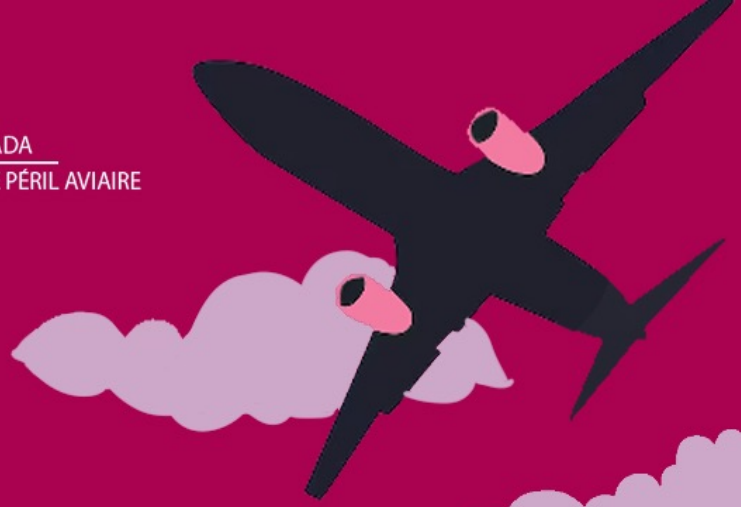
Bird Strike Committee - USA

BIRD STRIKE ASSOCIATION OF CANADA
ASSOCIATION CANADIENNE SUR LE PÉRIL AVIAIRE



2023 North American

AIRPORT WILDLIFE MANAGEMENT CONFERENCE PROGRAM

SEPTEMBER 11-14, 2023
KELOWNA, BRITISH COLUMBIA
CANADA

2023 North American Airport Wildlife Management Conference Program

Opening remarks and welcome by Bird Strike Association Canada and Bird Strike Committee USA

Welcome to the 18th Biannual North American Airport Wildlife Management Conference, previously known as the North American Bird Strike Conference. This a joint conference between Canada and USA Bird Strike Committees to serve as a gathering of industry leaders, experts, and enthusiasts dedicated to addressing the pressing challenges of coexisting with wildlife in an era of rapid climate change. With the conference theme, "From Bird Strike Mitigation to Airport Wildlife Management: A Paradigm Shift," we embark on a transformative journey towards not only controlling wildlife hazards but also comprehensively managing the risks they pose to safe airport operations.

In recent years, the aviation industry has witnessed the growing complexity of wildlife management, particularly in regions where the impact of climate change has become increasingly evident, such as permafrost zones. The challenges of mitigating wildlife strikes have expanded beyond the confines of bird strikes to encompass a broader spectrum of wildlife-related risks.

Our conference, now in its 18th iteration, will continue to build upon the legacy of the North American Bird Strike Conference, which has been a pivotal event in the field of aviation wildlife management. This conference promises a friendly and innovative environment, where we'll exchange ideas for proactive, reactive, and adaptative strategies are shared and improved. We look forward to advancing the common objective of safety and sustainability of airport operations in an ever-changing environmental landscape.

Join us as we embark on this exciting journey towards a paradigm shift in our approach to wildlife strike mitigation. Together, we will better understand the intricacies of managing wildlife risks, safeguarding our airports, while aiming at best practices to coexist with the natural world. We welcome you all to Kelowna to reshape the future of aviation wildlife management while carrying forward the legacy of the North American Bird Strike Conference

Pierre Molina
President, **Bird Strike Association of Canada**

BIRD STRIKE ASSOCIATION OF CANADA
ASSOCIATION CANADIENNE SUR LE PÉRIL AVIAIRE

Nick Atwell
Chair, **Bird Strike Committee USA**

Bird Strike Committee - USA

2023 North American Airport Wildlife Management Conference Program

All conference technical sessions will be held in the Mary Irwin Theater
Poster Presentations will be in the Salloum Room with the exhibitors' tables

Monday, September 11

08:00 – 09:00	Continental Breakfast
09:00 – 10:45	Bird Strike Committees – Meetings
10:45 – 11:15	**Morning Break**
11:15 – 12:30	Bird Strike Committees – Meetings
12:30 – 13:30	Lunch
13:30 – 15:00	Bird Strike Committees – Meetings
15:00 – 15:30	**Afternoon Break**
15:30 – 17:00	Joint BSAC and BSC – USA Meeting

