

Bird strikes during climb and approach: a need for radar-based management strategies involving multiple stakeholders

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Richard Dolbeer, PhD, USDA, Wildlife Services



Miracle on the Hudson, NYC, NY
Canada geese, 15 January 2009



Amazon Prime, Cincinnati, OH
Canada geese, 29 January 2026

Goal: to help the aviation industry to solve the off-airport, airspace deconfliction problem

- The need for industry collaboration, good science & engineering
- The problem of bird strikes during climb & approach 
- Managing aircraft instead of birds is a paradigm shift
- Radar-based management strategies serving pilots, airlines and ATC
- What about airspace deconfliction with drones?
- What's next in terms of our plans for stakeholder engagement?
- Q&A

We want to acknowledge our colleagues and express our openness to industry collaboration

- Acknowledgements

Richard Dolbeer:

- U.S. Federal Aviation Administration's National Wildlife Strike Database

Tim Nohara:

- Airports: SeaTac (SEA), Sacramento (SMF), Toronto (YYZ), Vancouver (YVR)
- Falcon Environmental, AWS, Delta Airlines, ALPA, IFALPA, FAA, NAV CANADA, TC, Bird Strike Committee (BSC) USA and Bird Strike Association of Canada (BSAC)

- Industry collaboration

- Accipiter will continue to collaborate with FAA, TC, NAV CANADA, BSC USA, BSAC, pilots, airlines, airports, wildlife consultants and other aviation industry stakeholders
- As a pioneer in avian radar as well as in surveillance solutions involving crewed and uncrewed aircraft, Accipiter recognizes the importance of being open and agnostic to sensors, and hence we welcome collaboration from our competitors. The effort we are undertaking is a long game open to everyone.
- The collaboration between Richard Dolbeer and Tim Nohara reflected in this presentation is not intended to be an endorsement of Accipiter's products nor an indication of the positions held by any of the parties we have acknowledged above, but rather professional cooperation directed towards a common aviation safety goal.

Bird strikes are comprised of two components:

- Our efforts have mainly focused on managing the birds at and near airports.
- To mitigate strikes at ≥ 500 feet AGL on approach/departure, **we must manage the aircraft** (will involve ATC and flight crews exchanging data).



January 15, 2009: Miracle on the Hudson

with permission
from R Dolbeer



19 multiple large-bird strikes outside P139 airport boundaries with engine damage (2024 - 2026)

with permission
from R Dolbeer



	Date	Airport	Aircraft	Phase of flight	Height (ft AGL)	Distance (nm)	Negative effect on flight	Bird species
114	1/15/2024	KICT	LJET-45	Climb	700		Other, P/EL	Canada goose
115	2/13/2024	KPDX	B-737-9	Climb	600	<1	P/EL	Cackling goose
116	6/26/2024	KCHS	DA-2000	Climb	1000		None	Anhinga
117	9/20/2024	KSAT	CL-300	Approach	2700	4	None	Black vulture
118	10/18/2024	KSFO	B-737-800	Climb	700	<1	None	Brown pelican
119	10/28/2024	KEWR	B-737-900	Approach	2500	3	None	Canada goose
120	11/10/2024	KMIA	B-737-800	Climb	1400	1	Other, P/EL	Turkey vulture
121	3/1/2025	KEWR	B-767-300	Climb	750	<1	P/EL	Canada goose
122	3/12/2025	KJFK	B-737-800	Approach				Am. black duck
123	3/24/2025	KMIB	B-747-400	Approach	550	4	Go-around	Snow goose
124	4/14/2025	KPVD	B-737-8	Approach	200	1		Osprey
125	4/15/2025	KIAH	B-767-300	Approach	1200			Shorebirds
126	9/18/2025	KSEA	A-321	Approach	300	0.5		Canada goose
127	9/20/2025	KGPI	EMB-170	Approach	400	1		Canada goose
128	10/9/2025	KLGA	A-321	Climb	1000	0	P/EL	Brant
129	10/18/2025	KSBP	EMB-170	Climb	600	0.5	P/EL	Turkey vulture
130	12/23/2025	KSMF	EMB-170	Climb	400	1	P/EL	Unknown bird
131	1/28/2026	KCVG	A-320	Climb	950	0	P/EL	Canada geese
132	3/24/2026	KFLL	A-320	Approach	800	1		Turkey vulture

