A SunCam online continuing education course

Airport Engineering

Part V: Airport Wildlife Hazards

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Introduction

This course focuses on wildlife hazards at or near airports. Airports are critical aviation infrastructure that tend to attract wildlife which interfere with safe aircraft operations. Wildlife, in its many forms, can cause expensive and sometimes fatal accidents. This course addresses the topic of airport regulation to prevent wildlife hazards, the features that attract wildlife, and recommended mitigation measures. This topic is certainly less technical than the other courses in this series; however, it has great influence on airport design and should be seriously considered by engineers and planners alike.

Why is Wildlife a Problem?

The FAA reported that about 227,000 wildlife strikes occurred with civil aircraft in the United States between 1990 and 2019. 97% of these reports involve birds; however, white-tailed deer and coyotes are the most commonly struck non-bird species. During the same 30-year time period, 327 human injuries were attributed to wildlife strikes, and more than $900 million reported costs. Needless to say, this is a problem.



The first bird strike was reported in 1905 by none other than Orville Wright, who was flying over a corn field near Dayton, OH when he struck what was likely a red-winged blackbird. The first mammal strike was reported in 1909 by Louis Bleriot as he prepared his historical flight to cross the English Channel when a farm dog ran into the propeller. The first aviation fatality caused by wildlife was Calbraith Rodgers (the first person to fly across the continental US) when his aircraft struck a seagull in southern California, causing him to crash into the water and drown.



Two-thirds of all bird strikes occur during the daytime, and most happen during the landing phase of a flight. About half of the reported strikes occurred during late summer when fall migrations occur. The most commonly struck bird is the mourning dove, accounting for 11% of birds identified. Ducks and geese only account for 5% of strikes, but are responsible for 28% of strikes that cause damage to an aircraft. 92% of all bird strikes occur below 3,000 feet AGL. One might assume non-bird wildlife strikes always occur at ground level, but that is not always the case.*

It is notable that reported strikes in the U.S. have increased by a factor of four since 1990. There are several reasons for this: bird populations are increasing, air traffic is increasing, aircraft are faster and quieter, and birds are adapting to urban settings. Another factor is the liability airport management faces when dealing with the aftermath of wildlife strikes.

Wildlife Strike Examples

There are many examples to demonstrate the damage caused by wildlife. Perhaps the most famous bird strike accident was United Airways Flight 1549 which simultaneously lost both engines in 2009 due to collision with a flock of Canada geese shortly after takeoff and subsequently landed in the Hudson River. Fortunately, this event occurred without loss of life.

The following examples illustrate the literal impact wildlife have on fast moving aircraft. Some cause superficial damage, others total destruction.

**See Appendix A*

This Dash-8 struck a deer while landing at a southeastern USA airport. The impact caused the nose gear to collapse.

Four men escaped unhurt when their Learjet 36 struck an elk and caught fire during takeoff at a western USA airport in December 2002. The pilot was able to bring the plane to a stop in a marsh just off the end of the runway and evacuate the aircraft before it was destroyed by fire.

The pilot of this Cessna 172 made a Mayday call to nearby Air Traffic Control Tower in Texas after hitting a bird (likely a vulture) with the left wing at 800 feet AGL. The pilot attempted to make an emergency landing in a field but lost control and crashed, killing him and his passenger.

Wildlife Attractants

Airports are attracting to wildlife for several reasons. Primarily, food and water, the most basic life necessities, are usually present in the form of grass, seed, rodents, or other vegetation. Water is found in ponds (detention ponds, fire ponds, etc.), streams, or other retention structures. Habitat and natural cover provide suitable nesting and bedding in trees, culverts, buildings, and brush, which offers security from predators. Off-airport habitats at areas nearby are also important to consider, although an airport operator may have limited ability to control land use and must work in partnership with local landowners. Off-site habitats should be more attractive to wildlife than the airport itself. Habitats to consider include nature conservation and recreational areas, agricultural land, landfills, water treatment plants, wetlands, surface mining, and gravel pits. However, extreme cases such as a landfill might attract excessive wildlife that it may present an increased hazard for air traffic.