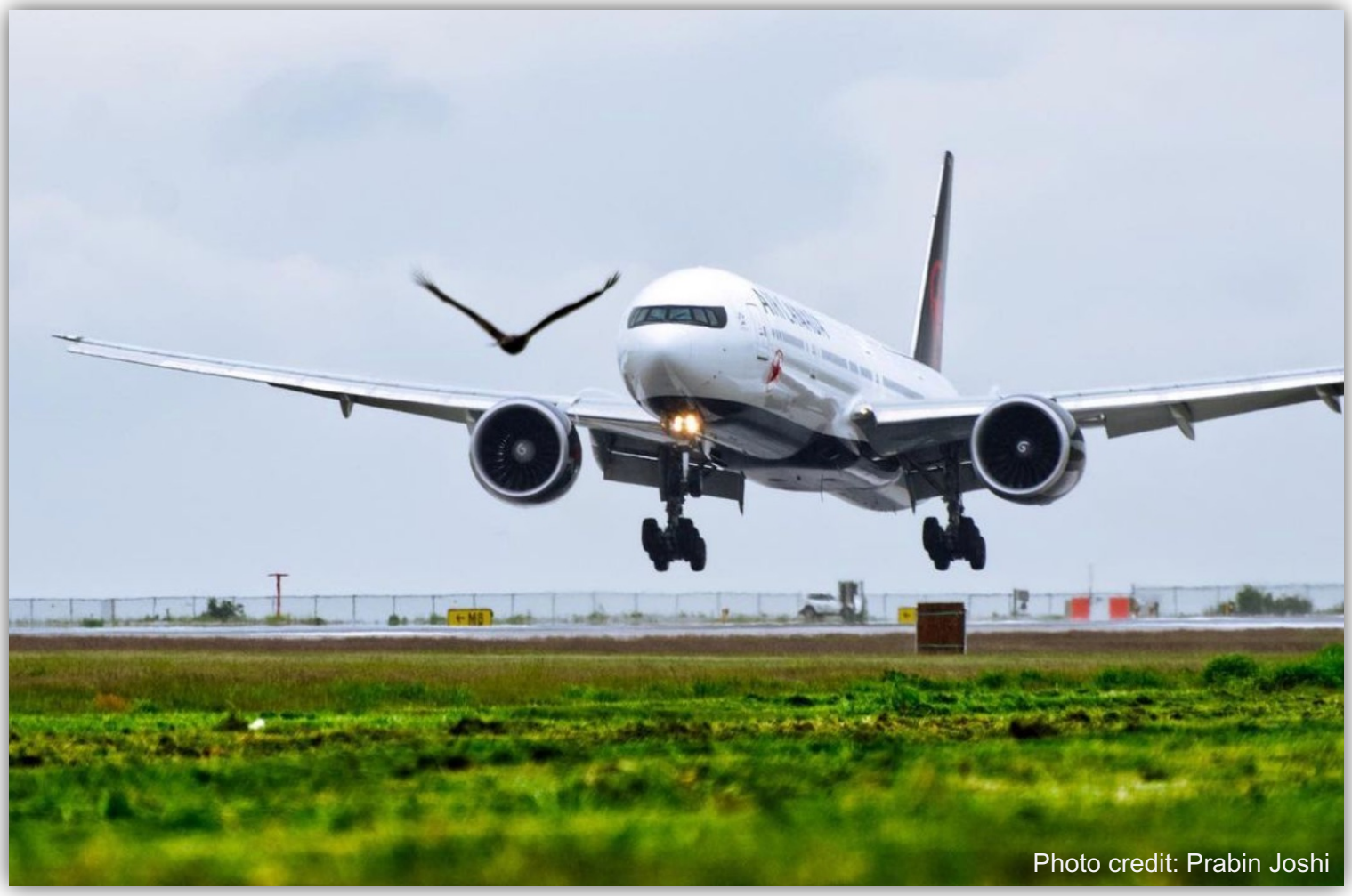


Photo credit: Prabin Joshi

2023 North American Airport Wildlife Management Conference Program

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Tuesday, September 12

08:00 – 09:00	Continental Breakfast
09:00 – 09:20	Land Acknowledgement & Welcome
09:20 – 09:50	Keynote Speaker *Richard Cannings, MP*

Technical Session 1 – Radar Applications

Jim Laughlin, Moderator

09:50 – 10:20	*Using Avian Radar to identify, predict and respond to flocking waterfowl hazards* *David Bradbeer and Jeff Follett*
10:20 – 10:50	*Avian radar data integration and complementarity with field observations* *Maxime Allard & Andrea Brown*
10:50 – 11:10	**Morning Break**

Panel Discussion

11:10 – 12:10	*Raising the Bar, Airport Wildlife Management above and beyond regulations* *Pierre Molina, Moderator* *David Bradbeer, Jeff Kolodzinski & Cathy Boyles*
12:10 – 12:30	BSAC Presidential Address
12:30 – 14:00	**Lunch**

Technical Session 2 - Data and Risk

Devon Harris, Moderator

14:00 – 14:30	*Line of sight: Simulated aerial avian predators can reduce problematic bird flyovers of airfields* *Jeremy Nicholson, William O'Shea, Neil Coughlan, Thomas Kelly & Neil Mitham*
14:30 – 15:00	*An analysis of wildlife strike data from the 30 busiest commercial airports in Brazil* *Flavio Mendonca & Joao Garcia*
15:00 – 15:30	*Why wildlife data matters to all sized airports* *Sarah Gagnon, Pierre Molina & Maxime Allard*
15:30 – 16:00	**Afternoon Break**

Technical Session 3 – Design and Operation

Devon Harris, Moderator

16:00 – 16:30	*Bird strike threat on jet airliners: Current protection and prevention techniques, focus on certification requirements.* *Beatriz Angulo-Ibanez & Antione Pilon*
16:30 – 17:00	*Influence of take-off on bird ingestion threat* *Duncan McDougall & Antoine Pilon*
17:00 – 18:00	**Conference Reception**

2023 North American Airport Wildlife Management Conference Program

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Wednesday, September 13

08:00 – 09:00	Continental Breakfast
09:00 – 10:00	Special Presentation *A bird's eye view* *Graham Martin*
10:00 – 10:15	Awards & Sponsor Recognition
10:15 – 10:45	Vendor Presentations
10:45 – 11:30	**Morning Break**

Panel Discussion

Current and future airport wildlife management challenges
John Weller, Moderator

Panel 1

11:30 – 12:00 *Small airports and wildlife: What's a manager to do?*
Mark Stella, Edith Senechal & Mike Leonard

Panel 2

12:00 – 12:30 *Global climate change and species shifts: Current impacts and planning for the future*
Lilian Sales Macedo, Nick Atwell, Jeff Follett

12:30 – 13:30 **Lunch**

Technical Session 4 – Hazards at Airports

Sean Baynton, Moderator

13:30 – 14:00 *Project Wunchell – Royal Air Force*
Ric de Ronde

14:00 – 14:30 Bird/wildlife strike hazard mitigation initiative at Tribhuvan International Airport, Kathmandu, Nepal
Ram Mani Thapaliya & Anish Tamang

14:30 –15:00 *Preventative wildlife strike strategy Implemented at airports operated by Fraport Greece during the Covid-19 pandemic*
Dionysios Ntapakis

15:00 – 15:30 **Afternoon Break**

Technical Session 5 – Radar Applications

Megan Denean, Moderator

15:30 – 16:00 *The use of Slew-to-Cue PTZ cameras integrated with avian radar for aviation safety at airports*
Sara Handrigan & Tim Nohara

16:00 – 16:30 *Formation wing-beat modulation (FWM) effect in radar signals of bird flocks: Theory and implication*
Jiangkun Gong

16:30 – 17:00 **Panel Discussion**
Hazard detection, standardized warnings, and avoiding hazards: lessons from mitigating wind shear.
Jeff Follett, Moderator

Isabel Metz, Richard Dolbeer & Kurt Roberts

17:00 – 18:00 **BSAC Annual General Meeting**

2023 North American Airport Wildlife Management Conference Program

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Thursday, September 14

07:30 – 09:00	US Military breakout sessions **Located in the Pacific Safety Productions Boardroom**
08:00 – 09:15	Continental Breakfast
09:15 – 09:30	Tribute to Luit Buurma 1948-2023 *Arie Dekker*

Technical Session 6 – Risk Assessment

Sean Baynton, Moderator

09:30 – 10:00	*Do investigations contribute to wildlife strike prevention?* *Valter Battistoni*
10:00 – 10:30	*Making the grade: using wildlife hazard management program evaluation report card (PERC) tool* *Lisa Harmon & Marieke Armstrong*
10:30 – 11:00	*A data-driven, simple and universal wildlife risk assessment* *Maxime Allard*
11:00 – 11:30	**Morning Break**

Technical Session 7 – Integration

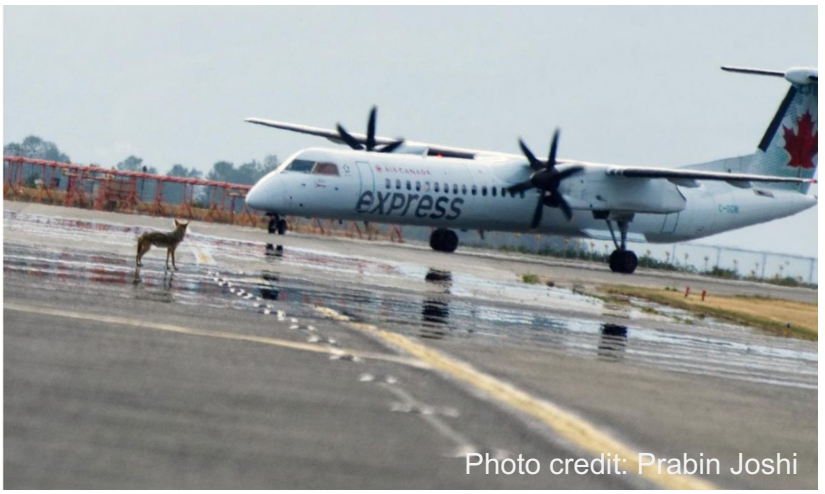
Sean Baynton, Moderator

11:30 – 12:00	*Integration of bird-detecting radar into the tower and cockpit: An urgent need* *Richard Dolbeer & Michael Begier*
12:00 – 12:30	*Wildlife, urban air mobility and air traffic control – What's the matter?* *Isabel Metz*
12:30 – 13:00	*An integrated approach to wildlife hazard management* *Cerian Henshaw & Isabel Metz*
13:00 – 14:00	**Lunch**