Normalization of Deviance

- These off-airport “Triggering” events typically “fall between the cracks” related to tangible actions to prevent future, similar events.
- **This is a classic example of the “Normalization of Deviance”**

Dolbeer, R. A., and M. J. Begier. 2025. Bird strikes during approach and climb: a need for innovative management strategies. Human Wildlife Interactions 19 (1):

<https://digitalcommons.usu.edu/hwi/vol19/iss1/13>

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Science versus Engineering

“When you can measure what you are speaking about, and express it in numbers, you know something about it.” Lord Kelvin (1824-1907)

- Scientists observe the world as it is...
- Engineers build the world as we want it to be...

Do we have the technology in 2026 to address these presently non-mitigated strikes during climb and approach?

Managing aircraft instead of birds is a paradigm shift

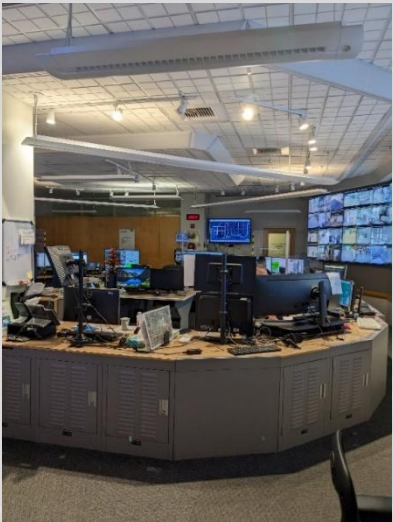
On-airport bird management is about wildlife teams making habitat unattractive and harassment

Avian radar is very helpful but not essential

FAA Advisory Circular [150/5220-25](#)
DoD Integration and Evaluation of Avian Radars ([IVAR](#))
Beware the Boojum: caveats and strengths of avian radar, Human-Wildlife Interactions 7(1):16-46, Spring 2013
[Beason, Nohara & Weber](#)

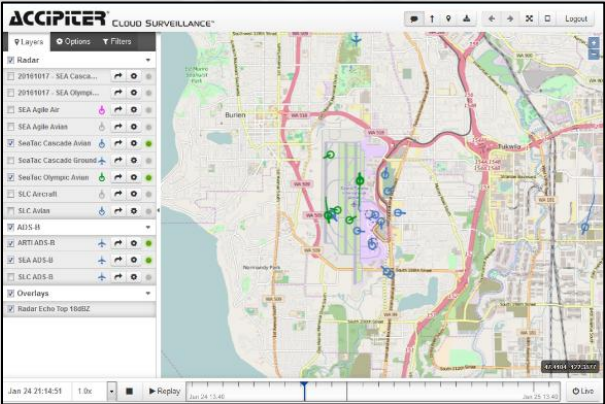
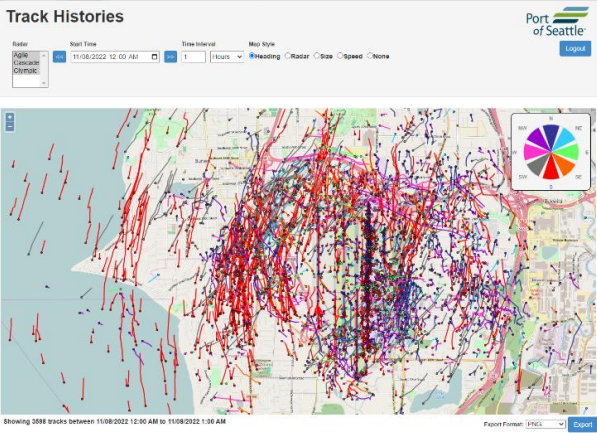
Analytical Assessment
& Understanding

