring so far [December 11] in 2025.

For Great Black-backed Gull:

This species is common in the NYC area and sightings were reported all along the Hudson River in April 2025. Review of video footage from various sources shows large, single birds with the silhouette of 'gull' flying singly along the river. The FAA Wildlife Strike Database has records of 14 Great Black-backed Gull strikes at NYC airports (LGA, JFK, EWR) from 2020 to 2025 with 1 occurring so far [December 11] in 2025. April is the month with the highest number Great Black-backed Gull strikes at these 3 airports.

The population density of these bird species in the NYC area is also confirmed by the sightings reported for April 2025 on eBird.org¹² (Figure 9). The sighting maps show the population density of these birds around the Hudson River in the same area as the sightseeing helicopter flight paths.

¹² eBird.org is an electronic platform that collects bird sighting data. eBird is among the world's largest biodiversity-related science projects, with more than 100 million bird sightings contributed annually by eBirders around the world.

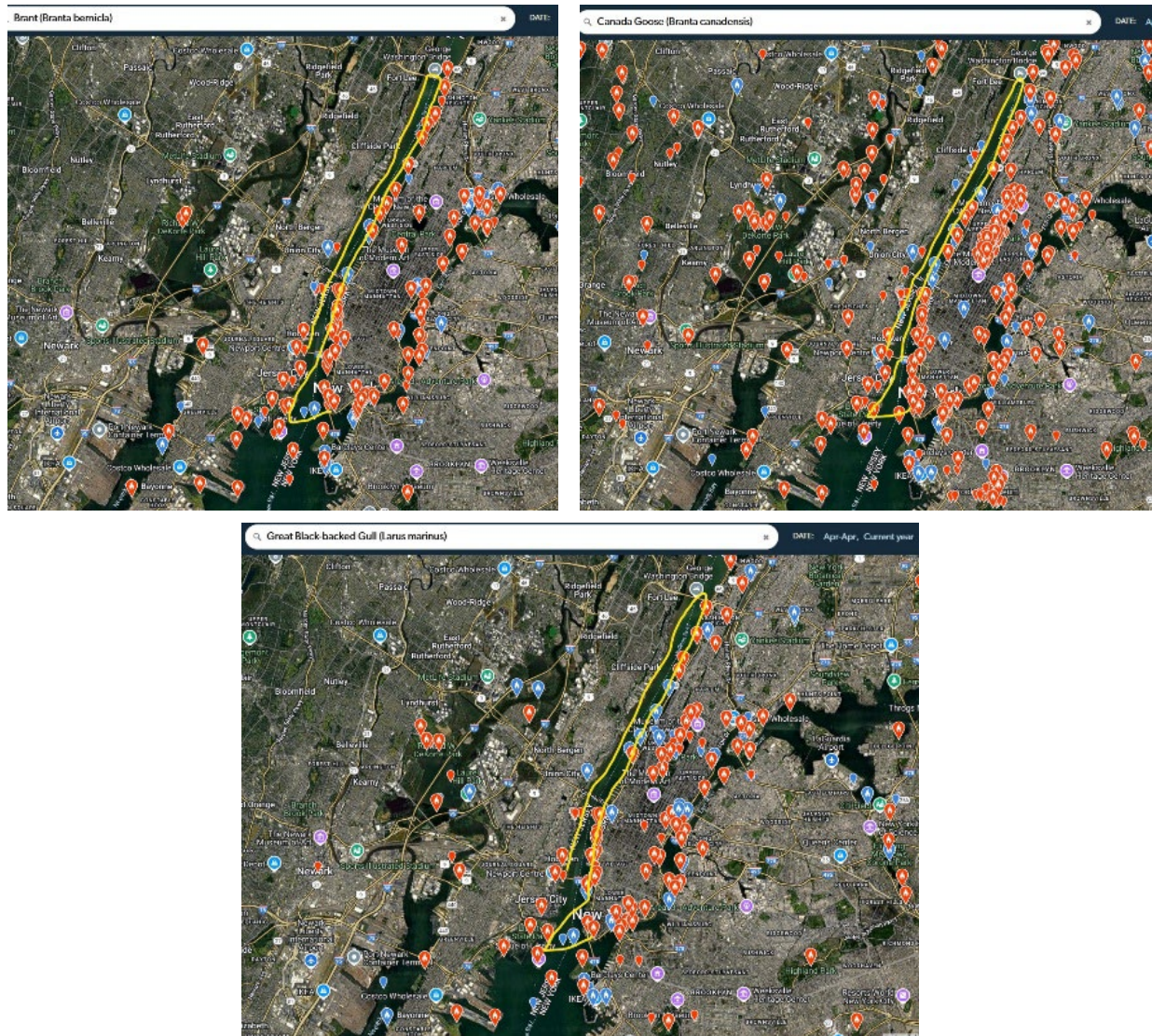


