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In Memory of Gerald (Gerry) Heifetz, Co-Founder of IFTTA and one of the early Editors of the Review.

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Message of the President

Dear IFTTA members, dear readers of RRA,

There are four issues of specific international travel and tourism law interest I would like to highlight in this editorial.

The first concerns the adoption by the United Nations World Tourism Organisation of the Framework Convention on Tourism Ethics. This was adopted at the 22nd General Assembly of UNWTO in China in September 2017. It is the UNWTO's first Convention. It takes the nine principles of the Global Code of Ethics for Tourism, 1999, and without much change enacts them as a Convention. The work of adapting the non-binding Code into a state-binding Convention took only two years. The Convention will be officially adopted when it is translated into the UNWTO's five official languages and enters into force a short while after the tenth instrument of ratification etc. is deposited.

The Convention will bind only state parties to it and like many conventions is weak on monitoring and enforcement. There is no judicial mechanism specifically provided to adjudicate and enforce, and even if there was, the language used to set out the key principles of tourism ethics is often so general as to make disputes over on-the-ground compliance almost semi-political rather than justiciable in nature. Individually actionable rights are not created by the Convention, though there is no express clause to this effect.

However, there are clause in the Convention – Article 10, titled 'Right to Tourism', and Article 11, titled 'Liberty of tourist movements' – which may prove useful when legal argument is based on general, universal values, and is used as back-up to other arguments, or as indicating trends in the evolution of ethics which a court might be tempted to follow in an appropriate case.

The second matter of international interest is that the UNWTO received backing from its 22nd General Assembly

to continue its work on the draft Convention on the Protection of Tourists etc. This means the renewal of the work of the Working Group, on which IFTTA is represented, and which has been deliberating for a long time. I mentioned previously a personal doubt over how far the Working Group's work would go, but it seems this is unfounded. Difficult questions still remain, however, especially over the listing of performance obligations of accommodation serviced providers.

The third matter of interest is the on-going national transpositions within the EU of the new Package Travel Directive 2015/2302, all due to be in place by 1st January 2018. There are the on-going difficulties which the travel trade has in understanding implications and complying with it. Not surprisingly, law texts on the subject are already appearing – a welcome development.

One text is a collection in English of conference papers, edited by Portuguese academic Carlos Torres, titled 'The new Package Travel Directive' published by ESHT and INATEL in Portugal. Carlos Torres also has a Facebook closed group with 65 members called 'All about the new Package Travel Directive [2015/23032]'. The other text is in Spanish by Antonia Panzia, a Spanish academic, dealing with aspects of the new Directive. More details on this when available.

IFTTA North America held its 6th Annual Meeting in Fort Lauderdale, Florida on 9–10 March 2017. Doug Crozier has prepared a summary of the presentations which can be obtained from dcrozier@heclaw.com.

Marc Mc Donald
(President of IFTTA)

Essays

Bloody Skies Revisited

Eric Uhlfelder, New York*

Improving techniques in wildlife management along with the advent of avian radar suggest bird strikes are not inevitable acts of nature. Had New York's LaGuardia Airport been equipped with today's avian radar, most experts believe Captain Sullenberger's jet would not have collided with a flock of Canada Geese. However, industry and regulator foot-dragging are to blame for the slow rollout of this proven technology.

More than eight years after Capt. Chesley Sullenberger miraculously landed his crippled US Airways A320 jet on the Hudson River after flying into a flock of Canada geese, he says the risk of airplanes striking birds is as great today as it was that cold January day in 2009.

"What happened to us," Sullenberger says, "could happen again tomorrow."

The data bear this out.

In its latest annual survey of US bird strikes, the Federal Aviation Administration¹ says more than 13,500 birds were reported struck in 2015, a figure that is rising every year. But because pilots don't have to report inconsequential bird strikes, the actual number is likely twice that.

The FAA has identified 529 bird species that were hit in the U.S. from 1990 through 2015. Airplanes run into loons, starlings, grebes, pelicans, cormorants, herons, storks, egrets, swans, ducks, vultures, hawks, eagles, cranes, sandpipers, gulls, pigeons, cuckoos, owls, turkeys, blackbirds, crows, chickadees, woodpeckers, hummingbirds, mockingbirds, parrots, bats – as well as various kinds of geese. (Animals, such as deer, struck on the ground during takeoffs and landings also make up a meaningful portion of kills.)