Technical Session 8 - General

Amy Anderson, Moderator

14:00 – 14:30	*Biosecurity – how to keep everyone safe from the invisible* *Sarah Gagnon*
14:30 – 15:00	*Applying UAS technologies at night to identify hazardous wildlife species to aviation operations* *Janelle Drennan, Flavio Mendonca, Jose Cabrera & Robert Sliwinski*
15:00 – 15:30	*Advanced air mobility: Looking at new technologies, persistent wildlife challenges, and applying lessons learned* *Lisa Harmon, Isabel Metz & Cerian Henshaw*
15:30 – 16:00	**Closing Remarks**



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POSTER PRESENTATIONS

Implementation of vegetation regimes to reduce wildlife strikes to aircraft at DOD airfields
Jacob Jung, Richard Fischer, Andrew J. Sharp & Paul Block

Abstract: Bird strikes to aircraft on U.S. Department of Defense airfields continues to be a major concern in terms of both cost of damage to aircraft and loss of life. Vegetation management on airfields is one of several important tools for reducing the presence of high-risk Bird/Animal Aircraft Strike Hazard (BASH) species. The current paradigm for vegetation management on military and civil airfields is to maintain grass height between 7-14 inches (18-35cm). Many bird species in native habitats either prefer short or tall vegetation, and often do not heavily utilize the range in-between. A recent investigation completed by Jung and Fischer (2018), who analyzed more than 250,000 BASH strike records from the U.S. Navy, Air Force, and Civil databases from 2000-2016, suggests that taller grass (i.e., greater than 14 inches) management may significantly reduce suitable habitat for the most problematic species involved in aircraft-bird incidences in approach and departure zones on and near airfields. To test this hypothesis that tall vegetation is likely to deter many problematic bird species, we established four treatment blocks where mowing operations ceased and four control blocks where normal mowing operations continued. Each treatment and control block was approximately 65 acres and was located at an outlying field for helicopter training near Pace, FL (NAS Whiting Field-Site X). This study began in March 2022 and is ongoing through October 2023. We established observation points along the perimeter of the airfield where the control and treatment plots adjoined. This placement allowed for eight observation points in total, with two observation points per treatment or control plot. We observed all bird activity at each point for 10 minutes with aid of a spotting scope and binoculars from the bed of a truck for a total of 1,200 minutes between May-September 2022, a period in which grass heights were noticeably different between treatment and control. We recorded the general location of where birds were first observed within each plot. We applied hazard scores for each avian species according to a previous study by Pfeiffer et al. (2018) which quantified avian hazards to military aircraft, and then multiplied the score for each species by the total number of individuals observed on the airfield. Preliminary results from the 2022 season indicate that tall vegetation does deter some medium to large-bodied birds (e.g., crows) and has not attracted other problematic species (e.g., raptors) that often associate tall grass with hunting areas. The mean hazard score per observation period for all species observed in short vegetation plots (mean = 36.4) was approximately 1.75 times higher than that of tall vegetation plots (mean = 20.9). The mean number of individuals per observation period was also approximately 1.5 times higher in short vegetation (mean individuals = 2.8) compared to tall vegetation plots (mean individuals = 1.9). These preliminary observations suggest that tall grass management may provide beneficial results by lowering BASH risks along with improved cost-savings from reduced maintenance costs associated with mowing operations. Additional analyses, one additional field season (2023), and the inclusion of more study sites will provide further insight into this important topic.

Development of an integrated BASH program at U.S. Marine Corps Air Station (MCAS) Iwakuni
Taylor Houston

Abstract: U.S. Marine Corps Air Station (MCAS) Iwakuni hosts an ever increasing number of military air assets, from USN and USMC, as well as Japan Maritime Self Defense Forces. This poster highlights the development of an integrated BASH program since 2016. In partnership with USMC, NAVFAC, and host-nation personnel, the program has seen dramatic decreases in strikes on an airfield once considered one of the most dangerous for USMC, Navy, JMSDF, and commercial air operations. The risks are still very much present, with the air station in an area with overlapping flyways, and aggregating features found on base and outside the fenceline.

ABSTRACTS

It can't be done, except we did – using avian radar to identify, predict and respond to flocking waterfowl hazards

TS1 – P1

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Lesser Snow Geese winter on the Fraser River estuary in southwestern British Columbia and are a hazard to aviation operations at Vancouver International Airport. Though the geese do not consistently use habitats at the airport, they actively transit between habitats outside the airfield. This includes movements between tidal sedge marshes, upland agricultural fields, and suburban amenity turf grass fields and lawns. The hazard associated with these daily movements is most acute when flocks overfly the departure runways. Understanding the routes taken by the geese and the timing of the flights allows airport managers to proactively deploy resources to manage these specific wildlife hazards. It also supports the planning and implementation of novel operational procedures as further mitigation.

We used an avian radar system to characterize patterns of Snow Goose movements. Analysis of flight patterns were initially conducted by studying hour-long blocks of radar data to visually identify radar tracks that were associated with Snow Goose movements. We also conducted observations of geese in the field to create a validated database of radar tracks. From these data we identified target characteristics associated with geese and created geospatially defined zones within the avian radar system that would automatically alert if goose flocks persisted within the zones. This provided on-duty wildlife management personnel with real-time awareness of goose movements Using the analysis of flight pattern methodology, we identified a new trend of goose flight behaviour in spring 2022. With the available information we were able to strategize mitigations to the new flight behaviour, which included a daily scheduled watch to detect the geese; real-time radar alert zones to improve situational awareness; and the coordination of dynamic departure management with ATC, airport safety officers and wildlife management personnel.

This work demonstrates that avian radar systems can be used to 1) identify new patterns of flight behaviour; 2) visually communicate the hazard to airport stakeholders; and 3) provide real-time situational awareness to on-duty wildlife personnel. Another finding is that novel departure management procedures can reduce the likelihood of striking flocking waterbirds.

