Flight Safety

Global and National Level

Front cover of the Flight Safety Unit leaflet at Entebbe, International Airport

Birds Haunt Nigeria Airways

Really, wonders will never end. Fortunes of the beleagured Nigeria Airways pluned during the week, as birds wrecked havoc on the airlines only two functional aircraft Boeing 373, grounding its fleet in the process.

Penultimate Thursday, one of the airlines two functional aircraft was billed to take off from the local wing of the Murtala Mohammed Airport Ikeja, Lagos, when a flock of birds swooped on it and damaged one of the engines. The airlines engineers worked through the night to replace the bad engine with one from the other only functional aircraft. They succeeded. The same aircraft was about to take off from the Maiduguri airport when again birds grounded it.

While the airlines workers went into a fervent session of prayers to wade off whatever evil follows the airlines, experts say there is no mystery about the development. That birds are common to airports all over the world and that it is the aviation authorities duty to keep them in check through serious measures.

The minister of Aviation, Dr. (Mrs.) Kerna Chikwe seems to share that thinking as she ordered FAAN (Federal Aviation Authority of Nigeria) to clear the bush.

Really wonders will never end...from Nigerian newspaper: This Day, October 8, 2000

The International Bird Strike Committee: From European To Global Activities

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Abstract

Bird strike prevention can be a highly complex and multidisciplinary affair. But before unravelling a few major aspects I start with the statement that the law of diminishing returns is clearly applicable here. It is, in principle, fairly simple to avoid obvious hazardous situations. Scaring away large flocks of birds from the runway does not require high skills. Neither does it require a great imagination to realise the risks of building an airport besides a bird sanctuary or flying at low altitude over a bird concentration area. Beyond these obvious threats, however, it becomes increasingly difficult to achieve greater flight safety. There will always be conflicts of interest and a degree of insoluble risk. As aviation is a truly international affair this raises the question of where and how to invest available resources. Clearly, rich countries are able to spend more money than poor countries but the tiny budget of the latter will contribute more to flight safety when spent in Africa than in Europe. And, even more importantly, local knowledge may often prove superior to general guidelines from abroad.

Résumé

La prévention des collisions aviaires peut être une affaire hautement complexe et multidisciplinaire. Mais avant d'exposer quelques aspects importants, je commencerais par attester que la loi des «retours en diminution» est clairement applicable ici. En principe, il est très simple d'éviter des situations de risque prévisibles.

L'éloignement des hordes nombreuses d'Oiseaux de la piste d'atterrissage ne requiert pas d'aptitudes spéciales. Non plus, il ne faut pas disposer d'une grande imagination pour réaliser les risques qu'entraînent la construction d'un aéroport dans les parages d'un sanctuaire d'Oiseaux ou les vols à basse altitude au dessus d'une aire où sont concentrés des Oiseaux.

Cependant, au-delà de ces menaces évidentes, il devient plus difficile de garantir une meilleure sécurité aérienne et il y aura toujours des conflits d'intérêt et un certain degré de problèmes insolubles. L'aviation étant réellement une activité internationale, il y a la question de savoir où et comment utiliser les ressources disponibles. En termes clairs, les pays riches peuvent dépenser plus d'argent que les pays pauvres mais le petit budget de ces derniers contribuera plus pour la sécurité aérienne, s'il est utilisé plutôt en Afrique qu'en Europe. Plus encore, les connaissances locales pourront s'avérer supérieures pour des indications générales de l'étranger.

Establishment of National Bird Strike Committees

As indicated in Figure 1 the first step in recognising the true nature of the problem is the collection of reliable bird strike statistics. This is problematic due to the difficulty of defining a bird strike, which may vary from an almost undetectable blood smear, without any damage to the aircraft, to a fatal crash. Furthermore, there may be an initial reluctance to disclose information. A certain awareness is necessary before bird strikes become reported on a regular basis. Consequently, intensification of a bird strike prevention program is usually followed by an increase in the bird strike ratio.

Proper identification of bird remains, together with stable reporting usually reveal three major factors causing high bird densities at airports: the availability of food, fresh water and resting grounds. In general, we have observed that species that follow human (agri)culture tend to become problem species. Consequently, habitat management plans have to be developed, and this usually requires expert assistance.