Target Analytics Suite



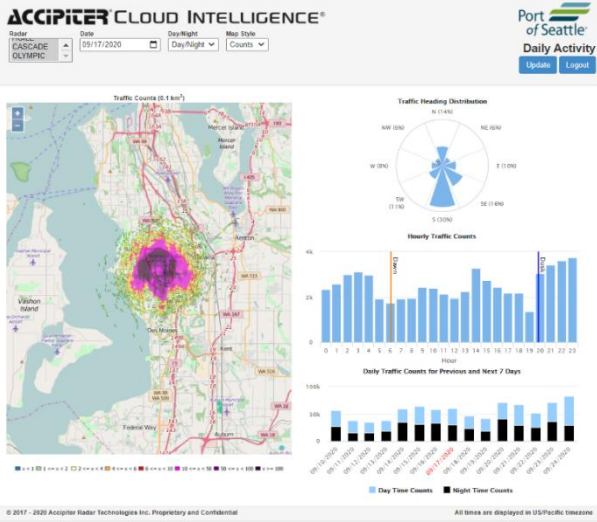
Targeted Harassment
Dispatch

Bird congestion alerts



Live Situational
Awareness

Common Operating Picture



Airspace deconfliction is about ATC, pilots and airlines avoiding birds on approach & climb

3D avian radar is critical to characterize bird trajectories for off-airport risk assessment and for deriving suitable tactical & strategic decision support for these stakeholders

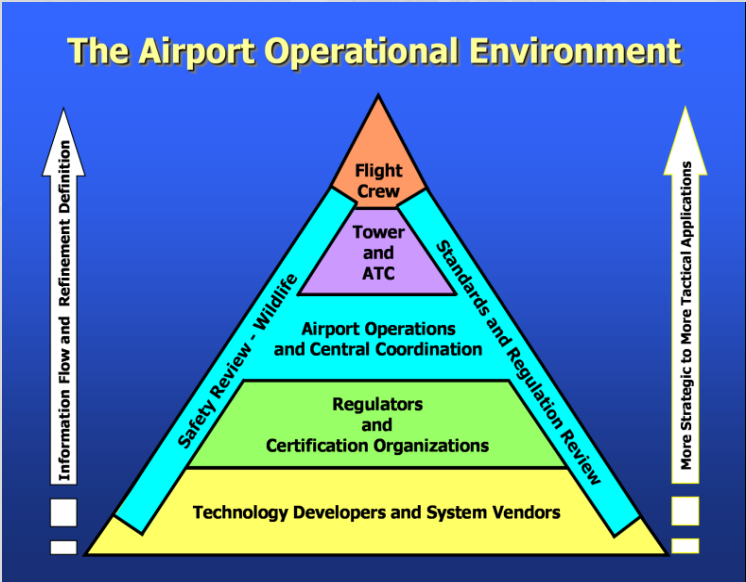
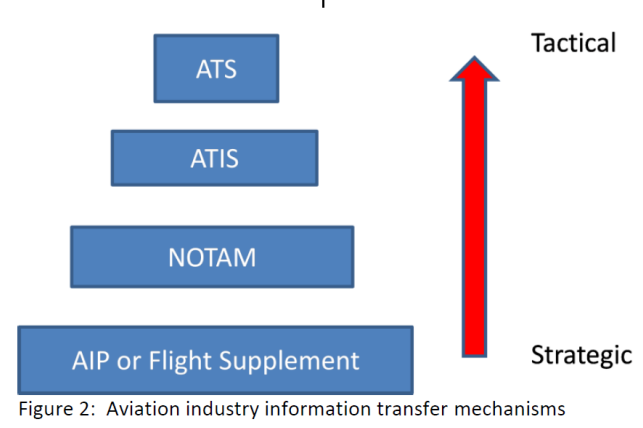


Nohara, Sowden, Perkins and Beason (2012):
"If information for bird strike threats occurring ... off-airport were available; and if this information was appropriately communicated to ... pilots, ATC, airlines, and airport operators, just as we provide other environmental hazard information such as wind-shear and volcanic eruptions, couldn't we improve aviation safety further? Shouldn't we?"

