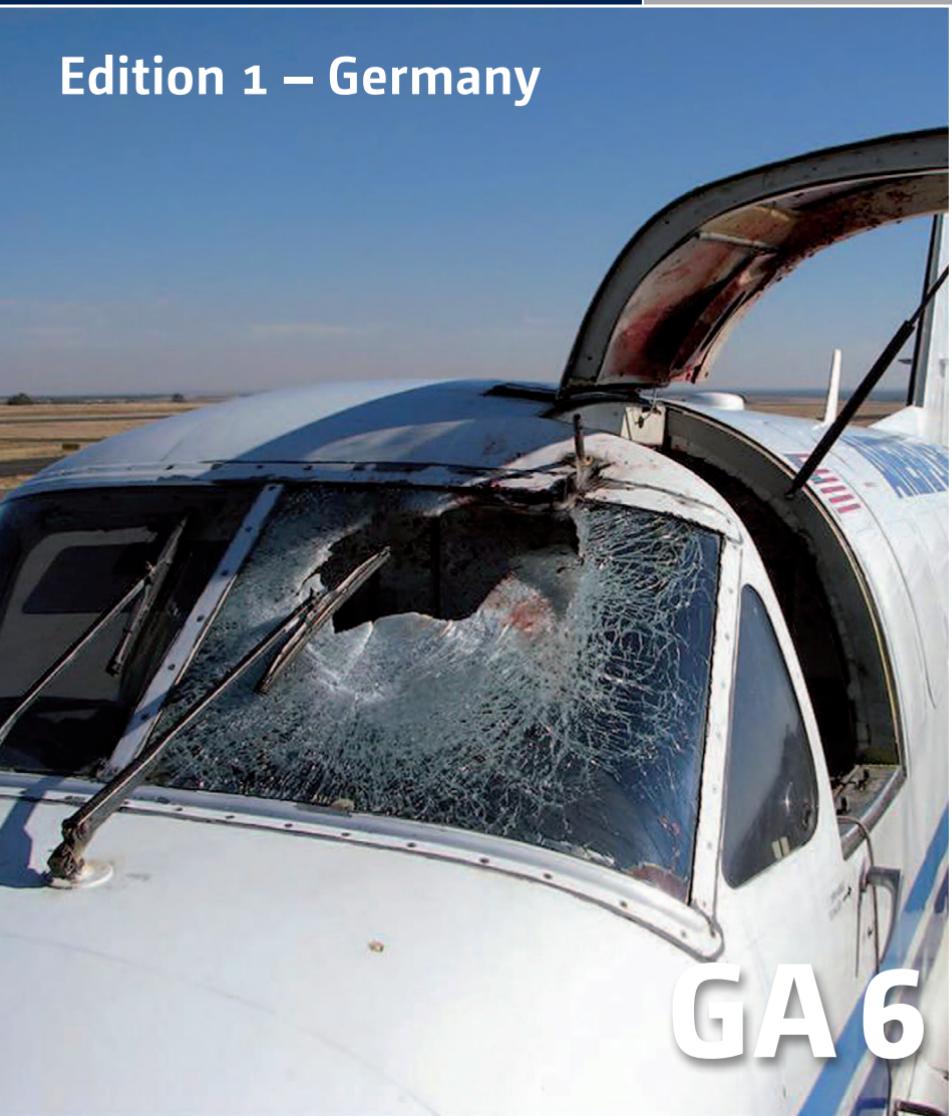


Bird strike, a European risk with local specificities

FOR GENERAL AVIATION PILOTS

SAFETY PROMOTION LEAFLET

Edition 1 – Germany



Bird strikes are not only a serious problem that concern commercial airlines causing annual damages in the millions, but also affects General aviation aircraft. Many pilots are not aware that a collision with a soft-feathered bird can lead to serious damage; such as a destroyed windshield that can injure the pilots, clogged air intakes, a broken pitot tube, damaged brake lines, holes or dents in the fuselage or wings, or in the case of helicopters; damaged blades. Bird strike is a European risk with local specificities.

