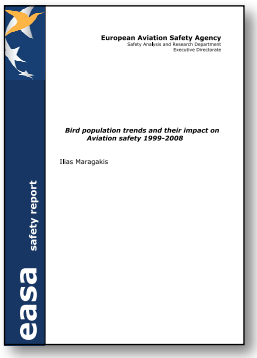
Bird Watch

Declines in overall European bird populations do not reduce all bird strike hazards proportionately.



REPORTS

Startling Starlings

Bird Population Trends and their Impact on Aviation Safety 1999–2008

Maragakis, Ilias. European Aviation Safety Agency (EASA). January 9, 2009. 24 pp. Figures, photographs, references. Available via the Internet at <www.easa.europa.eu/essi/Documents.htm>.

In recent years the overall bird population has declined in Europe by more than 10 percent, the report says. Bad news for environmentalists but good news for the aviation industry? Not necessarily: "The bird strike hazard for aviation has not [been] reduced proportionally."

Not all birds are created equal in their threat to aircraft. The population of Canada geese, which recently achieved media stardom after a flock of them was implicated in the in-flight engine shutdowns of US Airways Flight 1549 and its subsequent water landing, has increased in northwestern Europe by more than 100 percent in recent years, the report says.

"The interest of aviation organizations has been attracted to this particular species because of their large size … and tendency to fly in flocks," the report says. Written before the Flight 1549 accident, it continues presciently, "It is feared that in case of a bird strike, their in-flight separation of 3 to 4 meters [9.8 to 13.1 ft] may potentially lead to strikes on multiple engines."

Just as unsettling, although the Canada goose is by nature a traveler, "in recent years a non-migratory trend has been observed, as the species has adapted to urban environments. Because of the species' habitat preference, near standing water and/or conurbation [extended urban] areas, it has become of primary concern for avifauna management in northwestern Europe."

Size and the tendency to fly in flocks are the most important determinants, aside from habitat, of the risk that bird species pose to aviation. Among flocking birds, gulls and starlings are considered to represent a high risk. Gulls "feed on soil invertebrates on aerodromes, farmland, etc. and on landfill sites," the report says. "It has been observed that flightlines of gulls are most likely to occur between landfill sites and roost sites, and it is these movements that frequently cause grave concern." Many newer airports are built on landfill because no land in dense urban areas was suitable or available for them.

Starlings are very much birds of a feather; they fly in groups as large as 100,000, and their mass is 27 percent larger than that of gulls, the report says. The starling population has declined by almost 50 percent in Europe in the past 35 years, but because of their size and behavior, "changes in their population might not reflect a proportional decrease [in] the risk to aviation," the report says.

Nor have all species declined in population. "Climatological changes have allowed new species to forage and breed in geographic areas which were not particularly suitable to them several decades ago," the report says. "The ban of organochloride pesticides has also enabled some bird species populations to increase from their low levels in the 1970s. … Some of the wildlife protection programs have introduced a population increase of some large bird species which were almost extinct a few decades ago. For example, 24 of the 36 largest bird species (weight greater than 2 kg [4.4 lb]) in North America have shown significant population increases in the past 30 years, and only three species have shown declines."

The report also examines whether certification criteria for airframes and engines have kept pace with the evolution of the bird strike threat. "To this end, large-bird certification requirements [for engines] have recently been extended to include provision for large flocking-bird tests, in order to take into account recent concerns about changes in the European avifauna, as it has also been highlighted by the U.K. [Civil Aviation Authority]," the report says. "All the certification requirements [for a single large flocking bird and multiple birds of varying size] have been progressively updated after a number of bird strike accidents changed the perception of the hazard."

For airframes larger than EASA's commuter light classification, the original certification criterion was that the aircraft should be able to safely continue flying after striking a 1.8 kg [4 lb] bird at design cruise speed. "For the aircraft empennage in particular, this requirement has been increased to 3.6 kg [7.9 lb] following an accident [involving] a Vickers Viscount in the 1960s," the report says.

At altitudes above sea level in the standard atmosphere, the true airspeed of an aircraft is faster than the indicated airspeed, although the type of airspeed displayed typically is selectable on electronic flight instruments. "Therefore, a bird strike at a specific indicated airspeed will have greater kinetic energy as the atmospheric altitude increases," the report says. "This change in airspeed is not commented on in the regulations … . In addition, in recent years questions have been raised regarding the degree to which certification tests are representative of real bird-impact conditions, when these tests are conducted on carbon fiber polymer material."

"A bird strike at a specific indicated airspeed will have greater kinetic energy as the atmospheric altitude increases."