The unfortunate reality is that airplanes collide with birds at an astonishing rate because wildlife and airports exist in close proximity to each other.

How many of the collisions force pilots to land prematurely? The FAA says the rate over the past 25 years has been one a day.

The FAA notes bird strikes costs the industry more than \$1 billion every year.

Zero Tolerance for Geese

In the U.S., the FAA is responsible for flight safety. It collects information on bird strikes, conducts research, establishes air

safety directives, helps fund wildlife hazard assessments around airports, and helps develop wildlife management plans. But direct on-the-ground actions intended to mitigate bird strikes are put in place by local, state, and regional agencies.

After Capt. Sullenberger's near catastrophic collision on Flight 1549, then New York mayor Michael Bloomberg told the *Wall Street Journal*, "Look, the Department of Agriculture has to deal with the fact that all these geese are a danger to people flying. People are not going to stop flying and we have to make a decision. It's geese or human beings. And I can tell you where I come out on that."

So efforts to drastically reduce the resident population of Canada geese around New York City were stepped up.

A mayoral steering committee made up of eight government agencies gave the go-ahead for the USDA to cull geese. And the Port Authority of New York and New Jersey, which owns the three major metropolitan airports (John F. Kennedy International, LaGuardia, and Newark International), adopted a "zero tolerance policy" for geese.

Now early each summer teams of USDA goose catchers, paid by local governments, scour municipal properties in a 450-square-mile area encompassing the airports. At that time of year the geese are molting and can't fly. Once located, they and their offspring are easy to snag. They're then taken to slaughterhouses and quickly dispatched.

The USDA sweeps occur from Inwood Park in northern Manhattan to Jamaica Bay Wildlife Preserve in southern Brooklyn, adjacent to Kennedy Airport. Culling isn't supposed to occur more than seven miles from the closest airport, but USDA catchers have also removed hundreds of geese from Prospect Park in central Brooklyn, outside that designated limit.

In addition to authorizing the trapping or shooting of many thousands of geese, local governments have adopted longer-term strategies that focus on discouraging grazing and

* Eric Uhlfelder is a New York-based journalist who earned a National Press Club award for this article, which was originally published by National Geographic in 2013, and updated for the IFTTA. He has written for the Financial Times, The Wall Street Journal, The New York Times, BusinessWeek, and Bloomberg Press, who published his book, "Investing in the New Europe."

¹ https://www.faa.gov/airports/airport_safety/wildlife/media/Wildlife-Strike-Report-1990-2015.pdf.

nesting: letting grass grow taller, planting unpalatable grasses, reducing standing rainwater, discouraging humans from feeding them, oiling eggs (to prevent hatching), and using harassment techniques such as firing propane cannons and setting off pyrotechnics.

Super Goose – the Back Story

While migratory birds are known to fly remarkable distances, why did a species whose name indicates distant roots set up residence in the U.S.?

Answer: Half a century ago Canada geese experienced forced relocation, thanks to a revenue-raising plan by state wildlife agencies.

“The agencies,” William Langewiesche wrote in his June 2009 *Vanity Fair* article on Flight 1549, “captured breeding pairs of an endangered but supersize subspecies known as the giant Canada goose, and by clipping their wings forced them to settle permanently into authorized nesting grounds along the Eastern Seaboard and elsewhere in the United States. The offspring of these clipped-wing geese imprinted to the new locations, and, having lost the collective memory of migration, became full-time resident populations.”

The result: a lot of geese for hunters to shoot, and more money in state coffers from the issuance of hunting licenses, and a new avian population that found itself quite capable of reproducing and thriving.

Does Culling Geese Work?

According to USDA spokesperson Carol Bannerman, there are approximately 5.7 million migratory and resident geese in the U.S., and their numbers have been increasing by 10 percent a year.

Seen in the context of total bird strikes, and using the latest specie-specific data, airplane collisions with Canada geese made up less than one-half of one percent of the 10,726 reported avian hits in 2012. But geese are a worry because they’re large and fly in flocks.