Wildlife food resources at airports take different forms; for example, Canada geese, which are among the most hazardous birds to aircraft, often visit airports to feed on turf and grasses planted alongside runways and taxiways. Owls and hawks hunt for small rodents on airport grasslands. Gulls and European starlings feed on insects and earthworms. Many types of birds are attracted to seed and fruit producing trees. Deer and other mammals feed on agricultural production. This variation makes removal and mitigation difficult, to say the least. The simplest way to deal with food resources is to identify the source and remove it from the airport.

Surface water often represents a significant area within FAA siting criteria for U.S. airports. Unfortunately, water resource management is often at odds with wildlife management techniques. One example of this is the need for readily available on-site water to fight fires at an airport, conflicting with the need to eliminate standing water to prevent bird and mammal activity. Best management practices must be developed by engineers and airport managers to meet complex safety and regulatory requirements.

The third basic element for wildlife is cover. Minimizing available cover is critical for reducing wildlife at an airport. Trees, grasses, shrubs, and developed areas such as terminals, parking garages, and hangars all serve as forms of protection/roosting/nesting/foraging.

Airport Requirements

14 CFR Part 139.337 requires immediate action to alleviate wildlife hazards whenever they are detected. A wildlife hazard assessment (WHA) must be conducted when any of the following event "triggers" occur on or near the airport:

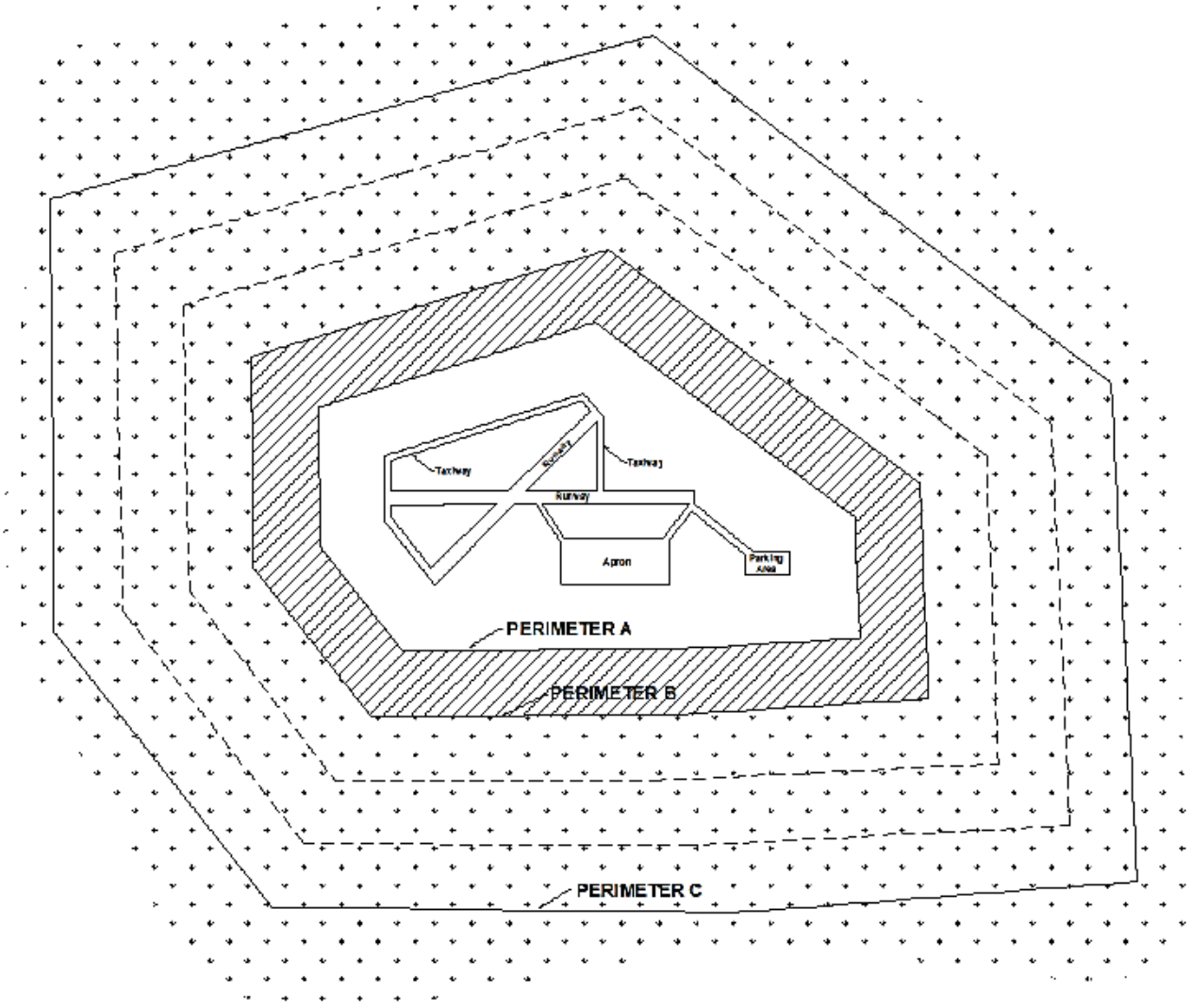
- Multiple wildlife strikes
- Substantial damage from striking wildlife
- Engine ingestion
- Wildlife observed of size or number capable of causing a significant event

