How Bird Radars Can Make Our Airports Safer Today …

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Bird radars have been successfully used for real-time, tactical bird-aircraft strike avoidance since 2003 by the U.S. Air Force (USAF), the Royal Air Force (RAF) and NASA with well documented records of preventing and reducing birdstrikes while increasing airspace utilization. Foreign airports are now moving ahead of the US in applying these existing, proven military technologies operationally at commercial airports to improve passenger and aircrew safety. Development and application of radar technology for aircraft-bird strike risk avoidance requires a unique combination of expertise in radar engineering, radar ornithology (the use of radar to study birds), aviation flight safety, airport operations and airfield bird control. It also requires a pragmatic, common sense, realistic approach in developing procedures to use the technology operationally.

There are those who say that bird radars need much more 'research' before we can deploy them operationally at commercial airports, citing concerns that we do not know if the current bird radar technology can 'see' all birds, among other issues. They are missing a key point - just as we **'do not have to see every rain drop to know it is raining'**, a bird radar does not necessarily have to see every bird for us to use the information operationally and meaningfully. First of all, we do not need to see 'every bird', but only the larger birds and flocks of birds that pose the greatest strike damage risk to aircraft. Studies have already concluded that the experimental bird radars they have tested to date 'see' 50 or more times as many birds in the environment than human observers (they have not yet tested the radars used operationally by the USAF, NASA or the RAF). Accordingly the technology can be immediately used to provide airport bird control staff and managers with a vast improvement about the current level and location of hazardous bird activity on and around an airport **essentially functioning as a pair of 'electronic binoculars' that can look for birds much farther in all directions and continuously**.

If one takes the time to talk to commercial airline pilots, they will tell you that the birdstrike risk

MERLIN Aircraft Birdstrike Avoidance Radar at Logan International Airport, Boston, Massachusetts, USA in July 2009.

advisories currently provided at our airports are virtually worthless (and are subsequently generally ignored) as they typically provide only generic, never changing information such as "elevated bird activity around the airport" (Captain Sullenberger cited this at the recent NTSB hearing on the US Airways flight 1549 birdstrike related crash). **Ask pilots and they will tell you they need is timely information and specificity**: What is the current level of the risk? How far out is it from the airport? At what approximate altitude is the risk? Controllers will similarly tell you that they need a usable, intuitive system that is highly automated and in real-time as they do not have the staff to monitor another system in the tower nor the skillsets to decide 'how many or what kind of birds' represent 'what level' risk. Also, as most US airports wildlife control programs are understaffed (or in some cases non-existent), bird control staff will tell you they need real-time information to help them **'be where the birds are'** and to alert them when and where activity is increasing. They also need a system that will allow them to more accurately determine the current 'risk level' for advisories and that will help them know when it needs to be raised or lowered.

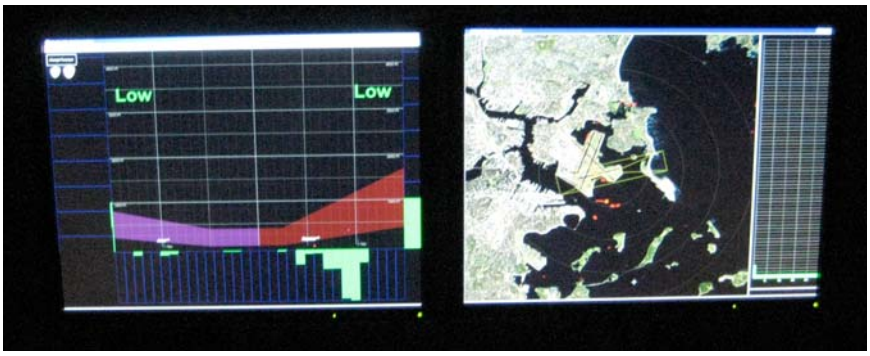
Some have also posited that it is necessary to detect and track birds around an airfield with TCAS-like precision and with military-level targeting 3-D radar accuracy before bird radars can be used operationally at commercial airports. This approach is similarly fundamentally flawed and shows a lack of understanding of airfield operations, bird control and aviation operational risk management (ORM), and,

as stated by the researchers that have been heading the FAA bird radar program for the past nine years, will also take 'years more development' before these theoretical 'Star Wars' type bird radars become available (if they ever do).

What is needed is a realistic, pragmatic solution to the birdstrike problem for commercial aviation and it is needed today . . . not at some undefined date years in the future. According to the U.S. Department of Agriculture Wildlife Services (USDA WS), 95% of commercial aircraft-bird strikes occur in runway approach and departure corridors or during ground aircraft movement (85% occur below 250 feet altitude), so focus on this highest risk zone provides the best opportunity for increased aviation safety and near term return on the investment in the technology. Bird radars currently on the market can immediately meet this need, without more taxpayer-funded R&D. Use of these bird radars at commercial airports, however will require a new "Concept of Operation" or CONOPS from the ones currently used by the military and NASA, but this does not present an insurmountable obstacle as some of the naysayers would lead us to believe.

The various users at a commercial airport have different information needs from a bird radar system. I recognize that putting anything new in an air traffic control tower is a complex process, but bird radar information does not have to go into the air traffic control tower to provide immediate results. The immediate beneficiary of bird radar technology at commercial airports is bird control staff user who can have a real-time bird radar display in the bird control vehicle to provide a real-time 'bird's eye' view of the airport of where activity is highest or developing. Additionally, bird radars already in production are capable of automatically monitoring bird activity by zones giving visual, audible and text message 'alerts' when increased risk is detected, allowing bird control staff to provide concise advisories and respond immediately to hazards before they become critical.

The most widely used bird radars in use today additionally include dedicated radars for each



MERLIN Bird Radar real-time displays showing bird activity around the airport and currently birdstrike risk for the runway approach and departure corridors.

runway that scan the runway and flight corridors out to 4 miles, continually monitoring bird activity in the corridor and converting it to a relative risk level (LOW, MODERATE or SEVERE) with specific detail as to where the activity is located. Before an aircraft takes off or lands, the bird radar is used in analogous to **'looking both ways before crossing the street'** . . . before a plane departs on a runway, the radar is checked to ensure that the corridor is 'clear' of high risk bird activity. Similarly, the same process is applied to landings and pilots can be advised if elevated activity exists in the flight corridor. As with weather advisories, the pilot may decide to continue the takeoff or landing even if birds are present, but at a minimum the aircrew will be better aware of the risk and prepared for the eventuality of a birdstrike (the extra seconds of preparedness can be the critical difference between a minor or major birdstrike incident). The wide beam and supplemental radar sensors in the most commonly used bird radar designs also allow for approaching threats to be detected and timely, meaningful advisories issues which would have been of specific value in the flight 1549 incident.

Bottom line, implementing bird radars at commercial airports does not have to be overly complicated and common sense practices can quickly yield significant reduction in birdstrike risk. The systems and procedures already used by the military, NASA and overseas airports can be adapted to US commercial aviation to immediately improve passenger and aircrew safety, and indeed are already being done so overseas.

- Gary W. Andrews