ABSTRACTS

Avian radar data integration and complementarity with field observations: A key to success

TS1 – P2

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For years, radars have been used to monitor real-time avian activity for airport wildlife risk assessment. Data collected from radars can also be used to assess changes in avian airfield activity such as anticipating increases or decreases in daily activity or general changes in activity patterns between seasons at different airports. However, on its own, data collected from radars have some limitations which also differ from one airport to the next depending on the location, obstacles, climate, and species present. Despite these limitations, FALCON has explored how radar data can be used to compliment other ground-based collected data such as intervention and bird strike data. By using radar with field observation data, we can better understand the overall biology and avian activity occurring on the airfield. Here, we present how radar data can be used to supplement other wildlife data to better understand the avian airfield activity. This approach can be used and applied to most airports, with the potential to provide more precise and targeted alerts and further the operational uses of radars at airports.

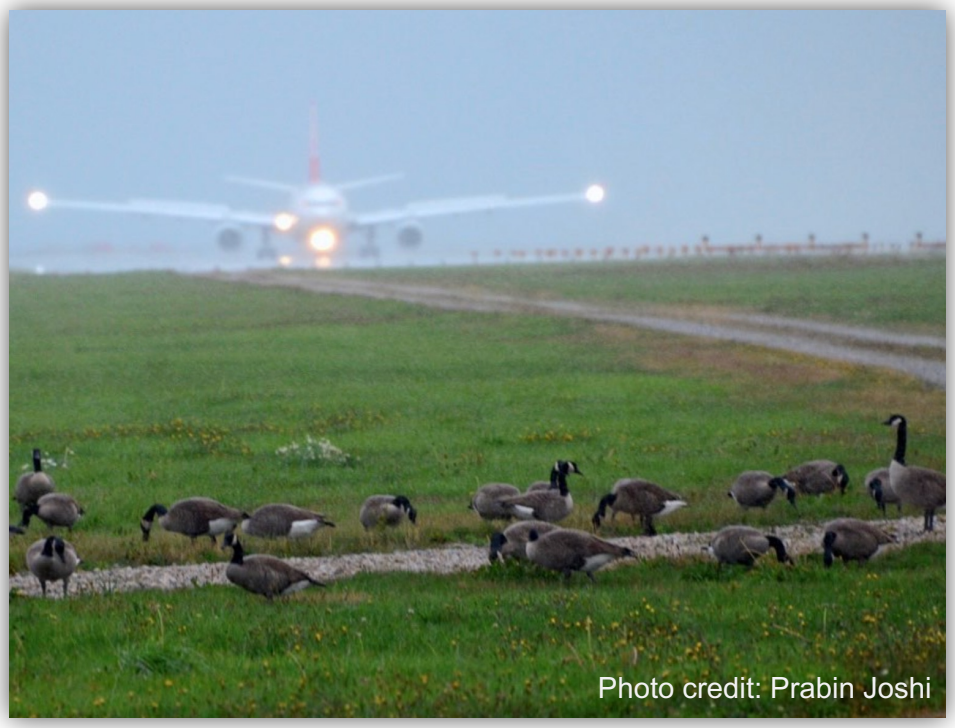
Photo credit: Prabin Joshi

ABSTRACTS

Line of sight: simulated aerial avian predators can reduce problematic bird flyovers of airfields

TS2 – P3

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Collisions between birds and aircraft (bird strikes) are a serious threat to air safety and represent a substantial economic cost to the global aviation industry. In recent years, the frequency of wood pigeons (*Columba palumbus*) flying over active runways has increased at airports in Ireland. Here, we examine the effectiveness of imitation hawk-kites as a means of excluding wood pigeons from sensitive airfield locations. Over 2 years, during August and September, we conducted control (no kites deployed) and treatment trials (kites deployed) at Casement Aerodrome, an active airfield of approximately 320 ha in County Dublin, Ireland and on agricultural farmland in County Waterford, Ireland, where the movement of large numbers of wood pigeons had previously been identified (≥50 birds per hour). Overall, we recorded a significant reduction in the mean (±SE) number of wood pigeons observed to successfully cross sites during deployment of the hawk-kites (70.69 ± 11.01 per hour), compared to control trials (178.37 ± 29.98 per hour). Although preliminary, our data suggest that hawk-kites can be used to provide an additional means of bird control to reduce instances of airfield flyovers by a problematic species. Nevertheless, further research is required to determine the reliability of hawk-kites under a range of context-dependencies, such as airfield location, size surrounding land-use, seasonality, and weather conditions.

ABSTRACTS

An Analysis of Wildlife-Strike Data from the 30 Busiest Commercial Airports in Brazil (2020-2022)

TS2 – P4

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Wildlife strikes are an increasing safety and economic concern for aviation operations in Brazil. This study will present information obtained from the analysis of wildlife strike data from the 30 busiest airports hosting commercial operations in Brazil (2020-2022). The study takes an Exploratory Data Analysis (EDA) approach to the analysis of wildlife-strike data based on two primary national data sources, namely the Brazilian national wildlife-strike database, managed by the Brazilian Aeronautical Accidents Investigation and Prevention Center (CENIPA), and the Air Traffic Operations Annual Reports, published by the Brazilian Air Traffic Control Department (DECEA). During the 2020-22 period, there were 5,765 and 1,005 reported strikes and damaging strikes, respectively, at and around these airports. Forty-five percent (*n*=3,056) of the total strikes occurred during the day. Most strikes (*n*=4,190) and damaging strikes (*n*=526) involved commercial operators. Ninety percent of the strikes (*n*=2,802) in which wildlife species was identified involved birds. Ninety percent (*n*=4,269) and 82% (*n*=633) of the strikes and damaging strikes, respectively, occurred ≤ 500 feet AGL. The number of damaging wildlife strikes per 100,000 aircraft operations in these airports increased from 15.87 to 28.99 from 2020 through 2022. While the impact of the COVID-19 pandemic may have contributed to oscillations in these numbers, the increase is consistent with longer-term trends. Findings of this research project may inform the development of national policies and standards in Brazil as well as future integrated research and management efforts to mitigate wildlife strikes.

ABSTRACTS

Why wildlife data matters to all size airports

TS2 – P5

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Airport wildlife data is the only way to effectively and objectively measure the associated risk to wildlife. It is unfortunate that few airports have sufficient information on the wildlife present on and around their territory, and that the measurement of risk is too often only based on strike number. Airports subject to safety management systems are supposed to measure the effectiveness of their program, but few are able to effectively do so. Such data should provide valuable insight into animal behaviour, movement patterns, and habitat usage on and around airports. However, some airports do not prioritize data collection because of lack training, understanding or even is seen as an extra task that could negatively impact daily activities around the airport. This presentation demonstrates ways to easily integrate wildlife data collection to daily airport tasks. Further, we use case-studies based on real events to explain why wildlife data is crucial for improving data analysis in airport safety.