The annual killing of some 25,000 Canada geese nationwide – which the USDA claims is essential for aviation safety – is the most aggressive piece of the government’s overall policy to reduce local geese populations in targeted areas where they graze and nest.

The USDA says that 80 percent of Canada geese struck by planes are resident, not migratory, birds – hence the argument for killing local geese.

There are an estimated 20,000 to 25,000 resident geese in the New York metropolitan area. Given the rich habitat surrounding New York’s airports, which will always attract wildlife, can continuous culling be a meaningful part of the answer? City, state, and federal officials say yes, because the visible number of large birds cited near takeoff and landing paths poses a clear risk.

In the wake of the culls in New York, Bannerman says, the number of geese observed “in only a partial survey of about half the city properties the USDA covers” declined from 2,826 in June 2010 to 953 in June 2013.

“Over time, populations can increase,” Bannerman notes, “but repopulation is not going to happen overnight, next week, and maybe not within 12 months.”

What the Numbers Say

It seems stepped-up USDA killings haven’t materially reduced the number of Canada geese strikes.

A study led by Richard Dolbeer and Michael Begier, the former and the current national coordinators of the USDA Wildlife Services Airport Wildlife Hazards Program, respectively, found the number of commercial airplane collisions with Canada geese peaked nationwide at 87 in 1998, with nearly 20 percent causing engine damage.

In 2009, the year of the US Airways Flight 1549 accident, and just before enhanced government wildlife management policies were adopted, the hit rate was 56, with 6 affecting engines. In 2012, the number had declined only slightly, to 50, also with 6 affecting engines. (Latest numbers available.)

Would the number of geese strikes have been larger without the culling?

That’s difficult to say for sure.

What we do know is that greater and persistent reliance on non-lethal techniques would likely have reduced collisions to similar, if not lower, levels. Why? Because focusing on dispersal and avoidance deals with the problem head-on.

The Politics of Culling

Killing birds may provide political cover, showing an elected official’s constituents that his or her administration is confronting the problem. It also presents a simple narrative that helps leaders discuss the problem in a way that seems to obviate discussion of alternative solutions.

But it’s a response uninformed by environmental realities.

In a policy statement, the New York City Bar Association wrote, “There is growing agreement among aviation experts and biologists that killing geese and other birds has no long-term impact in reducing the risk of bird strikes and may exacerbate existing threats by creating vacant desirable habitat thereby inviting other birds.”

By 2006 an aggressive USDA program to reduce the presence of laughing gulls around Kennedy Airport, where they were considered the primary threat to airline safety, had virtually eliminated their collisions with planes.

One debatable consequence – unforeseen and unintended – was that the local Canada geese population subsequently flourished in the broad ecological gap created by removal of the gulls.

The USDA maintains Canada geese were already a problem at Kennedy in the early 2000s. But the current government emphasis on killing thousands of geese implies they now pose a greater threat.

Following the original publication of this article in *National Geographic* in 2013, and the author's consultation with US congressional staffers, several US House of Representatives signed a letter to the Federal Aviation Administration Administrator inquiring about why avian radar has not been rolled out.

"We ought to use the technology," explains former Congressman James Moran of Virginia [who was one of the original co-signees, now retired]. "Other countries have figured out how to deal with this issue, but here in the United States all we do is say let's kill the birds. It's ineffective and frankly it's inhumane."

In response to a letter sent by Congressmen Moran and Joseph Crowley of New York, FAA Administrator Michael Huerta wrote, "The FAA does not have the statutory authority to require avian radar as a mandatory safety requirement. Nor do we believe there is enough information available to warrant making it mandatory."

However, the administration's stated purpose is to provide "leadership in planning and developing a safe and efficient national airport system ... [and] has responsibility for all programs related to airport safety."²

In his report, "Increasing Trend of Damaging Bird Strikes with Aircraft outside the Airport Boundary: Implications for Mitigation Measures," Richard Dolbeer asserts the importance of the USDA's wildlife management (including culling) for airline safety. But he also concedes "management actions at and in the immediate vicinity of airports do little to mitigate the risk of off-airport strikes during departure and approach."³ These are the times when virtually all bird strikes occur.