A wildlife hazard assessment has to be performed by a qualified wildlife biologist in accordance with the long-titled AC 150/5200-36 (*Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports)* and must contain the following information:

- Analysis of the event
- Identification of the species, numbers, local movements
- Identification of attractants on and off airport
- Hazards to air carrier operations must be identified
- Actions recommended for reduction

During the site visit, the biologist will look for birds on and around the airport and nesting locations. Access points for wildlife may display evidence of wildlife activity. Records of previous wildlife strikes should be reviewed. Upon completion, the assessment is submitted to the FAA for approval and determination whether or not there is a need for a wildlife hazard management plan. Note that the FAA will fund WHAs and wildlife hazard management plans (WHMP) with Airport Improvement Program (AIP) grants.

The FAA recommends a separation distance of 5,000 feet from airports serving piston-powered aircraft to hazardous wildlife attractants. This also includes new airport development projects meant to accommodate aircraft movement. Airports serving turbine-powered aircraft should maintain a 10,000 foot separation distance. To protect approach, departure, and circling airspace, all airports are recommended to preserve a distance of 5 miles between the closest point of the airport operation area and hazardous wildlife attractants. The following figure illustrates these boundaries.



PERIMETER A: For airports serving piston-powered aircraft, it is recommended hazardous wildlife attractants be 5,000 feet from the nearest aircraft operations area.

PERIMETER B: For airports serving turbine-powered aircraft, it is recommended hazardous wildlife attractants be 10,000 feet from the nearest aircraft operations area.

PERIMETER C: Recommended for all airports, 5-mile range to protect approach, departure and circling airspace.

Wildlife Hazard Management Plan

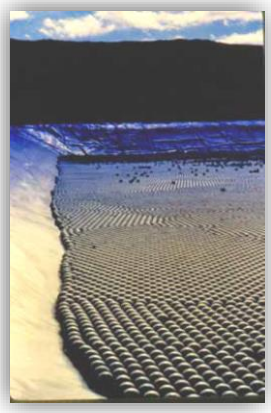
The WHMP is a document created to provide the strategy for reducing the risk that wildlife poses to safe airport operations. An effective WHMP should:

- Identify the wildlife species that are a priority for risk reduction
- Prescribe the actions necessary to reduce the risk associated with the individual species
- Provide measures to alleviate or eliminate wildlife hazards
- Identify persons who have authority for implementing the plan
- Clearly identify of the roles and responsibilities personnel are required to fulfill
- Establish priorities for habitat modification
- Describe a communication strategy for ensuring that the information necessary for managing wildlife risk is shared effectively
- Outline a training program for the personnel involved in Wildlife Hazard Management
- Describe a monitoring and evaluation strategy for the entire WHMP