This Leaflet is a translation of the German AOPA Safety Letter published in June 2012. In Germany, bird strikes are registered with the German Birdstrike Committee (Deutscher Ausschuss zur Verhütung von Vogelschlägen im Luftverkehr e.V., DAVVL). Fortunately this Committee assisted AOPA during the writing of this Safety Letter. Thanks to Chris Behnke for the translation!

The image shows the front cover of the AOPA SAFETY LETTER. At the top, it says "AOPA SAFETY LETTER". Below that is a photograph of a small aircraft with its cockpit open, showing internal damage. To the right of the photo, the word "VOGELSCHLAG" is written in large, bold letters. Underneath the photo, there is some smaller text. At the bottom right, it says "Nr. 02, Juni 2012". Along the bottom edge of the cover, there are several small text entries: "VOGELSKRANKHEITEN UND VOGELKONTAKTEN", "VOGELSCHLAG UND VOGELKONTAKTEN", and "Vogelschlag in Europa überw. von Dach ist das Risiko, während des Fluges mit einem Vogel zusammenzustoßen. Diese Risiken sind regional unterschiedlich, aber die Vogelkollisionen sind insbesondere im Flugzeugbereich und im unruhigen Mittelmeerraum ein ernsthaftes Problem. Die Vogelkollisionen sind von der Jahreszeit und geographischen Gegebenheiten abhängig. Im Sommer und Herbst treten Vogelschläge mit besonders hoher Konzentration von Vögeln zu rechnen auf. Vogelschläge können zu schweren Schäden führen. Vogelschläge mit Verletzungen des Piloten, verschüttete Leitstrukturen am Triebwerk, ein zerschossenes Flugzeug oder eine zerstörte Landeschleibe. Licher oder Basale im Rumpf oder den Triebgruppen, oder die Beschädigung des Fahrwerks kann zu schweren Schäden führen. Der Deutsche Ausschuss zur Verhütung von Vogelschlägen im Luftverkehr e.V. (DAVVL) ist ein Zusammenschluss von Piloten und Fliegern. Der Deutsche Ausschuss hat dankenswerter Weise bei der Verfassung dieses AOPA Safety Letters mitgewirkt.

In Deutschland liegen die Haupttagzeiten zwischen dem 20. Februar und dem 15. Mai, sowie zwischen dem 15. September und dem 10. November. Die Haupttagzeiten sind die Zeiträume, in denen die Gründungen des Vogelzuges im Frühjahr von Südwest nach Norden und im Herbst von Nordost nach Südwest stattfinden. Die höchsten Zugmengen werden im Mai erreicht.

MIGRATIONS AND CONCENTRATIONS OF BIRDS

Birds are found everywhere in Europe. Therefore there is an ever-present risk of a collision during flight. However, statistics show that the bird strike danger is particularly high near an airport and at lower altitudes. Additionally, the likelihood of a bird strike depends on the time of year and geographical conditions. Therefore one should be aware where and when there are large concentrations of birds and at what times the largest bird migrations take place.

Bird Migrations

There is a markedly higher bird strike risk during bird migrations in spring (March/April) and autumn (September/October), when several million migratory birds cross Germany. The largest bird migrations are conducted in a wide front at a height of 300 to 6.000 feet AGL; however coastlines, river valleys and mountainsides can have regionally denser flocks.

In Germany the primary migratory seasons are from the 20th of February until the 15th of May and the 1st of September until the 15th of November, whereby the primary flight path of these migrations are from southwest to northeast during spring, and northeast to southwest in the autumn. The highest intensity is found during the month of March.