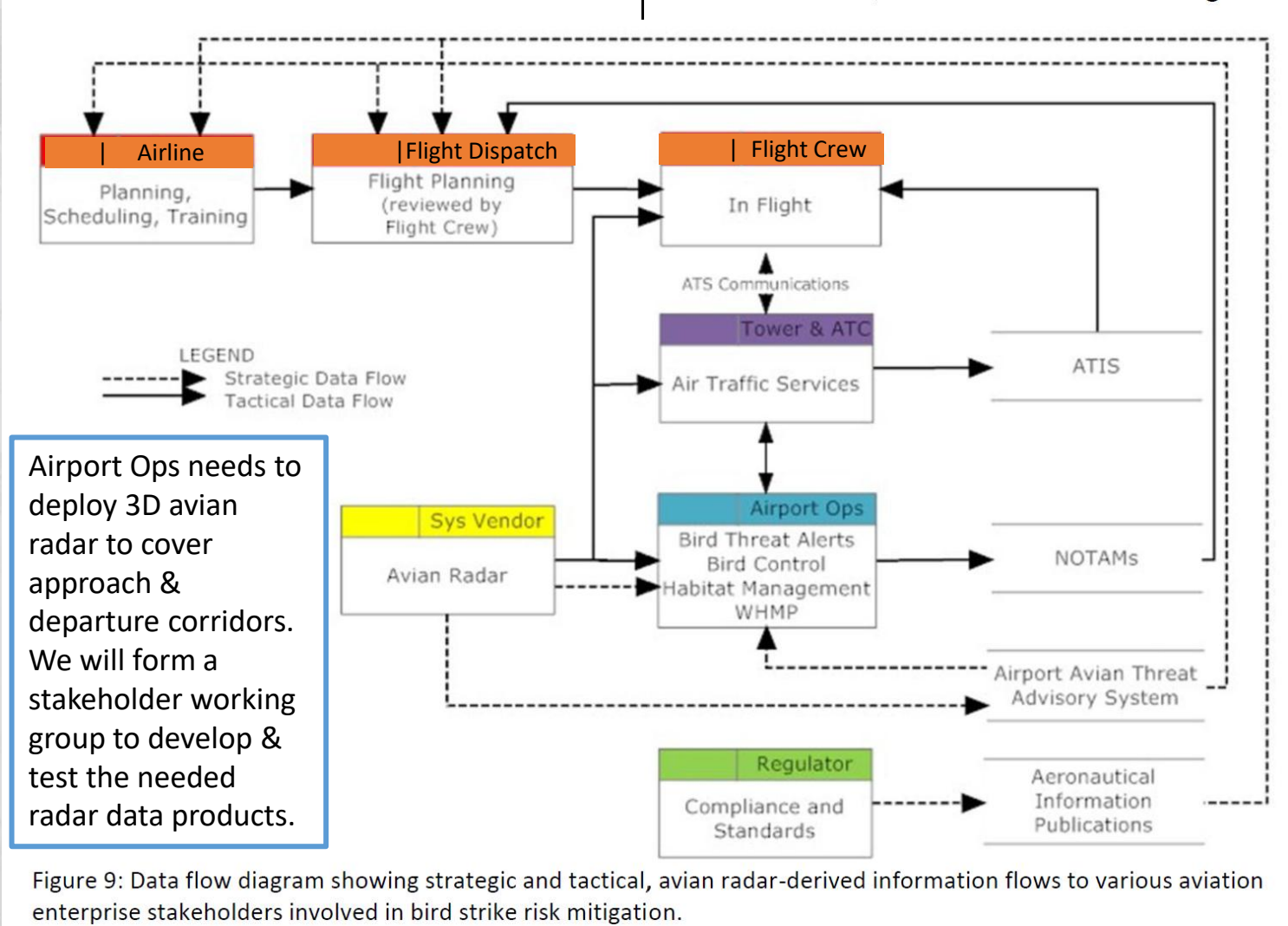
- We do have the radar and processing technology in 2026 to develop the means to mitigate bird strikes in climb and approach.
- We know it is time to act.
- Let's get to work together.

Aviation Stakeholder Management Of Bird Strike Risks – Enhancing Communication Processes To Pilots And Air Traffic Controllers For Information Derived From Avian Radar
Presented at the International Bird Strike Committee Conference, IBSC 2012, 25-29 June 2012, Stavanger, Norway

Tactical & strategic decision support data flows to ATC, pilots and airlines has been [reported](#) on



Airport Ops needs to deploy 3D avian radar to cover approach & departure corridors. We will form a stakeholder working group to develop & test the needed radar data products.