Jim Hall, former chair of the National Transportation Safety Board, and Ron Merritt, biologist and former chief of the U.S. Air Force's Bird Aircraft Strike Hazard team (and now president of the U.S.-based avian radar manufacturer DeTect), consider lethal intervention as justifiable only as an isolated response of last resort.

They believe officials must address underlying environmental realities, such as by adopting more mindful land-use management that deters avian residency and grazing near airports and by taking steps to scare off birds near runways, thereby altering habitual behavior and making takeoffs and landings safer.

The geese Capt. Sullenberger's plane hit at 3,000 feet were migratory, not resident. (This was established during the National Transportation Safety Board study of the accident, which included DNA analysis of bird remains.)

Authorities agree the risk migratory birds pose to flight is impossible to control, at least using their current tools. Despite this concession, the official response to Flight 1549 was an aggressive cull. According to data provided by the British newspaper, "The Independent," nearly 70,000 birds have

been killed through 2016 to make New York's skies safer since US Airways Flight 1549 went down.⁴

The FAA says it's continuing its long-term research of avian radar at several US airports. But when asked to describe the current status of these studies, the FAA also refuses to comment. Ditto for officials at the Port Authority of New York and New Jersey, who run the major airports in the NY metropolitan area, including LaGuardia, from which Sullenberger's ill-fated jet took off. And ditto for the New York City's Mayor Office and the New York City Department of Environmental Protection, who contract USDA to kill local wildlife.

What makes the lack of comment by New York City especially disturbing are the recommendations of a recent USDA report on its local culling program. There is no assessment of current or future bird strike risk or the impact of the last seven years of programmed killing of thousands of animals, especially on Canada Geese – the species which Sullenberger's jet collided.⁵

According to David Karopkin, a lawyer and founder of GooseWatch NYC, which seeks more transparent discussion of the issues surrounding aviation and wildlife, believes a faulty public review process led to defective policy.⁶

Sully's Rule

As long as avian attractants exist near airports, Sullenberger points out, killing birds doesn't address the underlying flight-risk problem.

In an interview with the author, Sullenberger said that even before his plane went down, "it was clear that in spite of how complex and large the problem of aircraft-bird collisions is, there is one thing we do know for sure. The most effective thing to prevent these collisions is not to allow anything anywhere near an airport that's likely to be a bird attractant."

² FAA could find a way to make avian radar mandatory, congressional staffers told NBC News, if the agency wanted to do so.

³ Richard A. Dolbeer, "Increasing trend of damaging bird strikes with aircraft outside the airport boundary: implications for mitigation measures," *Human-Wildlife Interactions* 5(2), Fall 2011, pp. 235-248.

⁴ <http://www.independent.co.uk/news/world/americas/new-york-birds-killed-70000-planes-flight-path-hudson-miracle-sully-sullenberger-landing-a7528076.html>.

⁵ Wildlife biologists are in agreement that understanding flight behavior of Canada Geese, their habitual flight patterns, and how that may be affected by atmospheric conditions and by season is essential in determining the risk they pose to air travel. Without this information, neither the USDA nor the City of New York is able to determine what has been achieved through culling and identify current risks. And this data void may be characteristic of wildlife risk assessment and management around many of the country's major airports.

⁶ "What supports this conclusion," posits Karopkin, "is that current policy has failed reduce bird strikes, despite the slaughter of thousands of animals."

Sullenberger said, for example, that he was very concerned by New York City's recent decision to build a major waste transfer station within 2,000 feet of LaGuardia – the airport from which Flight 1549 departed.

Despite precautions being taken, he said birds will inevitably be drawn to this development in search of small animals it will attract, compromising safety at an airport that is already one of the country's most challenging for pilots to navigate.

To permit construction, Sullenberger says, "officials changed the [safety] categorization of an adjacent runway. This means the runway will never again be able to be used to its fullest capacity where aircraft could land with the most precise guidance during periods of very low visibility. So this development has negative operational consequences as well as safety implications."

Such contradictory government policy leads Sullenberger to question the integrity of actions officials claim are necessary to make flying safe. "It just follows."

What happened to him, as he says, can happen again.