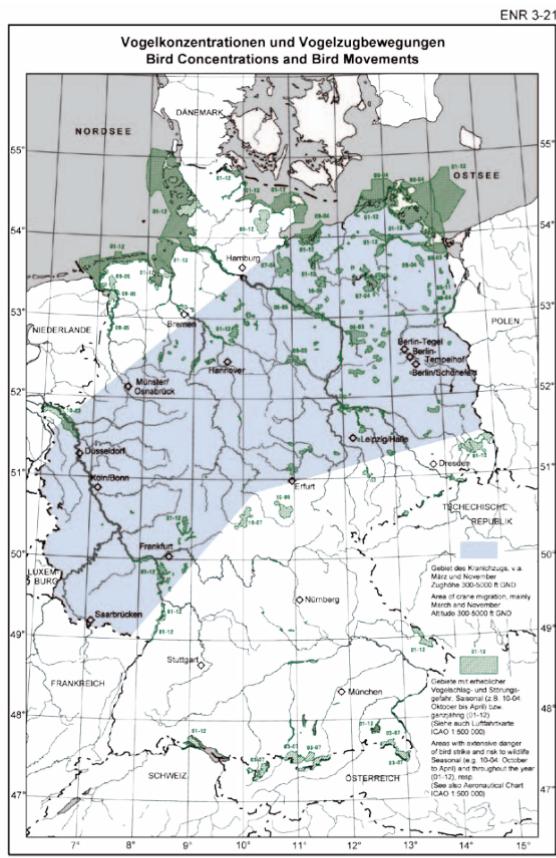
During the summer, numerous ducks gather to moult at the German Bight and inland lakes (e.g. the Ismaninger Reservoir,

Rieselfelder near Muenster, Lake Constance). In June, July and August, juveniles (herons, lapwings, raptors, starlings) fly aimlessly in all cardinal directions. During the fall migration the highest bird concentrations are reached during October. In the winter months northern waterfowl travel towards the German Bight and North Sea coastal areas. The winter months see Geese and Ducks alternate between the Baltic and North Seas including the larger inland lakes. For example, mass gatherings of over 100.000 geese will gather at the lower Rhine during winter.

Unlike birds that migrate in a wide front, cranes cross northern and central Germany in a 300 km wide swath. Over 100.000 cranes (weighing approximately 5 kg each) participate in these migrations. Primary migratory months are March and October/November; traditional gathering and rest areas can account for almost 70.000 birds (such as at the pools of Linum in Brandenburg).

Migration intensities and flight altitudes are greatly influenced by the weather. Early in the year migrations are assisted by a tailwind from the southwest and warm air advection. In autumn, migrations are helped by shallow gradient high pressure systems and northerly to easterly winds. In headwinds the flight altitudes can decrease to less than 500 feet AGL.

During the course of a year, 26 days typically account for a high to very high bird strike risk.



500-105-AIR-VFR-FNR-2-00 56

Areas with large populations of birds

In addition to the seasonal bird migrations there are massive gatherings of large bird species such as cranes, great bustards, geese, wading birds and waterfowl, and black grouse that are brooding, resting, or spending the winter. Due to these gathering areas there exists an increased risk of a bird strike. These locations are therefore depicted in green on the German ICAO 1:500.000 chart along with Jeppesen's VFR+GPS chart and labeled as "Aircraft-relevant Bird Areas" (ABAs) along with an identifier and information regarding the months (seasonally or year-round) during which activity can be expected. Germany's Federal Agency for Nature Conservation has dedicated a website at www.aba.bfn.de that contains a list of all ABAs with effective times and bird species that can be expected to be found. Pilots are urgently requested to overfly these areas by a minimum of 2.000 feet, not only to avoid a bird strike but also to avoid disturbing the more noise sensitive large bird species.



Excerpt from ICAO Chart, Rostock page with ABAs.

BIRD STRIKE RISK

Bird Strikes and Disruptions

Bird formations during the times of primary migration, during winter, and sudden appearances of groups or mass gatherings present a particular bird strike risk. In addition, low overflights, off-airport landings and off-airport takeoffs in or near the vicinity of an Aircraft-relevant Bird Area present a potential for disruption to the birds. Although it may seem that many breeding birds have become accustomed to consistent air traffic, as indicated by their prevalence near airports and airfields, some resting or wintering migratory flocks may react unpredictably to these foreign flying vehicles. Low overflights under 2.000 feet AGL and off-airport landings draw the attention of the birds and may lead to escape reactions.

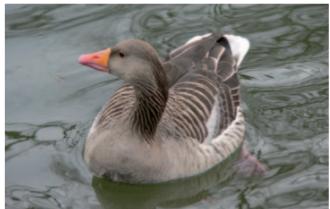
Which birds are of concern?