Figure 9. eBird.org data of sightings¹³ of Brant Geese (top left), Canada Geese (top right), and Great Black-backed Gull (bottom) in the NYC around the flight path of the accident helicopter (yellow) (provided by Smithsonian Institution's Feather Identification Lab)

According to FAA NWSD, historically the annual number of bird strike events of Brant Geese with civilian aircraft (data includes fixed wing and rotorcraft) was approximately constant with significant year over year (2010-2024) variability. The month of April (accident month) represented the highest number of reported bird strikes (Figure 10).

¹³ Red map pins are bird sightings for the species of interest. Blue, purple, and green pins are map locations and do not represent bird sightings.

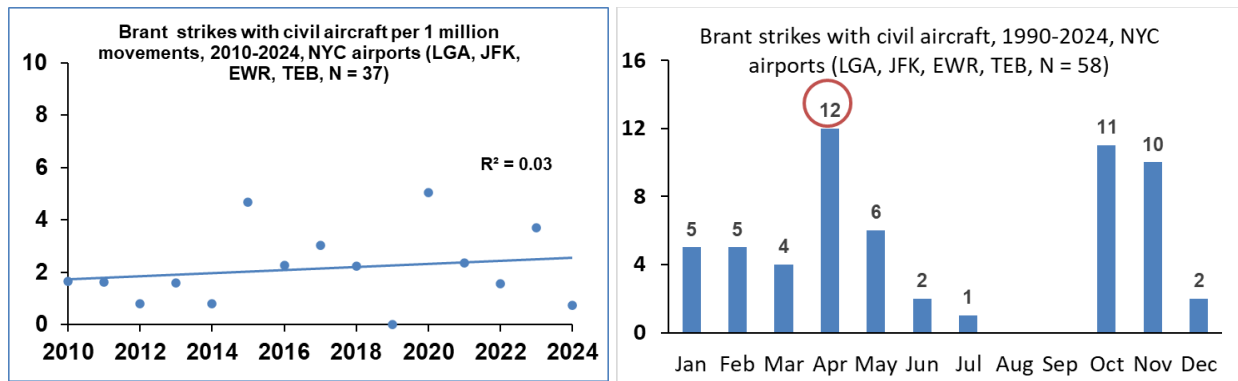


Figure 10. Brant Geese bird strikes with civilian aircraft year over year (left) and by month (right) (source: FAA NWSD provided by Smithsonian Institution’s Feather Identification Lab)

There has been a year over year (2010-2024) increase of bird strike events of Canada Geese with civilian aircraft with the month of October representing the highest number of reported bird strikes (Figure 11). The month of April (accident month) reported an average number of bird strikes.