The author of the report could find no standardized training for flight crews about bird hazards or any regulation requiring such training.

"The seasonal pattern of bird strikes is confirmed from all sources, indicating that the highest number of bird strikes occurs in the months between April and October," the report says. That is also a period of increased traffic, but even when traffic is factored in, the seasonal pattern holds true.

"The seasonal pattern may also affect the altitudes with the highest risk of a bird strike," the report says. "For example, July through November are considered the worst months for damaging strikes in the airport environment below 500 ft agl [above ground level]. During late summer, bird populations are at their highest levels and include many young birds that are not skilled flyers. Above 500 ft, September–November and March are considered the most dangerous months because these are the peak times of migration."

"Altitude information was not available in most of the occurrence reports used in this review," the report says. "Using various other sources of raw and derived data, it can be concluded that most of the occurrences, 95 percent, occur below 2,500 ft AMSL [above mean sea level] and around 70 percent occur below 200 ft. … This highlights the fact that the risk of bird strikes can be mitigated by measures taken primarily at an aerodrome level, such as avifauna assessment and management."

Analyzing 71 bird strike accidents during the decade 1999–2008, the researchers found that four of the six fatal accidents occurred during the takeoff phase, and 84 percent of all bird strike accidents in the database occurred during takeoff, approach or landing.

"Some past studies have indicated that aircraft with low noise-level engines have a greater risk of a bird strike because the low noise decreases the warning and reaction time of birds," the report says. "No such relationship could be confirmed within the data set used. On the other hand, engine configuration is understood to play a significant role [in] the probability of a bird strike damaging the engines, as it has been found that wing-mounted engines have five times more probability of being hit by a bird in a bird strike incident than fuselage-mounted engines."

The area damaged the second-most frequently — in 23, or 31 percent, of the accidents — was the wing structure. "In four out of the 23 cases, the bird strike led to a puncture of the fuel tank and consequently to fuel leakage," the report says. "For these cases it was a single large bird or a flock of large birds that hit the aircraft. … There are no fuel tank–specific requirements on this subject, and this may need to be reviewed."

For the bird strike hazard to be assessed and mitigated, "it is of the utmost importance that reporting of such occurrences improves significantly," the report says.

U.S. Pilots: Fewer and Older

An Analysis of the U.S. Pilot Population From 1983–2005: Evaluating the Effects of Regulatory Change

Rogers, Paul B.; Véronneau, Stephen J.H.; Peterman, Connie L.; Whinnery, James E.; Forster, Estrella M. U.S. Federal Aviation Administration (FAA) Office of Aerospace Medicine. DOT/FAA/AM-09/9. Final report. May 2009. 23 pp. Figures, tables, references. Available via the Internet at <www.faa.gov/library/reports/medical/oamtechreports/2000s/2009> or from the National Technical Information Service.*

The changing aviation industry and regulatory changes — particularly raising the age limit for commercial pilots from 60 to 65 years in 2006 — have raised interest in the question of how the U.S. civil pilot population as a whole has changed over the years.

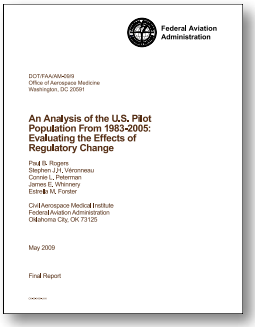
This study, using data for 1983 through 2005, was based on the records of U.S. pilots who obtained medical certificates in all three classes during that period. "The level of medical certificate, the year it was earned and the age of the airman at the time of the medical exam determines the length of time the airman is qualified to remain in the population," the report says. Those data gave the researchers a snapshot of the numbers of U.S. pilots in any year, as well as demographic information — gender, medical class, age and flight experience in years.

"Thus, the statistical results are population parameters, rather than estimates, and are not subject to sampling error," the report says.

The overall U.S. pilot population is "indisputably in decline," the report says. The number of pilots declined by 200,000 during the 23-year period, the study found. "This is an indication that the industry has gone through deep-seated changes in the past 40 years," the report says. But the decline in numbers varied among pilots with different classes of medical certification. Those with first-class certificates, needed for an airline transport pilot rating, increased.

"There were more third-class medical certificate holders than any other, but those numbers were in decline," the report says. "Second-class medical certificate holders numbered less than half that of third-class medical certificate holders, and they too were in decline. First-class medical certificate holders initially numbered less than either second- or third-class medical certificate holders but were generally increasing and were close to overtaking second-class medical certificate holders in recent years, in terms of overall numbers."