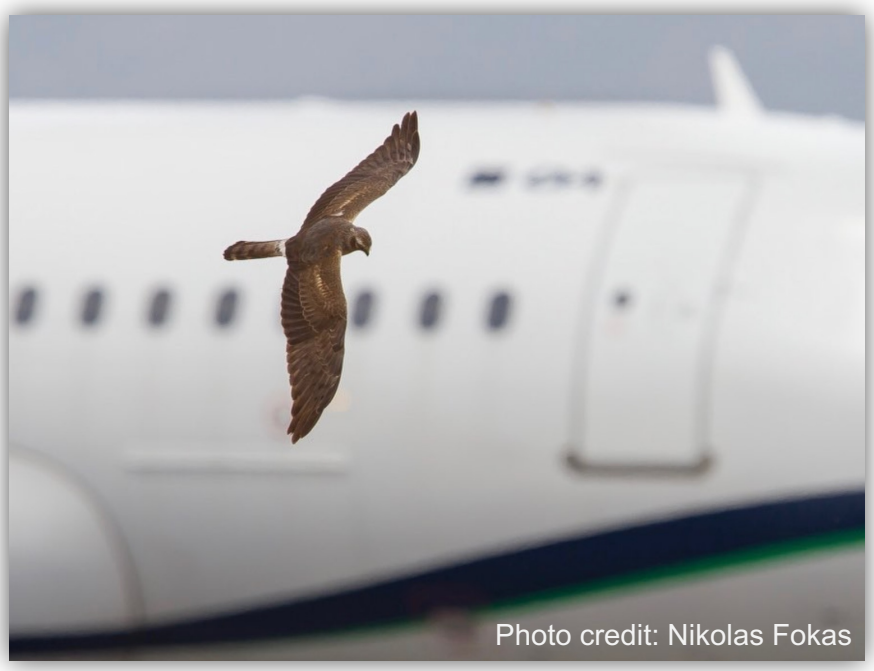
Photo credit: Nikolas Fokas

ABSTRACTS

Bird strike threat on jet airliners: Current protection and prevention techniques, focus on certification requirements

TS2 – P6

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Bird strikes are a safety threat for aircraft's airframe and engines, and the risk is increasing in the post-covid air traffic era. This increasing threat will be illustrated with analyses performed on Airbus fleet, as an update of last year's presentation "A320NEO vs A320CEO: EFFECT OF LATEST AND QUIETER ENGINES ON BIRD STRIKE RATES". Operational influencing factors, such as time since last movement, will be quantified.

In front of this threat, aviation relies on prevention and protection means, for which this presentation will provide insights from the aircraft designers' perspective.

Protection is obtained on the airframe and engines through compliance to Certification Requirements. This implies, depending on the aircraft area, either to demonstrate no penetration in case of bird strike or to prove capacity of Continued Safe Flight & Landing through redundant load path / system provision, if there is penetration and damage. The engines' Certification Requirements are focused on keeping a minimum level of thrust or ensuring a safe shutdown, depending on the size of the bird. The requirements take into account the possibility of encountering a flock, which may potentially impact all engines. Testing is required for large, medium and small flocking birds affecting fan blades integrity or being ingested into the engine core.

Regarding prevention means, in partnership with our Engine Manufacturers, Airbus has analyzed during the last years potential Operational Recommendations for pilots and operators to limit the bird strike exposure, by reducing the time at low altitude using higher power at take-off. An overview of the results of the 3 different conducted studies will be provided by this presentation. Our colleague Duncan McDougall, from Rolls Royce, will provide more details about this joint analysis at the Bird Strike Conference this year (proposal titled "Influence of Take-Off power on bird ingestion threat"). In closing, an overview of Airbus' perspective on other prevention techniques (such as aircraft mounted devices currently in service and in development, as well as wildlife management means at airport level) will be provided.

ABSTRACTS

Influence of take-off power on bird ingestion threat

TS2 – P7

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This study investigates the influence of take-off power on the number & severity of bird ingestion events for a large civil aero engine. The majority of bird strikes are known to happen at low altitude, with around 85% of events occurring below 1,500ft. Operators are motivated to use de-rated take-off power where possible, to reduce both engine deterioration and fuel burn. However, this practice results in aircraft accelerating more slowly, and operating at low altitude for longer, potentially exposing aircraft & engines to a higher rate of bird strikes. There is therefore a potential trade-off in the selection of take-off power between the motivation to reduce engine deterioration & fuel burn (lower power take-off) and to reduce time at low altitude where most bird strikes occur (higher power take-off). This study concludes that despite a predicted reduction in the number of strikes by the widespread use of higher take-off power, the remaining bird ingestion events would be more damaging to engines.

Special Presentation: Graham Martin – A Bird's Eye View

Graham Martin
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This study investigates the influence of take-off power on the number & severity of bird ingestion events for a large civil aero engine. The majority of bird strikes are known to happen at low altitude, with around 85% of events occurring below 1,500ft. Operators are motivated to use de-rated take-off power where possible, to reduce both engine deterioration and fuel burn. However, this practice results in aircraft accelerating more slowly, and operating at low altitude for longer, potentially exposing aircraft & engines to a higher rate of bird strikes. There is therefore a potential trade-off in the selection of take-off power between the motivation to reduce engine deterioration & fuel burn (lower power take-off) and to reduce time at low altitude where most bird strikes occur (higher power take-off). This study concludes that despite a predicted reduction in the number of strikes by the widespread use of higher take-off power, the remaining bird ingestion events would be more damaging to engines.

ABSTRACTS

Wildlife hazard management and mitigation in Banjul International Airport

TS – P8

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The proposed presentation on wildlife hazard management and mitigation in Banjul International Airport aims to create awareness and build a collective commitment among all stakeholders to address the challenges pose by wildlife – aircraft interaction in BIA by implementing robust mitigation strategies, monitoring systems, and fostering education. BIA ensures the safety of both aviation operations and the precious wildlife surrounding the airport. Together we can strike a harmonious balance between aviation and wildlife conservation. Serving as a crucial gateway linking The Gambia to the global community, Banjul International Airport faces unique challenges due to its proximity to diverse wildlife habitats. The safety of both human lives and the invaluable wildlife surrounding us is a shared responsibility that lies close to our hearts. The coexistence of human infrastructure and wildlife is a delicate equilibrium that requires proactive measures to ensure harmony and forestall any potential conflicts. As a member of the Airside unit, we witnessed firsthand the potential of consequences of avian collisions with aircraft and the aftermath results; hence, it is incumbent upon us as diligent members of the Airside team to prioritize and implement effective wildlife mitigation and control strategies. I take immense pride in sharing with you that the management of BIA has recognized this formidable challenge and is resolutely working towards its resolutions.