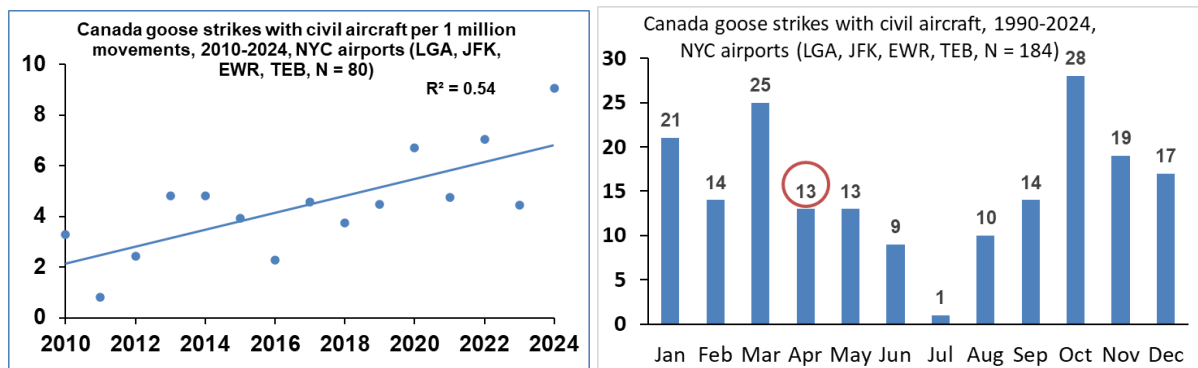


Figure 11. Canada Geese bird strikes with civilian aircraft year over year (left) and by month (right) (source: FAA NWSD provided by Smithsonian Institution’s Feather Identification Lab)

Similar to the Brant Geese, the annual number of bird strike events of Great Black-backed Gull with civilian aircraft was approximately constant with significant year over year (2010-2024) variability and with the month of April (accident month) representing the highest number of reported bird strikes (Figure 12).

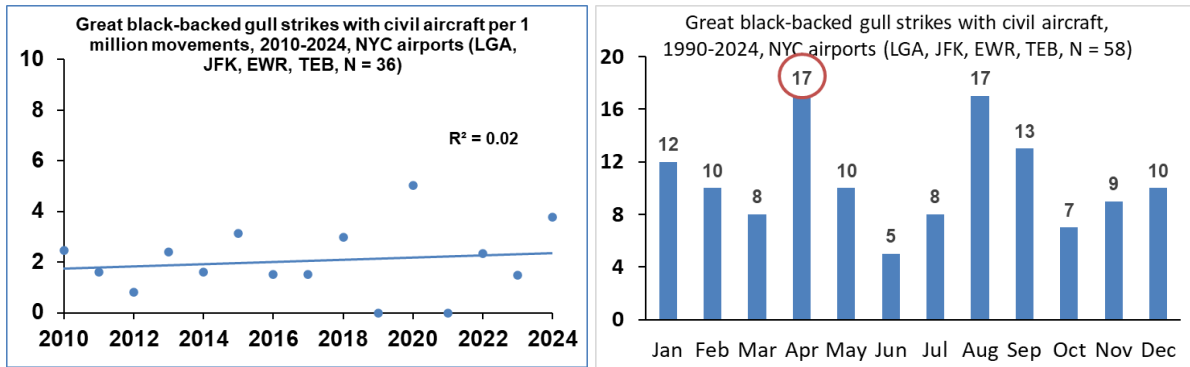


Figure 12. Great Black-backed Gull bird strikes with civilian aircraft year over year (left) and by month (right) (source: FAA NWSD provided by Smithsonian Institution’s Feather Identification Lab)

4.0 VHA 206L Main Rotor Blade Historical Tip Strikes

Van Horn Aviation provided a list of Bell 206L main rotor blades that were sent back to the manufacturer due to impact damage. In total, there were 46 blades sent back from 2019 to 2025, with 12 being scrapped and 34 being repaired and returned to service. The repaired blades broadly exhibited denting to the abrasion strip, paint chipping/cracking, and voids between the blade skin and core at or aft of the impact location. They were all repaired with a combination of resin injection to repair the core void and abrasion strip replacement. Of the 12 scrapped blades, 6 were scrapped for reasons directly related to the tip damage and 6 were scrapped for other reasons. Of the 6 scrapped due to tip strike damage, 4 showed visible laminate damage with 3 exhibiting split trailing edges. Those 4 blades are further detailed below.