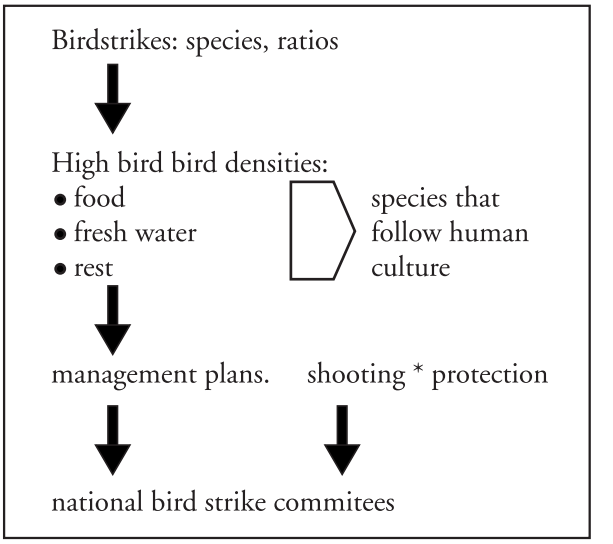


Figure 1

Threatened species only very rarely cause major bird strikes. Nevertheless, exceptions are possible. This creates the problem of obtaining a license to shoot a protected species. As a rule simply reducing bird numbers is not the key to solving the problem. A shot bird creates a vacant niche for a successor without (local) experience. But the options of shooting as a last resort, or of teaching avoidance to other members of a flock remain necessary. It is a matter of trust between flight safety and bird protection officials to find a *modus vivendi* and to reach the most efficient and effective levels when dealing with bird problems. Especially due to the complex legal situation, creation of a national bird strike committee is currently becoming essential.

Three Phases of Bird Strike Prevention

General experience has shown that selecting an airfield landscape that will attract minimal numbers of birds should be the first and most preferable safety measure (Fig. 2). However, the reality is that many airports are already situated in very bird-rich landscapes, such as flat coastal areas. Habitat manipulation through drainage and reduction of bird feeding conditions appears to be often a costly and delicate matter. Compulsory ecological management

plans should be initialled, with regular re-evaluation and adjustment. Acquisition of knowledge of local species and situations is crucial.

On top of this structural prevention of bird problems there will always be a certain need for additional bird control. Visual inspection from the control tower is usually insufficient by itself. Regular inspection sweeps on and around the runway, preferably by experts, should be an integral part of airport operations. Bird scaring should be most intensive from the runway itself. Scaring birds on the periphery not only creates the risk that birds will not relate the danger with the flight path of the aircraft, but their consequent state of unease might create greater risks than those present before the scaring action. Defining certain zones around the runway with adapted methods of inspection and bird control will help to optimise the investment of available manpower.

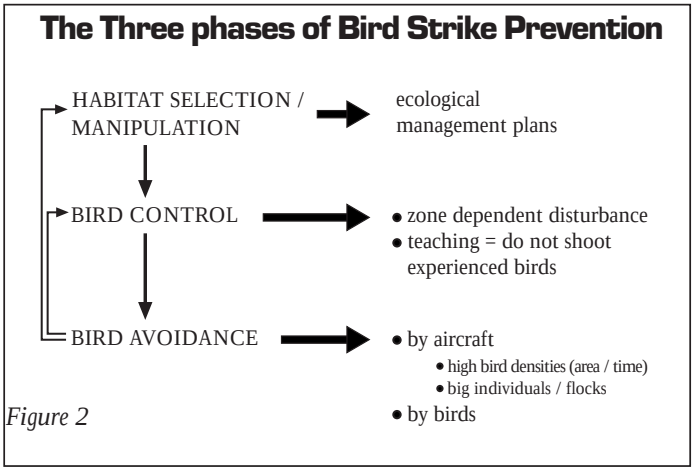


Figure 2

A certain risk will nonetheless always remain. Migrating birds unused to aircraft might cross the airport aerospace. Young inexperienced birds from the airport environment will enter the area to explore living conditions. Certain species and individuals will adapt, even to the most rigorous bird control. This is, of course, increasingly true further away from the runway. Where bird control becomes senseless, only bird strike avoidance (by adapting flight activity or path) might further contribute to overall flight safety. Such avoidance behaviour can be achieved by both aircraft and birds. Monitoring where the birds are flying by applying remote sensing techniques is technically speaking possible. Whether this will fit into the present air traffic control procedures is increasingly a matter of discussion. Stimulating aircraft avoidance by the birds is another promising field of research.

Bird Avoidance Modelling

Weighing flight safety against nature conservation seems to be the most critical aspect of the bird strike issue. As no-one wants to eliminate all birds, while equally no-one

Remains of the Boeing 737 that collided with a flock of pigeons and crashed on 15 September 1988, in Ethiopia. 35 of the 104 passengers were killed.

18/11/2000, Luanda Airport Angola. An Antonov 74 "digested" a bird while taking off

Right: *The author, Luit Buurma investigated the disaster and is seen collecting feather remains from the aircraft*

Below: *White-backed vulture hit at Bole International Airport Addis Ababa, Ethiopia (no details and date).*