ABSTRACTS

Bird/wildlife strike hazard mitigation initiative at Tribhuvan International Airport, Kathmandu, Nepal

TS – P9

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Tribhuvan International Airport (TIA) Kathmandu, Nepal is situated in the middle of the country at an elevation of 4,390 feet in a valley surrounded by hills, was a green pastureland "Gaucharan" used as a landing strip by a single-engine aircraft was declared an International Airport in 1964. TIA was an isolated area at the time of its establishment in 1949, but now it's among the dense human settlements. The first bird strike incident was pronounced in 1996 at TIA, when the left engine of Thai Airways Airbus 300 was damaged after striking eagles. Bird strike incidents increased during August – October in 2000, and one of these incidents the engine of a B-757 aircraft was heavily damaged. The first bird strike human fatality recorded in September 2012, a black kite collied with a right-hand engine of Sita Dornier 601, crashed shortly after take-off, 19 people were killed. In 2014, Jet Airway (India) B737 lost one engine due to bird strike. Study found 39 bird species at TIA, and mostly Birds of prey like kites, eagles, and vultures are major bird types hazardous to aircraft operations, polluted rivers on either side of runway, un-scientific municipal solid waste management, and emergence of earthworms near the runway and taxiways after monsoon rains in late summer caused bird attractants. Since, TIA has been adopting the measures of bird control at TIA i) Habitat Management, ii) electronic devices and Bird scaring Techniques, iii) Municipal garbage and waste control, iv) Study and Research, v) international co-operation, and vi) Public awareness. Capacity Building International Network (CBIN) has been conducting public awareness on environmental deterioration check among airport closet communities and community's capacity building through a training and awareness on production and use of composting in interest to prevent bird attractants at TIA. Since 2014, a serious bird strike incident has not been at TIA. CBIN has recommended CAA Nepal i) to carry out the baseline bird survey, ii) to adopt new bird dispersal technologies iii) to undertake integrated program of action to mitigate the birds/wildlife hazard problem at TIA and other major airports in Nepal.

ABSTRACTS

Preventive wildlife strike strategy implemented at the airports operated by Fraport Greece during the COVID-19 pandemic

TS2 – P10

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Any collision between wildlife (including birds) with an aircraft is known as a wildlife strike. Most of the time such a strike has no operational impact but occasionally it could result in delays because of a technical check or even cause damage to aircraft. The COVID-19 pandemic severely affected Europe's transport sector. Air connectivity collapsed worldwide and the demand on the airports operated by Fraport Greece (FG) decreased significantly during the pandemic years (2020–21). With less air traffic and more stay home orders, a variety of bird species were attracted to the green, quieter areas of the airports. The European Aviation Safety Agency (EASA) issued warnings concerning the increased presence of wildlife hazards in European airports. This case study aims to communicate to the aviation industry the wildlife strike prevention strategy implemented at the airports operated by FG during the pandemic years. The fundamentals of wildlife management, airport ecology, flight safety and sustainability are presented in a structured way to provide the reader with many relevant messages. The management implications, together with the best practices of this preventive wildlife strike strategy, are discussed for their possible wider use in the aviation industry.

ABSTRACTS

The use of Slew-to-Cue PTZ cameras integrated with avian radar for aviation safety at airports

TS – P11

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Cameras allow airport operations to visually monitor and record footage of critical safety areas from a central remote location but are limited in their field of view, range, and resolution. To get complete camera coverage, multiple cameras would normally be required. If a camera is not positioned or configured optimally, when an incident happens it is possible that no useful footage is captured. For real-time operations, airport staff are often required to continuously monitor video feeds live. When reviewing historical camera footage, it can be time consuming for staff to identify clips of interest and training is required to ensure important footage is not missed and is captured consistently. Technology can now automatically position and configure a camera in a strategic way depending on environmental and situational conditions, increasing the likelihood that the footage will be useful. Video clips can be automatically tagged and saved to make reviewing and storing useful footage more efficient. Airport operations can specify which objects or situations are most important to prioritize where a PTZ (pan tilt zoom) camera is aimed. The camera can automatically slew-to-cue birds detected by avian radar. To understand and manage wildlife risk at an airport, an airport biologist can remotely scan the aerodrome using a PTZ camera to assist with risk assessments.

Avian radar track characteristics such as size (i.e., radar cross section), speed, flight behavior, and location allow trained wildlife staff to estimate the species associated with the radar track, but there are typically too many similarities between and within different species for reliable species identification using radar alone. Slew-to-cue PTZ optical and thermal camera integration with avian radar can allow wildlife staff to automatically, and remotely, review a potential hazard indicated by avian radar. This increases the chance of identifying the bird that was tracked, helping wildlife managers make informed decisions on how to deal with a particular wildlife hazard. When operated 24 hours a day, 365 days a year this technology also serves as a means of automated data collection. Example clips recorded at multiple sites including a North American commercial airport will demonstrate how PTZ slew-to-cue camera works with avian radar to increase awareness of wildlife hazards.

ABSTRACTS

Formation wing-beat modulation (FWM) effect in radar signals of bird flocks: Theory and implication

TS2 – P12

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Radar ornithology has revealed the existence of modulation signals in radar echoes from bird flocks, yet the underlying scattering mechanism responsible for this modulation remains largely unexplored. This proposal presents our research on the radar signals emitted by bird flocks, focusing on the analysis of this modulation using the micro-Doppler theory. We discover that the modulation originates from the flapping gaits of birds within the flock, resulting in a distinctive pattern known as the Formation Wing-Beat Modulation (FWM) effect. The FWM effect manifests as a collection of spectral peaks with similar amplitudes, evenly spaced at specific intervals. Furthermore, our investigation establishes the correlation between FWM signals and key parameters such as bird number, wing-beat frequency, and flight phasing strategy. Experimental validations are conducted using multiple radar systems, including a Ku-band surface surveillance radar, X-band coastal surveillance radar, and X-band air surveillance radar. These experiments confirm the presence of FWM signals in radar echoes from ground birds, sea birds, and migratory birds across various scenarios. The practical implications of FWM signals are significant, as they provide valuable tools for quantifying bird numbers and estimating the average wingbeat rate of birds. Moreover, we highlight the interference caused by bird clutters on micro-Doppler radar detection of drones, emphasizing the importance of considering FWM in drone detection systems. This groundbreaking finding not only contributes to the classification of birds from drones but also facilitates the quantification of bird migration numbers and the estimation of bird flight behavior within the domains of radar ornithology and aeroecology. By shedding light on the previously unexplored scattering mechanism of bird flocks, our research paves the way for advancements in understanding avian dynamics and their interactions with radar systems.

ABSTRACTS

Do investigations contribute to wildlife strike prevention?

TS2 – P13

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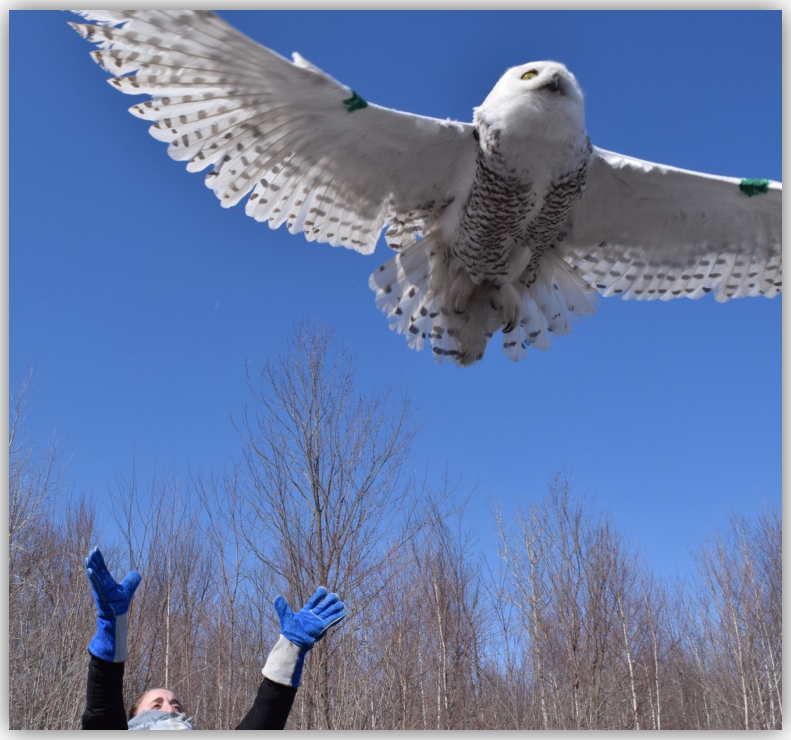
Every aeronautical accident or incident contains a lesson to be learned quickly so that it does not happen again. For this reason it is essential that the investigation ends within a reasonable time, contains the appropriate indications and recommendations and is widespread, so that it may form part of the knowledge and experience heritage of pilots, ATC, airport operators, regulators and aviation managers. This paper, based on the analysis of 70 final reports further to accidents or incidents caused by wildlife strikes worldwide, aims to demonstrate that such a result is not, or not completely, achieved and explores the possible reasons of such a failure, also trying to suggest some proposals for an increase in awareness.