Nationally, swallows and swifts account for 30 % of bird strikes. Larger songbirds, such as starlings, are only involved in 3 %. Falcons, particularly kestrels, account for 13 % and buzzards approximately 15 %. Bird strikes with seagulls occur not only along the coast, but also the interior. Bird strikes with large birds over 1,8 kilograms, such as grey heron, storks, swans, and in particular geese, occur only on rare occasion.

It should be noted that more than half of all registered bird strikes do not allow for positive identification of the particular bird type, indicating that the statistics of these particular bird strikes are an estimate.



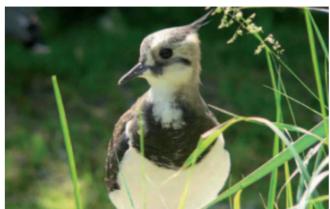
Swallow



Goose



Seagull



Lapwing



Stork

A few of the birds that can pose a threat to pilots.

Bird Strike Damage

The damage caused by a bird strike and resultant impact on the flight can vary greatly. Fortunately the engine failure and subsequent ditching caused by a bird strike, such as was the case with the Airbus A320 in January 2009, is a rare exception.

Due to their limited airspeed, most propeller-driven General aviation aircraft are rarely subject to bird strike damage that can cause a total loss. But one should not underestimate this possibility. In the worst case, a bird penetrating bullet-like through the windshield could cause serious injury to the pilot. In particular, the windshields of smaller airplanes and helicopters are designed for minimal loads and can easily shatter. The higher the airspeed and greater the mass of the bird, the more massive the result of a strike.

In addition to the exposed windshield a bird can impact other sensitive parts of the frontal area. The result can be dents or holes in the fuselage or airfoils, a broken or obstructed pitot tube, broken antennae, damaged brake lines, plugged air intakes or damaged helicopter hub rotors. Jet engines are particularly sensitive to bird strikes.

In most cases a bird strike “only” involves a single bird, whereby the collision is not violent enough to cause visible damage to the aircraft. Nevertheless one should land as soon as possible because an accurate assessment of the damage can only be accomplished on the ground.

WHAT TO DO AFTER A BIRD STRIKE?

During Takeoff

If a bird strike occurs during takeoff, the takeoff should be aborted if there is enough runway remaining. In most cases it is not possible to accurately determine what exactly occurred and therefore a return to the ramp area for a thorough inspection of the aircraft is required. Particular attention should be paid to air intakes for the engines in addition to all other air intakes to search for bird remains. One should not neglect to check the landing gear and hydraulic brake lines.

If aborting the takeoff is not feasible a return to landing should be made as soon as possible. If the bird strike has caused an engine problem, the circumstances will dictate the utilization of the appropriate emergency procedure. In any case one should notify the airport and return to the field.

In Cruise Flight

If there has been obvious damage to structural or control surface parts, then it makes sense to determine the controllability of the aircraft before landing. Such a check should be conducted at a safe altitude and airspeed.

If the windshield is broken, torn or has been penetrated, the airspeed should be reduced in order to minimize the pressure on the windshield. Additionally, sunglasses or safety glasses may help to protect from the headwind, precipitation or from floating debris. In no case should someone be distracted by the blood,

feathers or the odor of the dead bird. It is imperative to continue to safely fly the aircraft.

Windshields of smaller General aviation airplanes and helicopters are not necessarily tested for bird strike resistance. Gulls, pigeons, lapwings, and even swallows can penetrate the windshields of small aircraft. The propeller provides little protection.

Helicopter bird strikes are particularly common, due to the fact that these aircraft tend to operate primarily at the lower altitudes.



After a bird strike one should pay particular attention to the tail rotor. This damage is not always easily identified.

Remain Calm

The collision can in certain cases be quite distracting, combined with a loud bang that can momentarily fluster a pilot. The shock of a bird strike can be quite large. Therefore it is essential to remain calm, properly control the aircraft, maintain proper flying speed and proceed to the nearest airport.