Control Methods

Habitat Modification And Exclusion

The habitat on or near an airport can be modified to reduce attractants. Tall grass can be cut to eliminate cover. Agricultural operations can be altered. Rodents can be controlled. Potential nesting or bedding sites can be mitigated. Plant species composition can also be very important. USDA recommends using plant species of low nutritional quality or palatability whenever possible. For example, zoysiagrass, centipedegrass, and St. Augustinegrass are not preferred as forage by Canada geese and should be considered when reseeding or replanting areas at airports. In contrast, Kentucky bluegrass and fine fescues are preferred forage for geese and not typically recommended for use at airports. Ponds or other standing water can be covered with cable and net systems to prevent access. An alternative option is the use of floating balls or other products that completely cover the open surface to minimize wildlife allure. Tall fencing is extremely effective in excluding hazardous mammals from critical areas and is ideal for airport use. However, such fencing is expensive, and some general aviation airports, in particular, may need to consider other options.



Habitat modifications are often difficult to implement and typically expensive. Furthermore, habitat management varies regionally and depends upon the wildlife species present and existing land covers within and in close proximity to the airport.

Flight Schedule Modification

In the event of bird migration or other documented wildlife patterns, flight schedules may be modified to prevent wildlife strikes. During critical times and/or seasons, adjusting flights to a different time of day or postponing flights could be arranged. However, as effective as it may be, this method of avoidance may not be feasible for air carriers or airport operations.

Repellent And Harassment Techniques

The following methods demonstrate techniques to actively repel and harass airport wildlife. Although successful, there is not standard protocol as repelling is an art and a science. Each species is unique and responds differently.

Chemical

Chemical repellents are classified based on the physiological mode of action and whether avoidance behavior is learned or not. Primary repellents are characterized by unpalatable taste, odor, or irritation and evoke instinctual withdrawal or escape behavior. In contrast, secondary repellents produce an adverse physiological effect or illness which the animal associates with a sensory cue (e.g., taste, odor, visual cue) and then learns to avoid. Chemical wildlife deterrents, such as “Hot Foot” bird repellant provides long term protection against all types of birds to stop roosting and nesting. This product makes the applied surface sticky, which causes the bird to panic and feel mild distress. A plethora of other products are available, such as methyl anthranilate (grape-seed extract), which is a budget friendly, non-lethal option. One significant downside to chemical means is the necessity to re-apply the product at regular intervals.

Audio

Auditory repellents can be any device that produces sound in the audible (20 Hz-20 kHz) through the ultrasonic range (>20 kHz-200 MHz). Static wildlife scaring devices, such as gas cannons and other sound generators, gradually lose their effectiveness over time. Random sounds or pre-programmed devices may delay this decline. Distress calls are another alternative. Remote activation can increase convenience and efficacy. Audio deterrence are more suitable for short-term effects in limited areas and may have the undesirable effect of annoying passengers or airport personnel working in proximity to the devices.

Visual

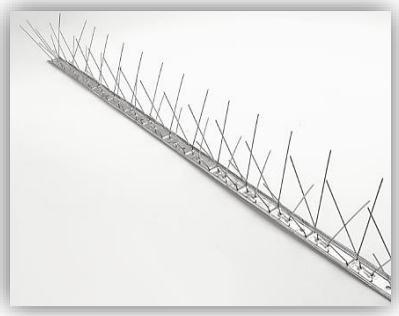
Visual deterrents are generally intended to provoke a fear response (e.g., antipredator behavior), and rarely provide effective deterrence when used alone. Pyrotechnics and/or flares cause wildlife to scare and are generally effective repellants. Lasers, fake predators, shimmering ribbons, and artificial "eyes" are other visual deterrents. Note that lasers and aviation do not mix well, and, however effective, must be used in very controlled situations.

Birds of Prey & Dogs

Real predators remove the need for 'simulated' repellants. Birds of prey (eagles, owls, falcons) or trained dogs are efficient methods of scaring wildlife from the premises. Airport wildlife dogs even become recognizable features (even "mascots") at certain airports. The successful use of dogs to repel birds requires a high degree of dedication and commitment by the handlers.

