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BASH TEAM NEW DEVELOPMENTS

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INTRODUCTION

The Air Force incurs over 1,900 bird strikes annually worth over 10 million dollars. Approximately 47% of all bird strikes happen in the airfield environment and as a result, the main thrust of our efforts is to control birds in that area. The Bird/Aircraft Strike Hazard (BASH) Team envisions expanding these efforts to include new developments which could aid in reducing bird/aircraft collisions.

THE BASH TEAM

The BASH Team was created in 1975 at Tyndall AFB FL to coordinate all aspects of Air Force bird strikes, as well as to assist bases in reducing bird hazards to aircraft. The Team presently has three members, all biologists (two hold master's degrees in biology), to aid bases worldwide in bird control. The Team maintains a technical library on topics related to bird strikes as well as a computer program and records on all Air Force bird strikes to determine trends and problem areas. During field surveys at bases they identify problem areas and make recommendations to alleviate them. Additionally, the Wright Aeronautical Lab uses the computer information and windshield/canopy bird strike resistance testing to determine aircraft ability to withstand four-pound bird impacts up to 500 knots airspeed.

The BASH Team also assists the Navy in its bird strike reduction program. Occasionally, the Navy requests the Team to visit bases to conduct surveys and provide recommendations. A Navy representative on the BASH Team would have better insight into Navy flying operations and could probably give better recommendations. In anticipation of such a team member, we have begun collecting Navy bird strike data.

NEW DEVELOPMENTS

Radar

In an attempt to improve our existing program, we have established several projects which are ongoing or will be investigated in the very near future. The first of these is the work being done with radar. It has been known for several years that radar can detect birds. Since airfield personnel cannot possibly see all birds which might be hazardous to aircraft, there is a need for radar operators to detect birds and to provide minute-by-minute information about them to pilots. The Air Force realized this need last winter when two major strikes at a Delaware base resulted in a loss worth several hundreds of thousands of dollars. To deal with the problem, the Delaware base installed and successfully used a manual radar which could detect birds. Currently, they employ a warning system using a GPN-20 Air Traffic Control radar whereby pilots radio the radar personnel for bird hazard information when approaching or leaving the airfield.

What the Air Force is striving for, however, is an automatic system so that no one is required to man the radar to watch for birds. The goal is to have a system to indicate the hazard level with the following parameters:

a. Give real time (minute-by-minute) information automatically.

b. Provide pilots with an accurate assessment of hazardous birds in the airdrome environment so they can make an avoidance decision.

A common problem in the US is that information given to pilots is not specific. Often a plane sits on the ground at the end of the runway and hears about birds in the airdrome but does not know where in the airdrome they are located or how many are concerned.

The Next Generation Weather Radar (NEXRAD) "fits the bill" as an automatic system which will do all of these things. It is a ground weather radar being jointly developed by the Departments of Commerce, Transportation, and Defense. In a previous study, NEXRAD showed it has the capability to detect birds. The next phase is to write the computer software which will allow it to distinguish birds from other targets and automatically notify airfield personnel of a hazard. This, we hope, will allow pilots to know where the birds are and avoid them.

Strobe Lights

Avoidance is also a key element of a proposed study with strobe lights. If birds are able to "see and avoid" planes (much the same way we see and avoid automobiles at a crosswalk), there will be fewer collisions. One of the important issues is whether, in fact, birds do see and avoid oncoming aircraft. If they do, we would like to know what their reaction time is and how we can use this information to reduce bird strikes.

Microwaves

Along similar lines, we are interested in determining what effect microwaves have in creating an undesirable environment for birds. We have no concrete evidence to determine their effectiveness, but their possible usefulness could be a partial solution to some bird problems. The Air Force is now following a study proposed by RCA to investigate the effectiveness of clearing birds from the path of aircraft using microwaves.

Bird Avoidance Model

The Bird Avoidance Model (BAM) is a computer generated model based on 40 years of waterfowl migration data. It takes into account migratory routes, altitudes, proximity to refuges, time of day/year, etc. The output is in the form of a graph which can be used to predict the bird strike risk posed to aircraft along military low-level flying routes (these are similar to airline corridors but at altitudes of less than 500 feet and at speeds in excess of 400 knots). We have determined that planes flying these routes are 40% more likely to collide with birds than other aircraft.