In analyzing the findings, the report says, "More first officers may be seeking first-class medical certificates to be able to upgrade to captain status or may be fulfilling requirements from their companies that they hold higher medical certificates than required by the federal regulations. Finally, commercial operations requiring a first-class medical certificate such as airline operations may be expanding, which is why we have observed an increase in this category. Our findings suggest that one or more general aviation components are declining, while air carrier and other commercial operations requiring a first-class medical certificate are growing."


Federal Aviation Administration

DOT/FAA/AM-09/9
Office of Aerospace Medicine
Washington, DC 20591

An Analysis of the U.S. Pilot Population From 1983-2005: Evaluating the Effects of Regulatory Change

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May 2009

Final Report

The average age of the overall pilot group increased during the study period for both men and women. For men, the lowest median age was 37 in 1983 and the highest was 45 in 2005. For women, the lowest median age was 32 in 1983, and highest — at 38 — in 1998, 1999 and 2005.

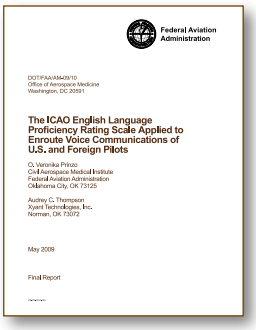
"Although women, as a group, were gradually aging, they were still younger than male aviators," the report says. "Breaking our analysis down by gender revealed that, since female pilots were younger than their male counterparts, their accumulated flight time was lower."

Language Level Busts

The ICAO English Language Proficiency Rating Scale Applied to Enroute Voice Communications of U.S. and Foreign Pilots

Prinzo, O. Veronika; Thompson, Audrey C. U.S. Federal Aviation Administration (FAA) Office of Aerospace Medicine. DOT/FAA/AM-09/10. Final Report. May 2009. 17 pp. Figures, tables, references. Available via the Internet at <www.faa.gov/library/reports/medical/oamtechreports/2000s/2009> or from the National Technical Information Service.*

"Non-native English-speaking pilots are at a disadvantage flying into countries where their primary or native language



is not spoken," the report says. "Not only must they be able to understand spoken English, the language of aviation, but also speak it when communicating with air traffic controllers."

Hoping to alleviate the longstanding and vexing problem of varying degrees of fluency in English among pilots and controllers, in March 2008 the International Civil Aviation Organization (ICAO) implemented language proficiency requirements: "Aeroplane and helicopter pilots and those flight navigators who are required to use the radio aboard an aircraft shall demonstrate the ability to speak and understand the language used for radiotelephony communications." ICAO requirements also say that "air traffic controllers and aeronautical station operators shall demonstrate the ability to speak and understand the language used for radiotelephony communications."

To retain their licenses, pilots, navigators, controllers and station operators must demonstrate at least Level 4 — "Operational" — ability in speaking and understanding. Failure to reach Level 6 — "Expert" — language proficiency will require retesting at least once every three years for those at Level 4 or every six years for those at Level 5, "Extended."

Two previous reports examined pilot-controller communication in the en route environment (*ASW*, 7/07, p. 54, and 1/09, p. 55). In this third and final report of the series, the researchers "apply the six operational levels of language proficiency scales to communications problems using the same database as the two previous reports. By restricting the analyses to only identified communication problems, we should gain a better understanding between the operational levels of the language proficiency scales and communication problems."

The previously identified problems were re-examined and rated according to ICAO's six dimensions of language proficiency — pronunciation, structure, vocabulary, fluency, comprehension and interaction. Each dimension is rated according to a scale from Level 1, or "Pre-Elementary," to Level 6.

Transmissions — 1,371 in all, made by 58 controllers — were examined. Among those controllers, all but one received a rating of "Extended," or Level 5, because ICAO language proficiency ratings are determined from the lowest rating awarded on any of the six dimensions. "An examination of the rater's notes indicated no problems with 80.5 percent of the controller's messages, and fillers such as 'ummm' and 'uh' appeared in 15 percent of their utterances," the report says.

Among the "U.S.-English" aircraft pilots, those who flew for U.S.-based airlines, "100 percent of the pilots' utterances were awarded [a rating of] Expert in structure, comprehension and interaction, while 99.4 percent achieved a rating of Expert for pronunciation and fluency. All of their utterances were rated as Extended in vocabulary," the report says. All the "foreign-English" pilots, those who flew for non-U.S. airlines but whose native language was English, were rated Expert on five dimensions and Extended on vocabulary.