It Did Happen Again

In June 2010, just 17 months after US Airways Flight 1549 went down, a Royal Air Maroc Boeing 737-400 with 162 people on board struck a flock of geese after departing Amsterdam's Schiphol Airport.

The plane was badly damaged, and the pilot struggled with the controls. Only by the slimmest of margins was he able to land the jet back at Schiphol.

The subsequent investigation revealed the carnage. The remains of 24 geese were found in the left main landing gear, the nose landing gear, and the electronic compartment. Seven more dead geese were found on the runway.

Study of the plane itself revealed:

- Dents in the underside of the fuselage near the nose;
- Denting in the leading edge of the vertical fin;
- Dents and cracks at the leading edge of the left engine's inlet and dents inside the engine;
- Three fan blades fractured at about mid-span and damage to all the rest of the fan blades;
- Damage to the left engine's low- and high-pressure compressors, the combustion chamber, high-pressure turbine guide vanes, high-pressure turbine blades, low-pressure turbine outlet guide vanes, and the first to fourth low-pressure turbine stages;
- Soot and oil found on the left side of the left engine
- Oil found on the fuselage; and
- Jammed right main gear brakes.

Lessons From Tel Aviv

For a better understanding of the link between birds and air safety, and how pilots can avoid hitting birds, Sullenberger

defers to Yossi Leshem, a senior researcher in Tel Aviv University's zoology department. Leshem's research has helped the Israeli Air Force dramatically reduce bird strikes through non-lethal means.

From 1960 through 1984, the country's air force lost nine aircraft outright and experienced 55 additional collisions, each resulting in at least a million dollars' worth of damage to planes. The authorities considered these accidents the unfortunate cost of high-speed, low-altitude training in narrow flight corridors where birds are present.

Israel sits squarely under the spring and fall migratory paths of some 500 million birds, and Leshem argued that a better understanding of these sky-darkening migratory movements would help reduce bird strikes.

Leshem used radar, motorized gliders, and drones to identify and understand flock movement by species, time, altitude, and habitual routes taken. "No one had ever undertaken this basic analysis before, and the knowledge that we gained from just this study alone helped immediately to mitigate bird strikes," he says.

Historical data about birds' flight patterns was then merged with active bird tracking – day and night – by radar.

"This began allowing us to follow individual birds as small as ten grams from as far away as 20 kilometers," Leshem says, "and birds as large as pelicans and Canada geese from up to 100 kilometers away."

Leshem says when these data are overlaid with weather radar, infrared and ultraviolet-based tracking systems, and historically based algorithms, it is possible to effectively predict where birds are heading.

Between 1985 – the year after Leshem completed his study and Israel adopted his measures – and 2016, the air force lost two jets and suffered approximately 25 bird-strike-related collisions that caused more than a million dollars' worth of damage each. And over the last 20 years, the air force has not lost one jet due to bird strike.

Leshem estimates adoption of bird strike mitigation strategies along with greater environmental awareness provided through avian radar has reduced serious collisions by 76 percent and has saved the Israeli Air Force \$1.4 billion.

He also believes if a real-time integrated avian radar strategy had been in place at LaGuardia before US Airways Flight 1549 took off, radar technicians would likely have recognized the approaching migratory birds from at least a dozen miles away. Their readings would have been overlaid on the screens of flight controllers, who would then have noted the potential for collision even before Sullenberger started his roll.

"Delaying takeoff by just several minutes or sending him off in a different direction," Leshem says, "would have meant Flight 1549 would not have hit these geese."

This is the lesson that can be taken away by officials everywhere who must confront the persistent risk of bird strikes.

The Radar Solution

Additional research appears to be verifying the capabilities of avian radar.

Seattle-Tacoma (Sea-Tac) International Airport installed an Accipiter Radar system in 2007. Since then, says Steve Osmek, the airport's wildlife biologist, the radar has been helping track birds and assessing avian movement at night.

"When we see – via radar – birds flying over the airfield, posing an immediate risk," Osmek explains, "we can direct airport operations to take action to scurry them away."

The airport's radar isn't being used to warn about potential midair bird strikes, which would require a seamless integration between radar technicians and the control tower. Osmek hopes eventually there will be a protocol for that. Further, with avian radar, he thinks authorities will one day have the capacity to generate "wildlife forecasts much like we have weather forecasts today."