From FAA Center of Excellence for Airport Technology

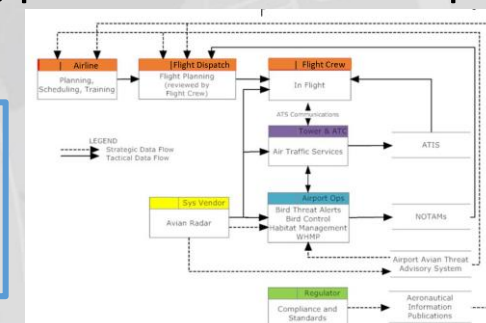
How can we develop appropriate, radar-derived, decision support products for pilots, airlines & ATC?

[Return](#)

See as a starting point, [Nohara & Handrigan, 3D Avian radar systems that automatically alert pilots, ATC and airlines to loss of separation with birds, NA AWM Conference, Portland, OR, 26-28 August 2025](#)

- We have learned much from [two decades of avian radar data](#) from North American airports impacted by Canada geese and other local and migrating birds.
- We have already developed an [avian airport threat advisory system](#) that is a starting point for a system to provide off-airport, tactical and strategic decision support.
- We already have developed [real-time bird tracking & alerting tools](#) suitable for ATC.
- Airport Ops wildlife specialists have already used avian radar in support of ATIS messages.
- We have begun to develop [pilot briefings](#) as a starting point for NOTAMs.
- We have also developed some [initial methods for measuring bird congestion](#), applied them to approach and departure corridors, and analyzed associated bird strikes which serve as a starting point for the development of new strategic and tactical, off-airport, airspace deconfliction tools.

We need to develop and agree on a standard for defining what constitutes a low, moderate or severe level of bird congestion in critical approach and departure corridors.



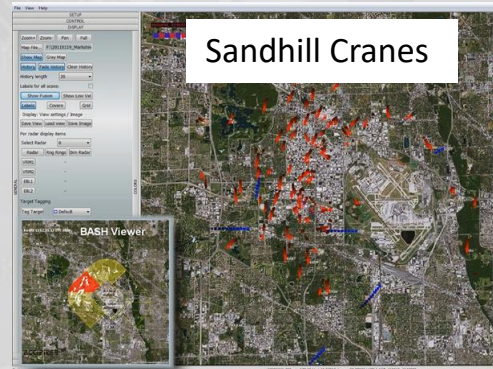
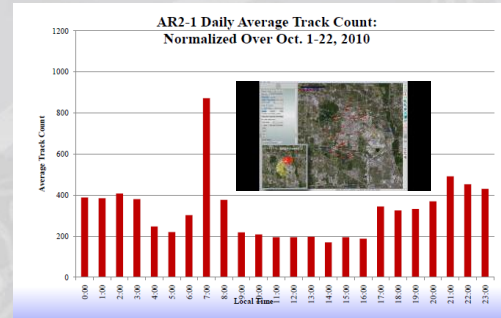
NOTAMs, ATIS and ATS Advisories to pilots need to be better than “birds in the vicinity”

[Back](#)

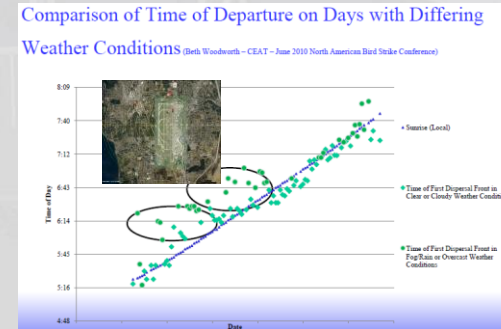
FAA AC 150/5220-25 identified three bird behaviors of interest which avian radar has proven it can capture.

These behaviors have seasonal and daily characteristics which can serve NOTAMs, ATIS and ATS Advisories.

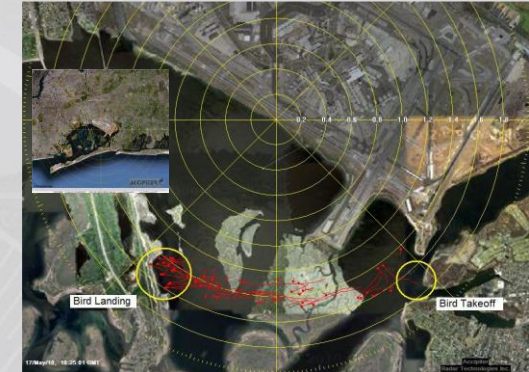
Migration (ORD)