ABSTRACTS

Making the grade: Using the wildlife hazard management program evaluation report card (PERC) tool

TS2 – P14

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Title 14 of the Code of Federal Regulations, Part 139.337, Wildlife Hazard Management, requires operators of certificated airports in the United States to review their Wildlife Hazard Management Plans (WHMPs) every 12 consecutive months or immediately following a triggering event. Although operators of general aviation airports are not required to submit their WHMPs to the Federal Aviation Administration (FAA) for review, some state agencies will require the review of a WHMP during annual safety inspection. Although FAA Advisory Circular (AC)150/5200-38, Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans, provides guidance to assist airport operators in reviewing their WHMPs, the AC does not provide a standard approach to evaluate whether the plan is successful or effective in addressing known wildlife hazards.

During an 18-month period in from 2021 to 2022, a research team led by Mead & Hunt, Inc. conducted extensive research with regulators, agencies, and representatives from diverse airports nationwide. The research, which included peer exchanges, interviews, and case studies, culminated in the publication of ACRP Report 250, Wildlife Hazard Management Plan/Program Evaluation Report Card (PERC) Tool and User's Guide. The PERC Tool, which is free of charge, uses readily available Excel software to provide an easy-to-use, scalable tool to determine the overall effectiveness of an airport's WHMP in reducing wildlife risks over time as well as the effectiveness of each component measure included in the WHMP/Program. The PERC Tool generates output in real time by producing a Program Evaluation Report Card (Report Card). The Report Card presents output as Key Performance Indicators (KPIs) using graphs, gauges, and charts to identify program compliance (if necessary), trends in wildlife strike history over time, and specific measures or areas for improvement. The easy-to-read Report Card can be used to facilitate a greater understanding of the breadth of an airport's wildlife management program and its effectiveness, and it can be used to facilitate communication between wildlife managers and diverse stakeholders. The proposed presentation will summarize the project-related goals, research effort, findings, and provide a live demonstration of the PERC Tool and its output.

ABSTRACTS

A data-driven, simple and universal wildlife risk assessment

TS2 – P15

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For more than a decade, FALCON as shared with the wildlife management community a proven risk assessment process that can be used by any size airports, which over 100 of them have now adopted. Based on Safety Management System processes, it assesses the risk by evaluating the likelihood and severity of wildlife strikes scenarios. That makes it so flexible that a very basic set of data can be used, for any size airports. This allows small airports with limited resources to conduct a basic science-based risk assessment, but also allow busier airports to assess their risk for different time of the year, day/night or even specific airfield areas. The risk assessment can even be updated in real-time using field data allowing monitoring changes in the risk. Last year this methodology has been internationally recognized by the industry since it is now part of the latest edition of the ACI Wildlife Management Handbook. That does not mean it can't be improved! This presentation is not about describing the methodology, but about the possible integration of historical strike data and related challenges. We will see that their addition can sometimes be beneficial but, in other cases, non-relevant because of the additional complexity or the lack of quality or relevant data to assess wildlife risk.

ABSTRACTS

Making the grade: Using the wildlife hazard management program evaluation report card (PERC) tool

TS2 – P16

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Wildlife Hazard Management Plans at civil airports in the USA focus on wildlife attractants at the airport and do not address threats posed by large birds moving through aircraft departure and arrival paths unrelated to nearby bird-attractant habitats such as landfills. As an iconic example, an Airbus 320 departing LaGuardia Airport (LGA) on 15 January 2009 struck a flock of migrating Canada geese 5 miles out during climb at 2900 feet. With both engines disabled, Captain Sullenberger made a water landing now known as the "Miracle on the Hudson". There were no measures to prevent this off-airport strike event; and 14 years later, there still are no measures in place. Bird-detecting radar (BDR) focused on departure and arrival airspaces integrated with Air Traffic Control and the cockpit, is a means of preventing these off-airport strikes. In fact, the feasibility to employ radar was demonstrated during the "Miracle on the Hudson" event. When the aircraft was at about 2,500 feet, data from local ASR-9 radar indicated that the aircraft's path intersected a string of unidentified primary targets. Shortly thereafter, some of these primary targets (geese) were ingested in both engines. BDR specifically focused on detecting large birds in approach and departure flight paths integrated with ATC and the cockpit is urgently needed because populations of large bird species continue to increase along with an increase in these off-airport strikes. From 16 January 2009 to April 2023, about 2,000 strike events at ≥500 feet AGL involving civil aircraft and large (≥1.8 kg) birds were documented on approach to or climb from Part 139-certificated airports in the USA. The technology is available to achieve this specific use of BDR similar to 30 years ago when the process to provide real-time windshear warnings (Terminal Doppler Weather Radar) was adopted. The alternative is the status quo–a continuation of these presently unmitigated "off-airport" strikes with large birds, some of which may not have "miraculous" endings.

ABSTRACTS

Wildlife, urban air mobility and air traffic control – what's the matter?

TS2 – P17

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Aviation operations taking place up to 3'000 ft are especially endangered to collide with wildlife. Intended Urban Air Mobility aircraft perform their entire flights at these wildlife-critical heights. To reduce the risk, a warning tool based on avian radar was developed for air traffic control. This system was evaluated in real-time human-in-the-loop simulations. The set-up included commercial fixed-wing traffic and air taxi shuttles between an airport and nine locations in the adjacent city center, all within the control zone supervised by the tower controller. Controllers were provided with a visualization of current and predicted tracks of critical wildlife and were asked to use the information upon their discretion. Their feedback as well as objective performance indicators indicate the feasibility of controller involvement in the wildlife strike management process.