Osmek also believes video-equipped drones could help monitor wildlife movement and chase away birds that pose risks to planes. But the FAA currently has a blanket restriction against the use of drones around airports.

Siete Hamminga, head of the Dutch radar manufacturer Robin Radar, claims his product "can distinguish among flocks of small, medium, and large birds." His system has been installed across Amsterdam's Schiphol Airport, Europe's fifth busiest, to help pilots avoid geese at low altitudes.

Here's how. The vast majority of bird strikes occur at or below 3,000 feet or 900 meters. Commercial jets transcend this finite space during landings and takeoffs within six minutes. Avian radar can help identify potential collisions within this defined spatial window, enabling flight controllers to assess and respond to such flight risks. No one believes this is a magic bullet. But avian radar drastically enhances awareness well beyond all other means of risk assessment.

The airport's CEO, Jos Nijhuis, believes avian radar "meets the growing need for more accurate and real-time information about movements of [large] birds in the vicinity of the airport."⁷

Dutch Air Force Lieutenant General Sander Schnitger found linking Robin Radar with existing air defense radar identifies risk up to a 150 kilometres away and has reduced bird strikes by over 50 percent.⁸

Robin Radar is also in use elsewhere, including air force bases in Holland and Belgium and Hatay Airport in Turkey. Hamminga says his company is enhancing its radar's capabilities by "including more variables like airspeed, flight path, wing-beat frequency, and pattern that together serve to create a species fingerprint that can trigger alerts when radar picks them up from as far away as ten kilometers."

Turkey is also building the world's largest airport on the Black Sea, the New Istanbul Airport, due to initially open in February 2018. Canada-based Accipiter Radar's systems are currently being installed across its six planned runways.

Accipiter was directly involved in a 2011 avian radar study managed under the auspices of the U.S. Department of De-

fense. It tapped the knowledge of leading U.S. Air Force, Navy, and Marine Corps along with university and industry experts. Called the Integration and Validation of Avian Radars (IVAR)⁸, it found mobile radar units manufactured by Accipiter Radar "could readily track more than 100 targets simultaneously, and could record in real time a host of parameters for each tracked target ... [at a] range of at least 6 nautical miles, and up to an altitude of [approximately] 3000 feet."

According to IVAR, the system "detected 50 times more birds than human observers using conventional visual methods." Also, "data generated can be displayed on maps or graphs to show bird activity patterns in time and space."

With data transmittable over vast regions, this system could trigger automatic alerts when, for instance, a large flock is entering sensitive airspace.

Further, Dr. Tim Nohara, head of Accipiter, reports the FAA completed an initial airport control tower simulated test with pilots in 2016, which integrated avian radar feeds into current data screens. The results: tower controllers and pilots found the additional tasking manageable and useful.

The cost of an Accipiter unit is about \$500,000. A large international airport, such as Kennedy, would need up to four of them.

Preserving the Status Quo

A year after the IVAR report was released, the FAA – one of whose officials participated in the study – contradicted its findings.

In a joint 2012 bird-strike study with the USDA, the FAA stated, "Though it is well established that radar can detect wild birds, there is little published information concerning the accuracy and detection capabilities related to range, altitude, target size, and effects of weather for avian radar systems."

Gary Andrews, general manager of DeTect – which manufactures the Merlin Bird Radar, used for real-time bird avoidance by the U.S. Air Force, the U.S. Navy, and NASA – says his company's equipment sorts birds by size and flock status.

He believes the USDA won't recommend use of radar because the agency sees it as a threat to its own business. "The USDA is paid by local agencies for the work it does to mitigate bird populations," Andrews says. "And because the FAA recommends use of the USDA for wildlife management, local agencies that do the hiring typically follow this recommendation to help sustain good relations with federal authorities."

⁷ Introduction of avian radar is not likely to reduce the Dutch aggressive killing of geese. Over the past seven years, according to a recent article in *The New York Times*, authorities have slaughtered up to 60,000 animals. Farming interests have been a large part of the story.

⁸ <https://www.serdp-estcp.org/content/search?qcp=Standard&SearchText=IVIAR&x=0&y=0>.