4.1 Blade A041 - Unknown Origin Strike

The main rotor blade tip damage was due to inflight impact with an unknown object (Figure 13). The strike resulted in an approximately 1 inch crack in the leading edge of the abrasion strip approximately 8 inches inboard from the end of the blade. The strike caused the delamination of the trailing edge strip from the blade tip upper skin which propagated inboard and outboard from the strike location.

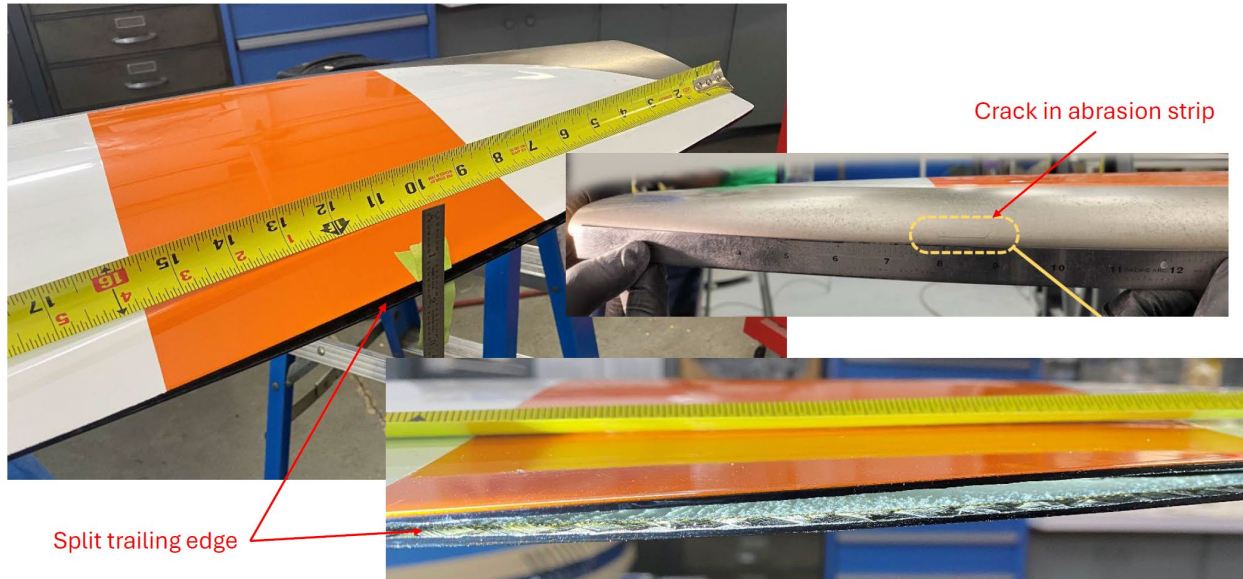


Figure 13. Blade tip impact damage resulting from blade strike with unknown object (provided by Van Horn Aviation)

4.2 Blade A149 - Vulture Strike

The main rotor blade tip damage was due to inflight impact with a vulture (Figure 14). The strike caused a significant inward deformation of the blade tip leading edge abrasion strip, with the aft edges of the abrasion strip debonding from the skin laminate as well as the inboard edge of the abrasion strip debonding from the main blade leading edge abrasion strip. The laminate upper skin was fractured directly aft of the leading edge deformation, with a section of the structural foam core visible where the laminate skin had separated from the blade. The strike caused the delamination of the trailing edge strip and structural foam core from the blade tip upper and lower skins which propagated inboard and outboard from the strike location.