Bird Deterrents

A simple and effective way to keep birds off hangars, equipment, signs, and other surfaces is the installation of bird spike strips. As permanent infrastructure features, this method requires minimal maintenance. Similar to this, electric track systems produce harmless shocks that "educate" birds to stay off flat surfaces.



Radio Controlled Aircraft

Radio-controlled (RC) model aircraft, which provide both visual and auditory stimuli, occasionally have been used to harass birds on airports. One advantage is that the RC aircraft is under the control of a person and can be directed precisely to herd the birds away from the airport runway. A second advantage is that the RC aircraft can be deployed on an "as needed" basis with little maintenance needed between flights. Some RC aircraft have been designed to mimic the appearance of a falcon and even to remotely fire pyrotechnics. The disadvantage is that a trained person is required to operate the RC aircraft in an airport environment. Before RC aircraft can be used, ensure that the radio frequencies used are compatible with other radio uses at the airport.

Wildlife Removal (Translocation)

Wildlife translocation is a management technique in which individual animals are captured and moved to a new location. Translocation has been used successfully for many years for a variety of reasons. In the context of wildlife damage management, animals are captured in a location where they are considered overabundant or otherwise unwanted, and then moved to a location where their presence is less problematic. At airports, translocation is usually limited to raptors, generally large birds that are among the most hazardous to aircraft. Live trapping wildlife is a safe way to capture and transport animals. Relocation to another distant habitat can prevent nesting and occupation of airport property. Nest and egg removal is a different form of the same technique. Although translocation shows promise and likely deserves a place in wildlife management at airports, it is not a universal remedy.

Population Control

Management of animals on or near airports via lethal means or reproductive control is generally the last option deployed after all other management actions have been considered or implemented. If live relocation is impossible or not feasible, lethal means may be employed to remove wildlife. Obviously, this must be done with caution and discretion for several reasons. As airports are generally high-security settings, lethal weapons must be carefully controlled and used. Airport passengers may have cause for alarm or distress if lethal wildlife removal is observed. Methods used for wildlife population control should be selected for efficient management of the specific problem and integrated with non-lethal approaches; there is no "general approach" to lethal control.

Reference Material

1. AC 150/5200-33C, *Hazardous Wildlife Attractants on or near Airports*; 2-21-2020
2. Wildlife at Airports, *USDA Wildlife Damage Management, Wildlife Services, February 2017*
3. Wildlife Hazard Management, *Dragonas L.*, FAA Presentation, June 2012
4. Planning and Design of Airports, *Horonjeff et al., McGraw-Hill, 5th ed.*
5. MacDill Fish Strike: Fishnado, US Air Force, February 21, 2014; https://www.macdill.af.mil/News/Article-Display/Article/765204/macdill-fish-strike-fishnado/

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Page 5:	*Cessna 172 Crash,* Wildlife Hazard Management at Airports, USDA & USDOT
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Page 13:	*Falcon Translocation*, Wildlife at Airports, 2017, USDA, Page 9
Page 13:	*Airport Bird Control*, Wildlife Hazard Management at Airports, USDA & USDOT

Appendix A: Jet Aborts Takeoff After 'Fish Strike' at Florida Air Base

MACDILL AIR FORCE BASE, Fla. -- Sharing the skies with different species of wildlife is a constant challenge for the Air Force. We stop at no end to ensure the safety of our aircrew, aircraft and all wildlife on and around the installation. Typically, we associate "sharing the sky," with birds and other wildlife that belong in the air. However, the men and women with the National Oceanic and Atmospheric Administration have a different perspective on what type of animals they need to look out for on takeoffs and landings.

September 10, 2013, will forever live in infamy for Lt. Cmdr. Nick Toth, NOAA pilot, and for everyone else involved in the first recorded "fish strike," in the history of NOAA at MacDill that occurred that morning.