Andrews says while USDA personnel are pursuing meaningful wildlife management at airports, the agency is “too focused on research and not enough on practical application to more effectively identify and quantify risk in real time, and then to implement effective responses.”

Accipiter’s Nohara, whose products were used in the many of the government’s test programs including the 2011 DOD study, believes authorities need to move beyond airport boundaries in assessing risk. “This spatial separation made sense early on,” says Nohara, “because officials saw the majority of strikes occurring on or over airport properties. But there is a clear need to see how birds move across much wider spaces and at higher altitudes.”

Nohara believes New York City offers a compelling test environment, given the configuration of its three major airports and the abundance of parkland, water, and wildlife preserves that’s home to substantial and diverse avian populations.

When the suggestion was posed to the Port Authority, the agency didn’t respond.

Nohara also has found that while European airport operators are beginning to consider and adopt avian radar, emerging economies appear to be far more interested in learning about the technology in response to their on- and off-airport approach to risk mitigation.

Many emerging markets seem to have less entrenched interests threatened by new technology. Their airports are more likely surrounded by extensive natural habitats that raises the need for more careful tracking of avian movements.

And again not surprisingly, as Lesham found in Israel, Nohara sees militaries are also actively interested in avian radar. He surmises with greater control over flight scheduling and management of their properties, Air Forces are naturally more inclined to see the upside of such technology.

Edwin Herricks, professor emeritus at the University of Illinois, has helped coordinate the FAA’s testing of avian radar across the U.S. In his view, avian technology can support wildlife management and improve the situational awareness of controllers and pilots. And he feels it’s ready for use in air traffic control. But he feels it has not been deployed mainly because airport personnel are not ready to use it yet.

“They are presently up to their ears in procedures,” explains Herricks. “To bring a technology into the present operational environment you need specific procedures and a regulatory driver that forces action. Absent a really good reason, say several burning holes in the ground that led to wind shear radars and the associated warning system, there will be the continuing situation where low frequency events are by nature low frequency so it is likely that one won’t occur on your watch.” And then there’s the prevalent emphasis on the bottom line.

Herricks believes avian radar can help identify on- or near-airport hazards that personnel can help disperse, as has been demonstrated at Sea-Tac. But he doesn’t believe it can be used like automatic collision avoidance systems, that planes already have to avert accidents with other aircrafts.

“I am not sure if technology will ever achieve that end,” Herricks explains, “because of basic physics, timing involved in data tracking, analysis, and information exchange, and the fact that birds operate independently of air traffic control.”

Know Your Species?

The USDA’s Michael Begier, co-author of the IVAR study, says identifying bird species is essential for risk assessment and real-time decision making.

He faults avian radar for not being able to distinguish one species from another and doesn’t want to see avian detection systems in place until such recognition is possible.

“This is typical bureaucracy,” scoffs Yoshi Leshem. “You don’t need to identify the species by radar.” But, he says, you do need “to identify an approaching flock, and this we see perfectly with radars used by the Israeli Air Force, and in air bases in Netherlands, Germany, and Belgium.”

He says that the Swiss Ornithological Institute, in Sempach, has developed Doppler radar that can identify species. And Robin Radar’s Hamminga says that the wide range of corporal and flight characteristics of birds his system picks up can collectively form a virtual species fingerprint.

Herricks agrees avian radar systems can work well for targeting a single species. He cites La Mercy Airport, in Durban, South Africa, where DeTect’s radar is used to monitor swallow roosting, shown to be a significant threat to air-planes, especially around sunrise and in the afternoon.

DeTect’s Ron Merritt finds the USDA’s comments ironic. He has come across many experts who favor using avian radar at night when they know they can’t see, “but during daylight hours, when they’re virtually as blind as they are at night, they’re more reluctant to use the tool.”

Driving the point home, Merritt posits: “Ask any seasoned air traffic controller how many times he or she actually saw a flock of birds, then provided any kind of advisory to an air crew. Most will tell you, ‘Never.’”

Other Possible Solutions

When a bird strike occurs, the media typically report a bird flew into a plane. The gruesome reality is that airplanes plow into birds that are either oblivious to the oncoming risk or apprehend the hazard too late.