Resident Birds (SEA)

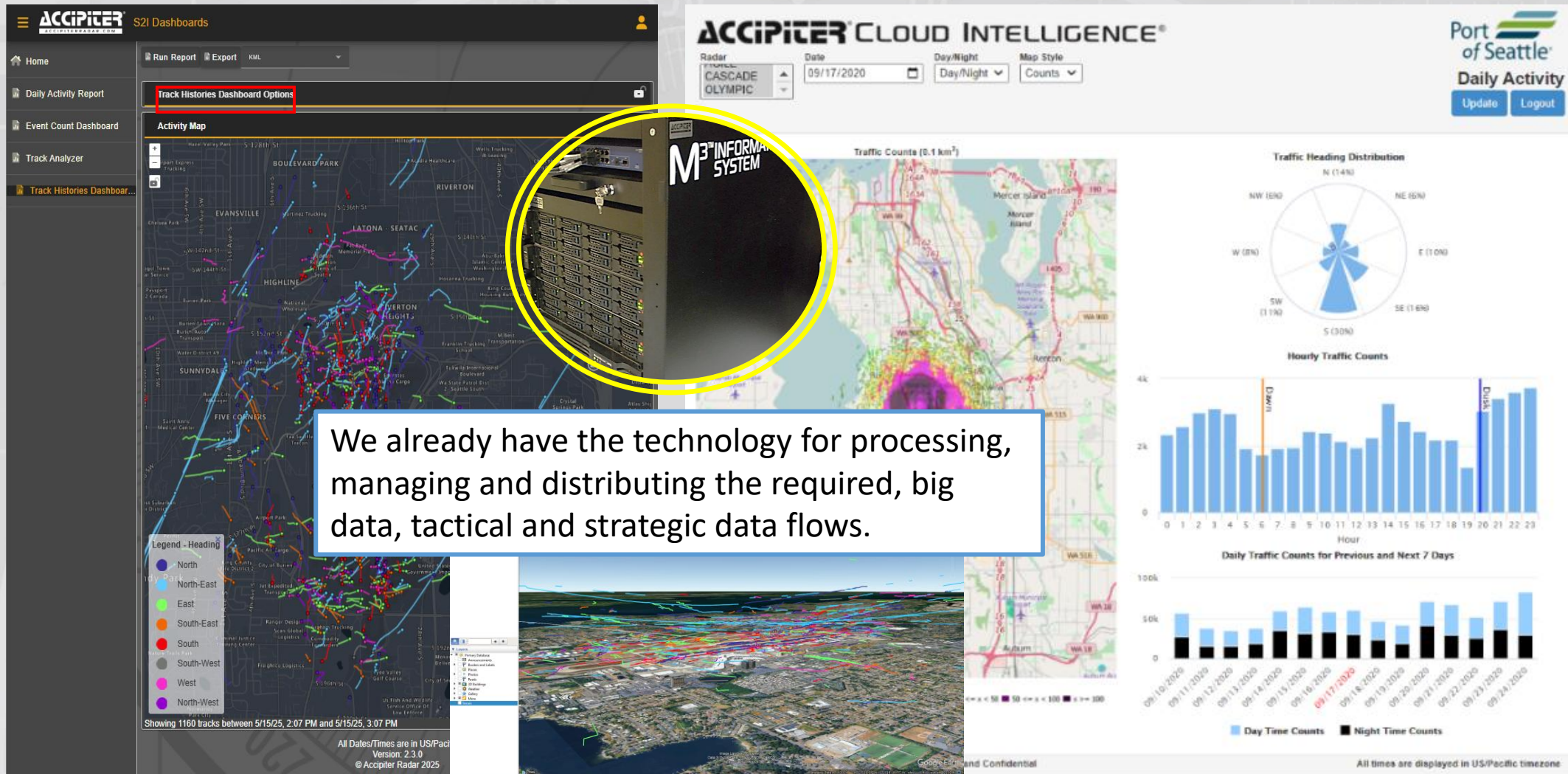


Commuting Birds (JFK)