AVOIDING BIRD STRIKES

The risk of a bird strike cannot be completely eliminated. But there are many techniques to effectively reduce this risk.

Inform oneself regarding bird strikes

In the AIP (Aviation Information Publication) in the Enroute chapter one can find a section dedicated to bird concentrations and migratory paths in the respective state. Of particular importance are advisories regarding areas of intense bird concentrations and expected bird types. Whoever flies to another state should use this resource to thoroughly inform themselves.

In addition to the general information found in the AIP one should always check the NOTAMS for reported bird strike risks before every flight. These special NOTAMS may also be published as a so-called BIRDTAM. These can provide information regarding permanent and seasonal migrations, but also contain important warnings concerning observed bird concentrations at the departure and/or destination airports.

In Germany the Bundeswehr Geoinformation Office (BGIO, Amt für Geoinformationswesen der Bundeswehr, AGeoBw) is responsible for the issuance of bird strike advisories. Various levels of intensity are determined for these risk forecasts. Advisories are published once moderate/high and high risks are determined. This information is considered advisory in nature. Additional information is included in the VFReBulletin. The internet site of the

German Birdstrike Committee (Deutscher Ausschuss zur Verhütung von Vogelschlägen im Luftverkehr e.V., DAVVL) www.davvl.de can be used to retrieve migration forecasts and BIRDTAMs.

Thorough Preflight Checks

Not all collisions with birds are noticed by pilots and therefore are not reported. Perhaps a bird unknowingly made its way into the engine cowling or damaged a pitot tube. A walk around inspection of the aircraft demands keeping an eye open for potential bird damage.

Incidentally, during spring the preflight inspection requires particular attention, due to the fact that birds may have built a nest overnight. If one should find grass or small branches, additional inspection is called for, even in less accessible areas. A nest beneath the cowling could catch fire; a nest in the tail could compromise the control cables.

Observe Bird Activity at the Airfield

During taxi one should keep an eye out for birds at the airfield. Due to their plumage and size some birds may be difficult to make out on the concrete or asphalt. Perhaps there is also a bird activity advisory on the ATIS.

If large groups of birds are noticed on or near the runway the takeoff should be delayed. This is of particular importance when

operating turboprops and jets at smaller General aviation airports (the birds have become accustomed to the slower aircraft). If in doubt, one should not takeoff while birds are present on or near the runway. One should never use the aircraft to drive off the birds.



Particular caution during approach and landing

Whenever high bird concentrations are expected near the airfield one should avoid steep approaches or at a higher than normal approach speed. Reducing the airspeed by about 30% results in a half of the impact energy.

If there are flocks of birds in the approach area a timely go-around should be executed. The next approach may be clear.

Proper cruise procedures

Since most birds remain at lower altitudes VFR flights should maintain at least the minimum cruise altitude of 2.000 feet for overland flights (see § 6 LuftVO). Very few General aviation bird strikes occur at the higher altitudes.

At airspeeds up to 80/90 knots birds often have enough time to avoid an aircraft, but the higher the speed the greater the chance of a collision.

Professional pilots that must fly for extended duration at low altitudes often wear a helmet with a visor. The lives of many pilots have been saved by such equipment.

Nature preserves and bird strike risks

Nature preserves that are charted on aviation charts should generally be overflowed at a higher altitude (minimum of 2.000 feet AGL). Preferably these areas are completely avoided. As a result not only the probability of a bird strike is greatly reduced but the environment is enhanced.

— — — — —
Caution is also recommended when flying along rivers or coastlines, particularly at low altitudes. Birds, much like human pilots, utilize these helpful navigation aids.

— — — — —
It should also be noted that a large number of seagulls, waders (marsh birds) can be found near lakes and shallow river estuaries during the dawn and twilight hours. To minimize the risk of a bird strike, but also to not disturb these birds, one should circumnavigate such areas.

— — — — —
Additionally, helicopters tend to disturb flocks of birds more than fixed-wing aircraft.

— — — — —
June and July present the highest risk of a bird strike due to the large number of inexperienced juvenile birds. The flying ability can also be compromised due to the moulting process. Generally speaking larger birds tend to flap their wings more slowly and present more of a danger. Caution: Raptors have been known to attack aircraft in order to defend their territory.