Begier says birds do typically try to avoid planes when they see them. But turbine-powered jet engines have gotten quieter over the years, which, he surmises, may be exacerbating the problem.

He urges “methods to enhance aircraft detection by birds be pursued more vigorously.”

Ryan King, formerly with the Airport Safety Research & Development Team at the FAA William J. Hughes Technical Center, pointed to anecdotal evidence offered by Australia’s Qantas Airlines and by Alaska Airlines that suggested pulsing

landing lights may help deter birds from veering into flight paths.

Use of more frequent visible light pulses from an aircraft, King says, could make birds flying ahead of planes more aware of an approaching threat.

Authorities are also studying the possibility that finely tuned weather radar emissions from an aircraft's nose cone could warn birds of impending danger. According to King, anecdotal evidence suggests that birds may respond to such microwaves. But he's less hopeful about this strategy because birds may sense the emissions only when they're close to the source – too late to avoid disaster.

Soon after Flight 1549 went down, James Genova of the U.S. Naval Research Laboratory, in Washington, D.C., suggested a more powerful signal could do the trick. He claimed research had shown heat from microwave radiation – the medium of weather radar – makes the inner ear expand, causing a clicking sound. If the wave is sufficiently disturbing, it may be enough to redirect birds away from planes. (According to DeTect's Merritt, this notion has long since been disproved.)

You All Be Careful Now

Without systems in place that visually track flocks, how are pilots warned about potential bird strikes?

When there have been sightings of birds by ground crews, air traffic controllers, or pilots, airports and the FAA may put out a general warning.

"But that's like saying, 'Be careful out there!'" Capt. Sullenberger exclaims. "It's not useful. It's not effective. So any improvement on bird detection and bird warning would be welcomed."

Despite the FAA's having started radar testing in 2001, and having issued an advisory in 2010 that recommends guidance and specifications for deploying and managing an avian radar system, not one U.S. airport now uses an integrated system tied to air traffic control.

Why the Foot-Dragging?

When the Port Authority was asked about the potential use of integrated avian radar at New York City's three main airports, the agency didn't respond.

A number of industry observers suspect that adoption of integrated radar networks has been retarded by worries about the time it takes to learn how to efficiently use the systems. And then there is the inevitable need to fine-tune them for greater accuracy.

(Introduction of wind-shear gauges was greeted with the same skepticism. Initially, false readings led many pilots to deactivate them, but the devices have since been improved and are now an essential cockpit tool.)

Spokespersons at the USDA and the New York City Department of Environmental Protections have expressed concerns about the operational and economic impacts of potential flight delays triggered by overly cautious interpretation of data about the presence of birds.

If unnecessary flight delays do occur, might someone be liable for related economic losses? Hard to say at this point, but it's unlikely, given the benign underlying intent of avian radar systems.

One expected source of input into the discussion of liability – the insurance industry – has been conspicuously silent about risks and expenses associated with bird strikes.

The large global insurer Allianz, which underwrites policies for both major airlines and airports, admits the problem of bird strikes is significant. But Joseph Strickland, who in 2013 was the firm's head of its Aviation-Americas, says bird accidents "represent only a small percent of total losses paid."

Further, he says, there's no standard process to assess avian risk when underwriting such policies.

Implementation delays may also have to do with the additional labor costs associated with round-the-clock management of avian radar systems. The airline industry is averse to most initiatives that could raise costs. But a small fee levied on passengers could help offset labor costs and finance operations.

Sullenberger surmises the main reason such technology isn't in place has to do with the fractured layers of government, which means that policies set at the federal level are often very hard to put in place at the local level.

He also points to a lack of leadership by Washington on the bird-strike issue, as well as complacency bred by a strong industry safety record that produces what he calls "a drift toward expedience."

These constraints may help explain why only one quarter of the recommendations issued by the National Transportation Safety Board after Flight 1549 landed on the Hudson have been fully implemented.

As Capt. Sullenberger sees it, the risk of a catastrophic event is plain as day. "There's always this constant tension between doing what's easiest, what's quickest, what's least costly, versus taking the time, making the effort, to doing it right. But I think many are hoping we can continue to be lucky."

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