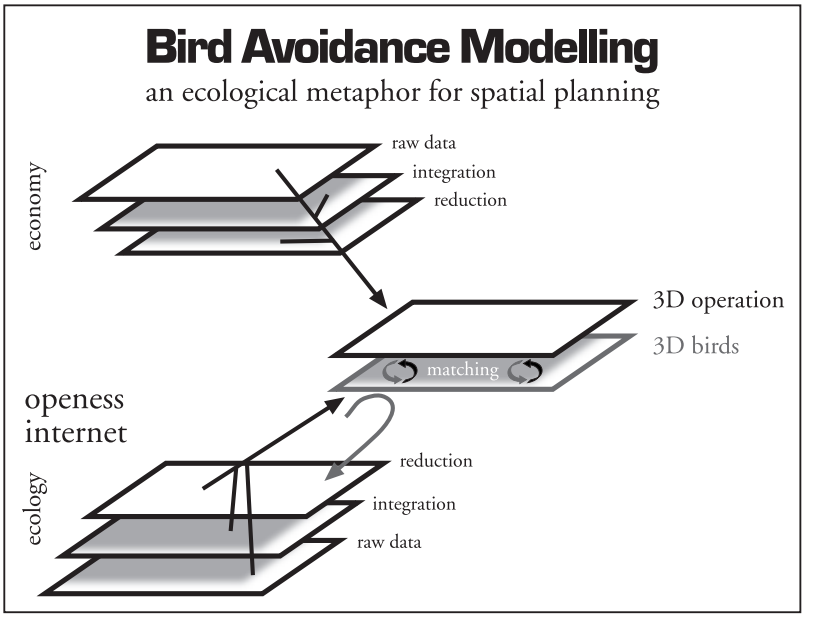
July 15, 1996. A Belgian Air Force C-130 (Hercules) which flew The Netherland Army Orchestra collided with a flock of starlings at Eindhoven, the Netherlands. Thirty four people were killed and 6 were badly injured.

A Twin Otter which was totally destroyed in 1995 while coming to land at Bole, Inernational Airport in Addis Ababa and hit by a White-backed vulture (below). The vulture hit the pilot's head, over the slaughter house a few miles from the airport, during his finel descent. The estimated damage, 4.5 Million dollars.

travelling on an aircraft wishes to crash, those involved in accident prevention and those in nature conservation must learn to solve their differences and work toward the mutual benefit of both. The ultimate key to optimal bird strike prevention is, of course, knowledge of the spatial behaviour of birds and aircraft. Modern computing power and network technology offer fascinating possibilities to model and thus predict potential bird/aircraft collisions. Consequently, bird avoidance modelling (Fig. 3) presents an apt metaphor for spatial planning. Bird avoidance models, which include bird strike risk (bird mass weight per km3) as well as nature values (important areas for protected species) bring together risk management and the protection of biodiversity, i.e. help to promote the integrity of our environment.

The Eindhoven – Asmara Case

On the 15th of July, 1996 the Belgian Air Force lost an Hercules C-130 at Eindhoven AFB in the Netherlands - and 34 people lost their lives - in a tragic chain of mishaps initiated by a collision with a flock of starlings. This is not the place to analyse in depth the unhappy coincidence of so many unlucky factors. The accident is a clear example of the type that can only be prevented by applying the System Safety Approach, using the philosophy behind James Reason's "Accident Trajectory". The bird aspect is only one factor within a chain of several others. But the bird aspect itself can be broken down into an array of factors that should have been involved in the bird strike prevention practice:



- flocks of young (inexperienced!) starlings were to be expected at that time of the year;
- it was known that harvesting grass is very attractive to this species;
- the birds were already dangerous during that particular day;

- the birds might have panicked due to the sudden appearance of the aircraft;
- it should have been known that the presence of birds at the particular spot could not be visible from the air traffic control tower, making a bird sweep essential.

Without blaming anyone, it was concluded that bird control was ranking low on the list of priorities in that time. Nobody expected a heavy transport aircraft to be that vulnerable. Of course, much has changed since then. The bird control team has been extended and much research has been performed. Consequently, we now have precise data on the still-existing bird strike frequency.

Recently, this knowledge acquired a new application. To support the recent United Nations peace-keeping operation in Eritrea, the Royal Netherlands Air Force performed flights with DC-10 aircraft between Eindhoven AFB and the airport of Asmara. During ca. ten arrivals and departures at Asmara the DC-10 suffered three bird strikes. Although this relates to only a very small sample, this bird strike ratio is roughly 100 times higher than that of Eindhoven AFB! A fact-finding mission from Holland found several obvious reasons for bird problems, such as agricultural activities at the airport itself and a nearby lake and garbage dump. But it was also obvious that financial constraints would limit the possibilities of developing a bird strike prevention programme. While Eindhoven AFB nowadays can be considered as 'overdeveloped' (according to the average), Asmara is clearly 'underdeveloped', while the same aircraft, crew and passengers are at risk. According to the law of diminishing returns more solidarity with respect of the application of available resources would clearly increase overall flying safety!

IBSC and the Future

The Eindhoven - Asmara case illustrates the necessity for a global approach to bird strike prevention. While this necessity seems so obvious, the bird issue has nevertheless not reached the level of standards within the regulations of ICAO. ICAO's Annex 14 only speaks in terms of recommendations. Thus, the first priority of the International Bird Strike Committee is to strive towards legislation and enforcement of relevant ICAO regulations. As nature will never be under the full control of humans, there should be a clear sequence of defined measures, fitting into a spectrum from globally agreed principles to locally applicable measures. Articulation of the various aspects necessitates the involvement of state-of-the art knowledge from all relevant disciplines. Exploring the balance between short-term (flying) safety and long-term (environmental) safety also demands a multinational and intercultural approach. The present seminar nicely illustrates the way ahead.

References

'Sharing the Skies', Transport Canada, 2001

For further details see www.int-birdstrike.com

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