At roughly 10:50 a.m., Toth and the rest of the aircrew were cleared for takeoff and started their roll in their Gulfstream GIV. "We were nearing the point in the takeoff where we needed to rotate, or raise the nose of the airplane off the ground, when an Osprey with something in its claws flew in front of our aircraft," explained Toth. "We saw that the Osprey did not gain enough altitude, and that it passed underneath the centerline of the aircraft." The crew heard a thud, and assuming that they had hit the Osprey, aborted the takeoff. Following the aborted takeoff the aircraft was taxied back to Hangar 5 for inspection.

Airfield Management and Operations and Wildlife Management responded to what was still being referred to as a "bird strike." "We swept the runway, but we didn't find any remains of the bird," said Lindsey Garven, 6th Air Mobility Wing Bird Aircraft Strike Hazard contractor. "We continued our search and were surprised to find a 9-inch sheepshead lying near the end of the runway." Wildlife Management collected the specimen from the runway and DNA from the aircraft and sent the samples to the Smithsonian Feather Identification Laboratory in Washington D.C. for comprehensive analysis.

Results concluded that the Gulfstream GIV did in fact strike the sheepshead upon takeoff. "At first, we didn't believe the test results," exclaimed Toth. "There was no way we hit a fish during takeoff. I mean, how does something like that even happen?" Wildlife Management and NOAA's aircrew suspect that the Osprey was perched on the runway eating its catch upon departure of the NOAA Gulfstream GIV. The bird must have taken off, because it saw the NOAA aircraft approaching. The bird barely got away and probably would have struck the aircraft, if not for dropping its catch.

"As comical as this event is, the underlying lesson is that vigilance with regards to wildlife on and around the runway is necessary to keep all aircrew and aircraft safe and to maintain our goal of mission readiness," stated Garven.

Appendix B: Bird/Other Wildlife Strike Report

U.S. Department of Transportation
Federal Aviation Administration

BIRD / OTHER WILDLIFE STRIKE REPORT

1. Name of Operator	2. Aircraft Make/Model	3. Engine Make/Model
4. Aircraft Registration	5. Date of Incident ___/___/___ (Month / Day / Year)	6. Local Time of Incident ☐ Dawn ☐ Dusk ☐ Day ☐ Night ___ HR ___ MIN ☐ AM ☐ PM
7. Airport Name	8. Runway Used	9. Location if En Route (Nearest Town/Reference & State)
10. Height (AGL)	11. Speed (IAS)	

12. Phase of Flight

- ☐ A. Parked
- ☐ B. Taxi
- ☐ C. Take-off Run
- ☐ D. Climb
- ☐ E. En Route
- ☐ F. Descent
- ☐ G. Approach
- ☐ H. Landing Roll

13. Part(s) of Aircraft Struck or Damaged

	Struck	Damaged		Struck	Damaged
A. Radome	☐	☐	H. Propeller	☐	☐
B. Windshield	☐	☐	I. Wing/Rotor	☐	☐
C. Nose	☐	☐	J. Fuselage	☐	☐
D. Engine No. 1	☐	☐	K. Landing Gear	☐	☐
E. Engine No. 2	☐	☐	L. Tail	☐	☐
F. Engine No. 3	☐	☐	M. Lights	☐	☐
G. Engine No. 4	☐	☐	N. Other: (Specify)	☐	☐

14. Effect on Flight

- ☐ None
- ☐ Aborted Take-Off
- ☐ Precautionary Landing
- ☐ Engines Shut Down
- ☐ Other: (Specify)

15. Sky Condition

- ☐ No Cloud
- ☐ Some Cloud
- ☐ Overcast

16. Precipitation

- ☐ Fog
- ☐ Rain
- ☐ Snow
- ☐ None

17. Bird/Other Wildlife Species

18. Number of birds seen and/or struck

Number of Birds	Seen	Struck
1	☐	☐
2-10	☐	☐
11-100	☐	☐
more than 100	☐	☐

19. Size of Bird(s)

- ☐ Small
- ☐ Medium
- ☐ Large

20. Pilot Warned of Birds ☐ Yes ☐ No

21. Remarks *(Describe damage, injuries and other pertinent information)*

DAMAGE / COST INFORMATION

22. Aircraft time out of service:	23. Estimated cost of repairs or replacement (U.S. $):	24. Estimated other Cost (U.S. $) (e.g. loss of revenue, fuel, hotels):
_____ hours	$	$