Transmissions from "foreign-other" aircraft pilots, who flew for non-U.S. airlines and whose native language was not English, were more varied. "Their utterances received ratings that varied from Expert to Operational on all but structure — of which slightly more than 93 percent received a rating of Expert," the report says. "Approximately 65 percent of the transmissions were rated Expert for comprehension and 74 percent for interaction; 47 percent received a rating of Expert on pronunciation and fluency. Between 30 percent and 37 percent of their utterances were awarded Extended on pronunciation, fluency and comprehension; and 23 percent on interaction. Nearly 23 percent of the pilots' pronunciation was awarded a rating of Operational. About 16 percent of their transmissions also received a grade of Operational on fluency, and only 3 percent were rated as Operational on comprehension and interaction."

Among all the 1,414 pilot communications, English language proficiency was a factor in 18.2 percent of problem communications, the report says.

The researchers found a subjective element in the ICAO descriptors, which guide graders in assigning numerical scores for each dimension. "It would help graders to have quantifiable metrics when rating pilots, controllers and other

aviation personnel on their language proficiency," the report says. "The ICAO descriptors may be a necessary first step in meeting the goals of the ICAO but may unavoidably introduce inconsistencies between graders. In particular, will graders use the same metric on which to determine what 'almost never,' 'rarely' or 'consistently' means?"

The report's recommendations include the following:

- "Increase awareness of the importance of good microphone techniques and the issues arising from the technical aspects of ATC delivery to reduce the technical challenges;
- "Increase awareness of good/bad communication techniques and message receiving and delivery issues to improve message delivery among pilots and controllers;
- "Provide native and non-native English-speaking pilots and controllers with radio broadcast training programs to reduce the number of communication problems attributable to speech delivery;
- "Increase awareness of what native speakers do (e.g., elision, use of non-standard phraseology, poor enunciation with everyday language) to improve ATC transmissions among pilots and controllers; [and,]
- "Conduct further research to quantify the ICAO descriptors in practical terms."

— Rick Darby

WEB SITES

Magnificent Seven Versus Dirty Dozen

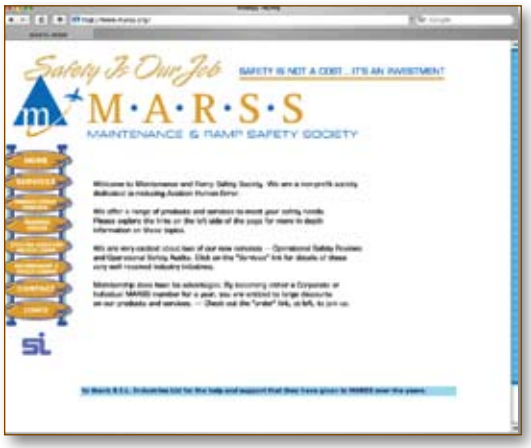
Maintenance and Ramp Safety Society, <www.marss.org/index.htm>

Maintenance and Ramp Safety Society (MARSS), a Canadian nonprofit organization "dedicated to reducing aviation human error," offers safety products and services on its Web site to members and nonmembers.

Colorful, animated human error posters are motivational and educational, identifying the "dirty dozen" factors that affect safety, quality of workmanship and quality of personal and workplace life. "The Dirty Dozen" posters focus on lack of communication; complacency; lack of knowledge; distraction; lack of teamwork; fatigue; lack of resources; pressure; lack of assertiveness; stress; lack of awareness; and norms. Negative illustrations are followed by solutions called "safety nets."

For example, a poster on "complacency" illustrates a technician deliberately failing to inspect an area on an aircraft because "I've looked back there one thousand times and never found anything wrong." The poster then offers two "safety net" messages to counteract complacency: "Train yourself to expect to find a fault" and "Never sign for anything you didn't do."

Continuing with the movie title theme, another series of posters is called "The Magnificent Seven," with slogans such as "Safety is not a game because the price of losing is too high."



MARSS also offers training videos. They include "Helicopter Risk Management," which was produced by Transport Canada; "Anatomy of an Accident"; "To Kill a Whopping Bird"; "Human Performance in Maintenance"; "Human Factors in Aircraft Maintenance"; and "The Death of an Airline," about the chain of events that resulted in low tire pressure on an airliner that led to a crash with 161 fatalities.

"The aim of all these videos is to enable viewers to spot the links as they form, and determine what safety nets can be used to stop that chain [from] forming," the Web site says.

Clicking on the title of a video opens a window that provides a brief preview. Order forms and pricing appear on the Web site.

— Patricia Setze

Source

* National Technical Information Service <www.ntis.org>