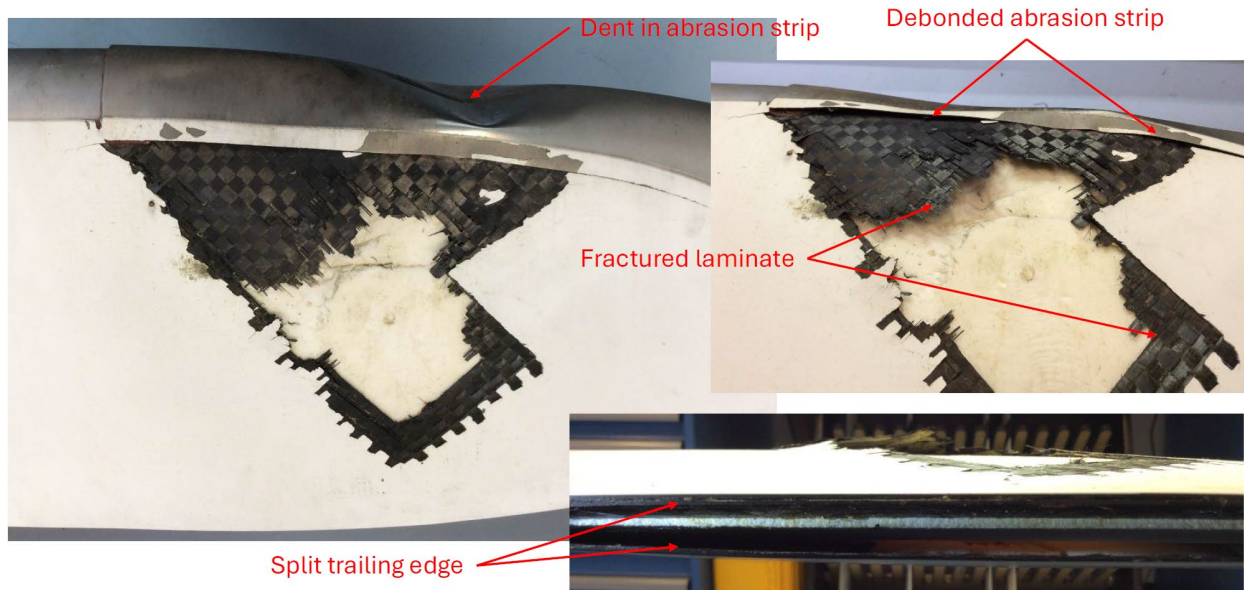


Figure 14. Blade tip impact damage resulting from blade strike with vulture (provided by Van Horn Aviation)

4.3 Blade A046 - Oak Tree Strike

The main rotor blade tip damage was due to inflight impact with an oak tree (Figure 15). The strike caused a significant inward deformation of the blade tip leading edge abrasion strip, with the aft edges of the abrasion strip debonding from the skin laminate. The strike caused the delamination of the trailing edge strip and structural foam core from the blade tip upper and lower skins which propagated inboard and outboard from the strike location.