The BASH Team has determined that the BAM graphs are about 70 to 75% accurate in predicting waterfowl strikes. Only 12% of all Air Force bird strikes, however, involve waterfowl. When taking into account all types of birds, the BAM graphs fall in about the 50 to 60 percentile range. We feel that by including raptors in the model we can enlarge its effectiveness. Biologists know much about the locations, habits, and population size of hawks, vultures, and other raptors, making them a logical choice for the next phase of the BAM program. Eventually we would like to incorporate all bird categories into the model. For now the BASH Team has a two-year contract to include raptor data into BAM. The success of this phase will determine the next direction of the BAM development.

Pilot Film

Awareness is one of the most important aspects in bird strike reduction. If pilots and airfield personnel know that a hazard exists and what to do about it, they can greatly minimize the damaging results caused by bird/aircraft collisions. The BASH Team is currently working on a film which will help increase pilot awareness of bird hazards to aircraft. In the past, most films were oriented toward the airfield management responsibilities to remove the threat from the ground. The pilot film envisioned will inform pilots of the severity of the problem and instruct them on what they can do whenever birds are encountered during flying operations. It will also discuss what they

might do if they were to hit a bird and safely return to the ground. Since bird problems are often taken lightly by inexperienced pilots, we hope to reveal some of the consequences of hitting birds at high speeds.

CONCLUSION

By continuing with our existing programs of assisting bases with managing bird problems and researching new methods to reduce the hazards from birds, the BASH Team hopes to reduce the risks to flyers and the loss of dollars caused by encountering birds. These new developments are the next step in reducing bird strike numbers while creating a safer environment for flying.

DISCUSSION

Shoaf: What is the distance from which strobe lights will work?

Will: That's one of the things we will have to study. We have to determine at what distance birds can detect a strobe light on an aircraft. Effectiveness may depend on weather conditions, lighting, time of day, etc.

Laidlaw: We don't know how birds respond to these stimuli. In the situation you mention, birds only have milliseconds to respond. If the bird has to turn, that further reduces the response time. All we're doing here is to provide a fraction of a second more, and that may make a difference of only 1 or 2%.

Will: These pilots, especially fighter pilots, are used to operating in milliseconds; their reaction time is very good. We tell pilots if they see a bird in the air to pull up, mainly to add to the bird's reaction to dive and not expose the canopy to a bird strike.

Areson: What specific ideas do you have for pilots relative to avoiding bird strikes?

Will: Our purpose in the pilot film is to create increased awareness in pilot training. We'll show a bird impacting a canopy. We'll have interviews with pilots who have incurred bird strikes to give a realistic feeling; we have information from seven bases as to briefings giving pilots on actions to be taken. In 2-person aircraft it's important to be able to maintain communication with hand signals after a strike.

Question: Do you have records of mammal strikes?

Will: We do not have much data, but we do have a few records of deer and bat strikes.

Question: What is the comparison of strike incidence in the air compared to landing and take-off?

Will: Approximately 50% occur in landing and take-off and in the airport vicinity. However, the Air Force does a lot of low-level flying, so we do incur many strikes in that environment as well.

Johnson: Do birds detect radar and could you use radar on planes to alert birds?

Will: All of the evidence so far indicates that birds sometimes will scatter from radar. Whether installation in an airplane would be effective needs to be investigated.

Johnson: Would the silhouette of a plane produced by flashing strobe lights be a sufficient visual repellent to birds?

Will: I don't believe birds would pick it up; planes are moving too fast.

Kelley: Do you have anybody educated in habitat modification, so you can approach bird management from this direction?

Will: The safety officer is the primary reporting office for bird strikes. Base operations people deal with airfield management and are responsible for bird scaring operations. Each base has an environment planner or natural resources manager. He should deal directly with habitat modification, if required.

Question: Do you use hunting as one means of regulating wildlife in these environmentally managed areas?

Will: Limited on-base hunting is allowed where feasible. This is the responsibility of the base environmental planner/natural resources manager. But any hunting allowed would be far from the runways. Only operations people would discharge firearms close to the runways.

Question: What kind of authority do you have at an airport that is shared with commercial airlines?

Will: We work with the airport's airfield manager and develop a host tennant agreement. This is the responsibility of many, including the safety officer. He watches out for aircraft safety, but the airport manager normally has the ultimate authority.

Question: What sort of range do you have with this new weather radar to detect birds?

Will: It depends on the angle of the radar energy projected. It can range from 1-100 nautical miles.

Schneider: To whom would you show this Canadian Bird Strike film? You showed pictures of bird nests in engines, and the implications can be quite frightening. Pilots seem to be well aware of these kinds of problems. Airport management is receptive to safety needs. But would you show this to the general public? Whom are you trying to reach?

Laidlaw: If a commercial airliner were to delay a takeoff because of a flock of gulls, the public could better understand the reasons. The passengers would be aware that the pilot has their safety in view.