Bird strike inspection and reporting

As a rule one should land as soon as possible after a bird strike. During flight it can be very difficult to determine the extent of the damage, for example if the strike has compromised the structural or aerodynamic integrity of the aircraft.

After any bird strike, even with a small bird, the aircraft must be thoroughly inspected after landing. The case could be that the resultant damage is extensive enough that the aircraft is no longer airworthy and must be repaired at an appropriate maintenance facility. A bird strike incident that occurs near an airport should be reported to the operator of that airport.

An aircraft collision with a bird does not classify as an accident and therefore is not reported to the German Federal Bureau of Aircraft Accident Investigation (BFU). However bird strikes should be reported to the German Birdstrike Committee (Deutscher Ausschuss zur Verhütung von Vogelschlägen im Luftverkehr e.V., DAVVL, www.davvl.de) in 56831 Traben-Trarbach, Postfach 1162. Reporting is mandatory only for commercial flights. But in the interest of safety, pilots and certificate holders of non-commercially operated aircraft are requested to report bird strikes. Unfortunately a large percentage of General aviation bird strikes are not registered.

In order to support the DAVVL in their research of bird strikes and establishment of appropriate countermeasures every pilot should report all bird strike incidents and therefore contribute to air safety. The DAVVL is even interested in the remains (e.g. feathers) of the bird in order to accurately determine the species involved.

Should a bird strike lead to a serious incident (e.g. engine damage or runway excursion) this is required to be reported to the DAVVL according to § 5 of the LuftVO.



CONCLUSION

- » The risk of a bird strike is particularly high during spring and autumn.
- » Avoid bird preserves and coastlines during spring.
- » Utilize all resources to be informed about migratory routes and bird concentrations.
- » Check NOTAM (BIRDTAM) and ATIS regarding bird activity at departure and destination.
- » Plan to fly as high as possible; most birds fly at only a few thousand feet AGL.
- » Conduct a thorough preflight inspection; bird nests can be built in only a few hours.
- » Many birds have plumage that can be difficult to discern from the background.
- » If a large gathering of birds is observed on or near the runway the takeoff should be aborted or delayed.
- » The greater the airspeed and heavier the bird, the greater is the risk of a bird strike and resultant damage.
- » The windshield of most General aviation aircraft are not designed to withstand a bird strike.

- » If the windshield is damaged do not allow yourself to be distracted-fly the aircraft.
 - » Keep in mind that birds also fly at night.
 - » After a bird strike land as soon as possible and determine the extent of the damage.
 - » Report all bird strikes, even smaller birds; use the reporting form of the DAVVL e.V.

IMPRINT

Disclaimer:

The views expressed in this leaflet are the exclusive responsibility of EGAST. All information provided is of a general nature only and is not intended to address the specific circumstances of any particular individual or entity. Its only purpose is to provide guidance without affecting in any way the status of officially adopted legislative and regulatory provisions, including Acceptable Means of Compliance or Guidance Materials. It is not intended and should not be relied upon, as any form of warranty, representation, undertaking, contractual, or other commitment binding in law upon EGAST its participants or affiliate organisations. The adoption of such recommendations is subject to voluntary commitment and engages only the responsibility of those who endorse these actions.

Consequently, EGAST and its participants or affiliate organisations do not express or imply any warranty or assume any liability or responsibility for the accuracy, completeness or usefulness of any information or recommendation included in this leaflet. To the extent permitted by Law, EGAST and its participants or affiliate organisations shall not be liable for any kind of damages or other claims or demands arising out of or in connection with the use, copying, or display of this leaflet.



European General Aviation Safety Team

May 2013

**EUROPEAN GENERAL
AVIATION SAFETY TEAM (EGAST)**
Component of ESSI

EUROPEAN AVIATION SAFETY AGENCY (EASA)
Safety analysis and Research Department
Ottoplatz 1, 50679 Köln, Germany

Mail egast@easa.europa.eu
Web <http://easa.europa.eu/essi/egast/>