An integrated approach to wildlife hazard management

TS2 – P18

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Traditionally, aerodromes have been considered the key party for coordinating Wildlife Hazard Management (WHM) on and within 13km of airfields. However, strike risks are not the exclusive management problem for aerodromes since wildlife strikes are a low altitude airspace problem. This requires a holistic approach from more stakeholders than just aerodromes. Minimization of strike risks needs improved quantitative approaches to strike risk assessments and mitigation planning. This strategically and proactively reduces the likelihood of aircraft and wildlife being in the same place at the same time. It also supports time and cost optimization throughout the whole process of WHM. Within the presented project, guidance is being developed for all stakeholders to provide an easy-to-follow approach to wildlife strike risk assessments for all phases of aircraft flight. The guidance material highlights the areas requiring improved stakeholder collaboration to reduce the likelihood of wildlife strikes for all types of aircraft – fixed wing, rotary, electrical take-and landing (eVTOL) and unmanned aerial vehicles (UAV). As such, all areas of business in and surrounding aerodromes and low altitude flight corridors will benefit from a move towards more effective, efficient and sustainable processes in WHM and the minimization of strike risks.

ABSTRACTS

Biosecurity – how to keep everyone safe from the invisible

TS2 – P19

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The recent pandemic of Highly Pathogenic Avian Influenza that quickly followed COVID-19 has clearly put zoonotic diseases on the map. Managers and employees alike are becoming more and more aware of the risks that are present when handling wildlife and are looking towards measures to protect themselves as well as the animals they handle. Biosecurity measures are key to help prevent disease transmission. By looking at case studies, this presentation will guide the audience through the best practices than can then be adapted to fit different airport realities.

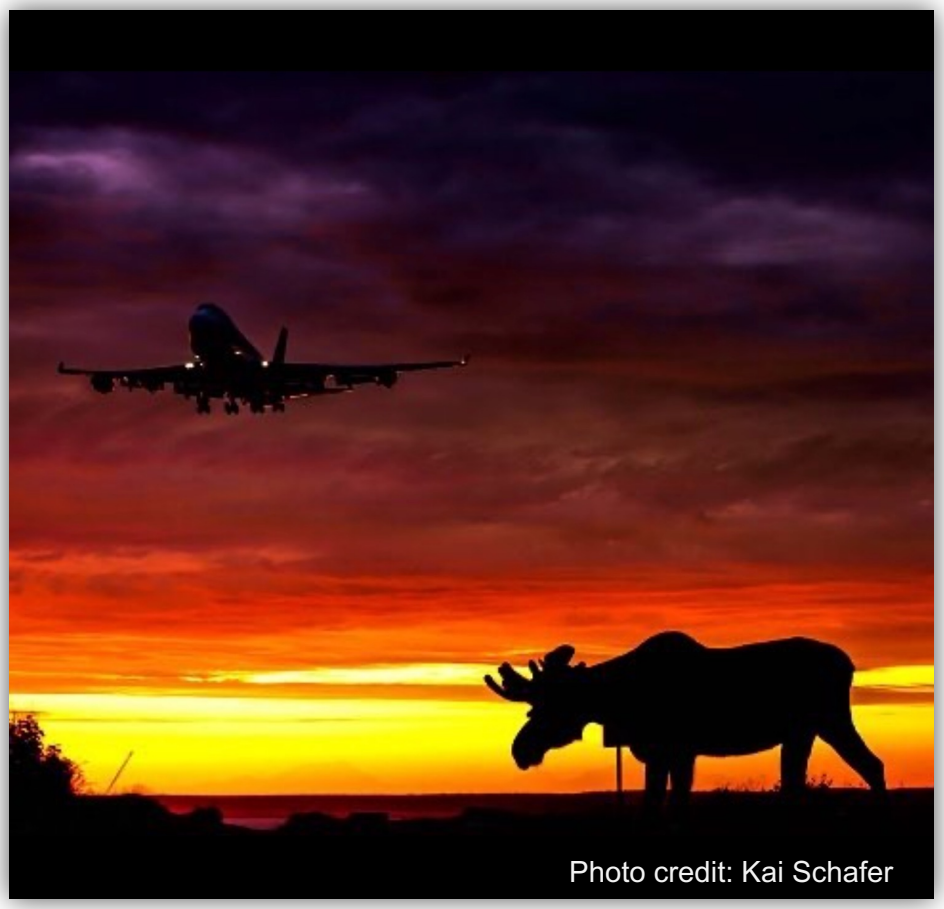
Photo credit: Kai Schafer

ABSTRACTS

Applying UAS technologies at night to identify hazardous wildlife species to aviation operations

TS2 – P20

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Wildlife strikes are an increasing safety and economic concern for the US aviation industry. In this ongoing study, our team has explored the use of UAS technologies to support data collection and analysis during nighttime Wildlife Hazard Assessment (WHA) processes. Data has been collected in a farmland area that is located two nautical miles south of Daytona Beach International Airport. The research team has applied safety risk management concepts and protocols to identify hazards and mitigate the risks associated with the operation of UAS at and around the airport environment. The safe application of UAS to streamline the WHA process is anticipated to provide several benefits to the airport operator, including task completion in reduced time, enhanced level of accuracy during the data collection process, reduced risks for the qualified airport wildlife biologist, and cost efficiencies. Most importantly, researchers are expecting to develop benchmark safety protocols that can facilitate the effective integration of UAS into the airport environment. During our presentation audience members will be invited to provide feedback and suggestions to this ongoing research effort.

ABSTRACTS

Advanced air mobility: Looking at new technologies, persistent wildlife challenges, and applying the lessons learned

TS2 – P21

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Original Aircraft Manufacturers (OEMs), regulatory agencies, and communities throughout the world are preparing for the advent of Advanced Air Mobility (AAM) during the next five years. AAM envisions the use of highly automated, short-range, high automated, electric vertical takeoff and landing (eVTOL) aircraft to move people and cargo at altitudes below 4,000 feet above ground level (AGL); however, more than 30 years of wildlife strike data indicate that approximately 92% of wildlife strikes for commercial aircraft occur at or below 3,500 feet AGL, indicating that AAM operations will face increased exposure to wildlife strike risks. Moreover, the comparatively small size of UAM aircraft, proposed cruising speeds of up to 170 knots, and comparatively quieter engines are expected to reduce opportunities for threat perception and evasion by aircraft operators and wildlife. The presentation will identify both the challenges posed by AAM and how well-established wildlife strike prevention measures can be adapted to meet the needs of UAM operations and how, with new technology, OEMs, regulatory agencies, aircraft operators, communities, and other stakeholders can work together to enhance safety.

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Year	Location	Type
2009	Victoria, BC	NA
2010	Utah, USA	NA
2011	Niagara, ON	NA
2012	Sidney, BC	CDN
2012	Memphis, TN	USA
2013	Milwaukee, USA	NA
2014	Ingersol, ON	CDN
2014	Altanta, GA	USA
2015	Montreal, QC	NA
2016	Edmonton, AB	CDN
2016	Chicago, IL	USA
2017	Dallas, USA	NA
2018	Vaudreuil, QC	CDN
2018	Baltimore, MD	USA
2019	Halifax, NS	NA
2020	Cancelled, replaced with online seminars	CDN
2020	Cancelled	USA
2021	Virtual	USA (NA cancelled)
2022	Ottawa, ON	CDN
2022	Salt Lake City, UT	USA
2023	Kelowna, BC	NA

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