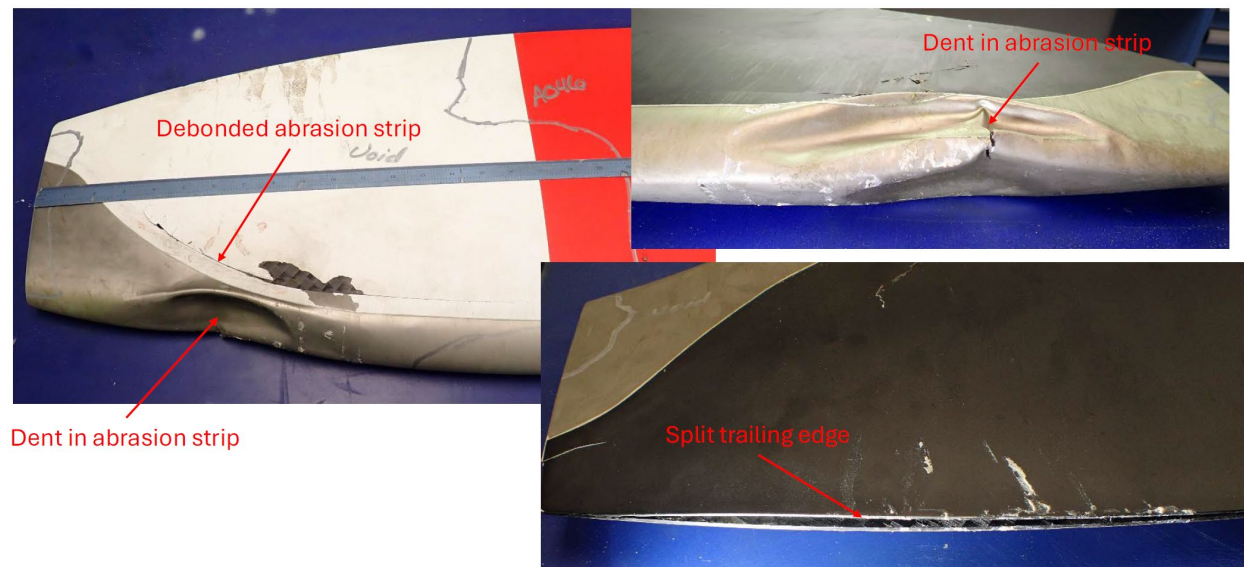


Figure 15. Blade tip impact damage resulting from blade strike with oak tree (provided by Van Horn Aviation)

4.4 Blade A012 - Tree/Branch Strike

The main rotor blade tip damage was due to inflight impact with an unspecified tree (Figure 16). The strike caused denting in the blade tip leading edge abrasion strip, with the aft upper edge of the abrasion strip debonding from the skin laminate as well as an upwards deformation of the abrasion strip trailing edge. The laminate upper skin was fractured directly aft of the leading edge deformation, with a section of the structural foam core being visible where the laminate skin had separated from the blade.

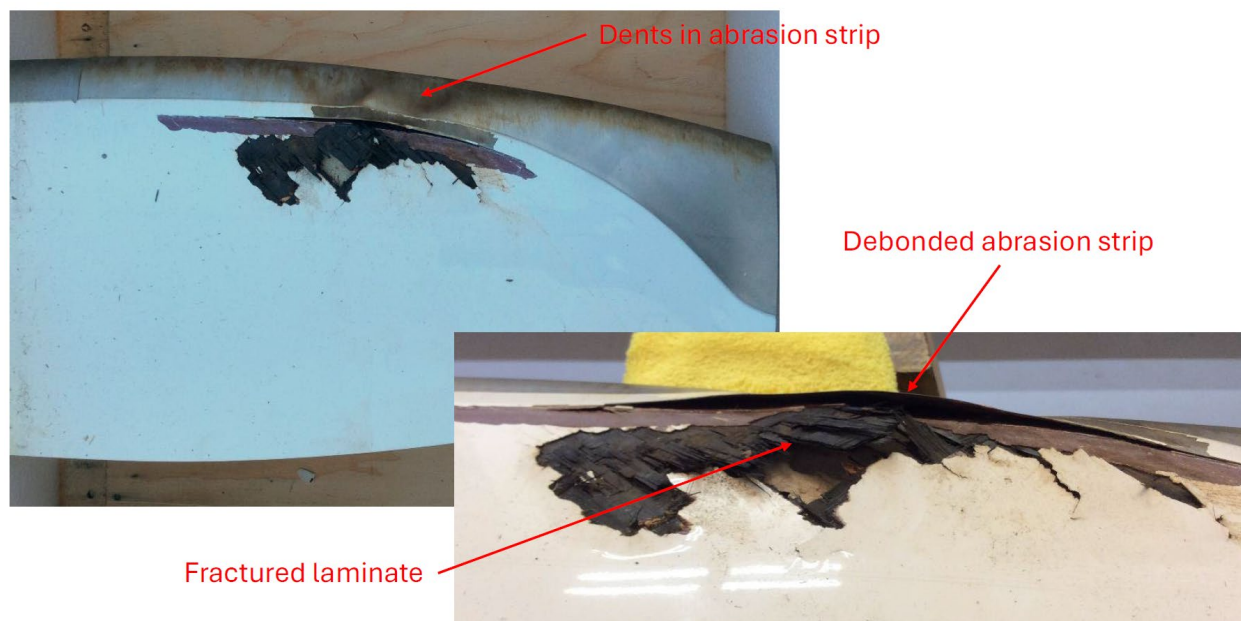


Figure 16. Blade tip impact damage resulting from blade strike with unspecified tree (provided by Van Horn Aviation)

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