Reported by (Optional)	Title	Date

Paperwork Reduction Act Statement: The information collected on this form is necessary to allow the Federal Aviation Administration to assess the magnitude and severity of the wildlife-aircraft strike problem in the U.S. The information is used in determining the best management practices for reducing the hazard to aviation safety caused by wildlife-aircraft strikes. We estimate that it will take approximately 6 minutes to complete the form. The information collected is voluntary. Please note that an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection is 2120-0045. Comments concerning the accuracy of this burden and suggestions for reducing the burden should be directed to the FAA at: 800 Independence Ave SW, Washington, DC 20591, Attn: Information Collection Clearance Officer, ABA-20

FAA Form 5200-7 (11-97) Supersedes Previous Edition Electronic Version (Adobe) * U.S. GPU:1997-432-349/74201 NSN: 0052-00-651-9005

Directions for FAA Form 5200-7
Bird/Other Wildlife Strike Report

1. Name of Operator - This can be an airline (abbreviations okay - UAL, AAL, etc.), business (Coca Cola), government agency (Police Dept., FAA) or if a private pilot, his/her name.
2. Aircraft Make/Model - Abbreviations are okay, but to include the model (e.g. B737-200).
3. Engine Make/Model - Abbreviations are allowed (e.g., PW 4060, GECT7, LYC 580).
4. Aircraft Registration - This means the N# (for USA registered aircraft).
5. Date of Incident - Give the local date, not the ZULU or GMT date.
6. Local Time of Incident - Check the appropriate light conditions and fill in the hour and minute local time and check AM or PM or use the 24 clock and skip AM/PM.
7. Airport Name - Use the airport name or 3 letter code if a US airport. If a foreign airport, use the full name or 3 letter code and location (city/country).
8. Runway used - Self explanatory.
9. Location if En Route - Put the name of the nearest city and state.
10. Height AGL - Put the feet above ground level at the time of the strike (if you don't know, use MSL and indicate this). For take-off run and landing roll, it must be 0.
11. Speed (IAS) - Speed at which the aircraft was traveling when the strike occurred.
12. Phase of Flight - Phase of flight during which the strike occurred. Take-off run and landing roll should both be 0 AGL.
13. Part(s) of Aircraft Struck or Damaged - Check which parts were struck and damaged. If a part was damaged but not struck indicate this with a check on the damaged column only and indicate in comments (#21) why this happened (e.g., the landing gear might be damaged by deer strike, causing the aircraft to flip over and damage parts not struck by deer).
14. Effect on Flight - You can check more than one and if you check (Other", please explain in Comments (#21).
15. Sky condition - Check the one that applies.
16. Precipitation - You may check more than one.
17. Bird/Other Wildlife Species - Try to be accurate. If you don't know, put unknown and some description. Collect feathers or remains for identification for damaging strikes.
18. Number of birds seen and/or struck - check the box in the Seen column with the correct number if you saw the birds/other wildlife before the strike and check the box in the Struck column to show how many were hit. The exact number, can be written next to the box.
19. Size of Bird(s) - Check what you think is the correct size (e.g. sparrow = small, gull = medium and geese = large).
20. Pilot Warned of Birds - Check the correct box (even if it was an ATIS warning or NOTAM).
21. Remarks - Be as specific as you can. Include information about the extent of the damage, injuries, anything you think would be helpful to know. (e.g., number of birds ingested).
22. Aircraft time out of service - Record how many hours the aircraft was out of service.
23. Estimated cost of repairs or replacement - This may not be known immediately, but the data can be sent at a later date or put down a contact name and number for this data.
24. Estimated other cost - Include loss of revenue, fuel, hotels, etc. (see directions for #23).
25. Reported by - Although this is optional, it is helpful if questions arise about the information on the form (a phone number could also be included).
26. Title - This can be Pilot, Tower, Airport Operations, Airline Operations, Flight Safety, etc.
27. Date - Date the form was filled out.