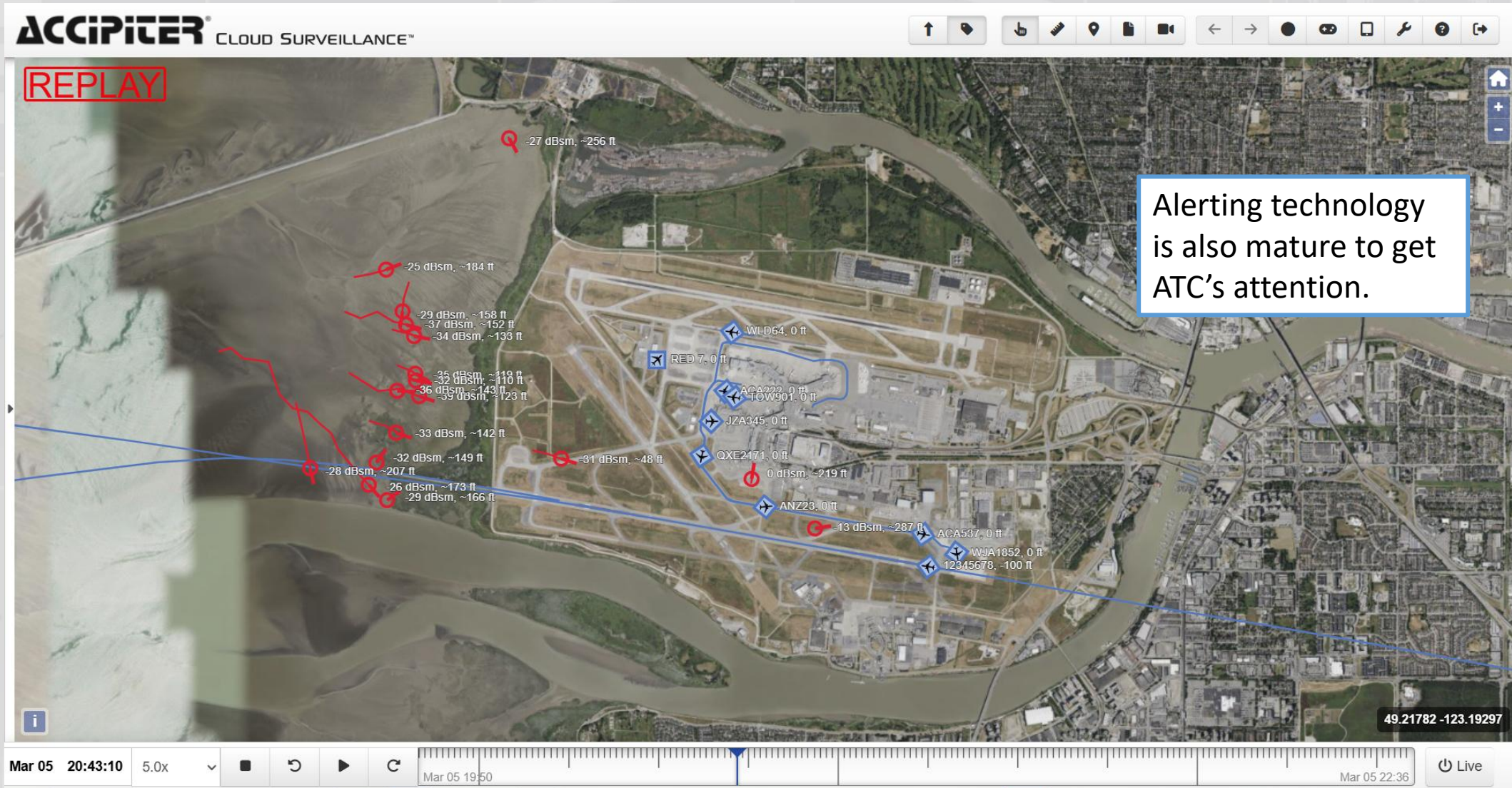
We have developed an [avian threat advisory system](#) that processes avian radar data in many ways for different purposes, and can serve as a starting point for off-airport deconfliction data products

[Back](#)



Real-time bird tracking and alerting tools over departure/arrival corridors suitable for ATC

[Back](#)



Pilot briefing: snow geese congestion at night over two-month period is a seasonal hazard

[Back](#)



Vancouver International Airport

PILOT BRIEF SHEET

YVR AVIAN HAZARD DURING NIGHT OPERATIONS

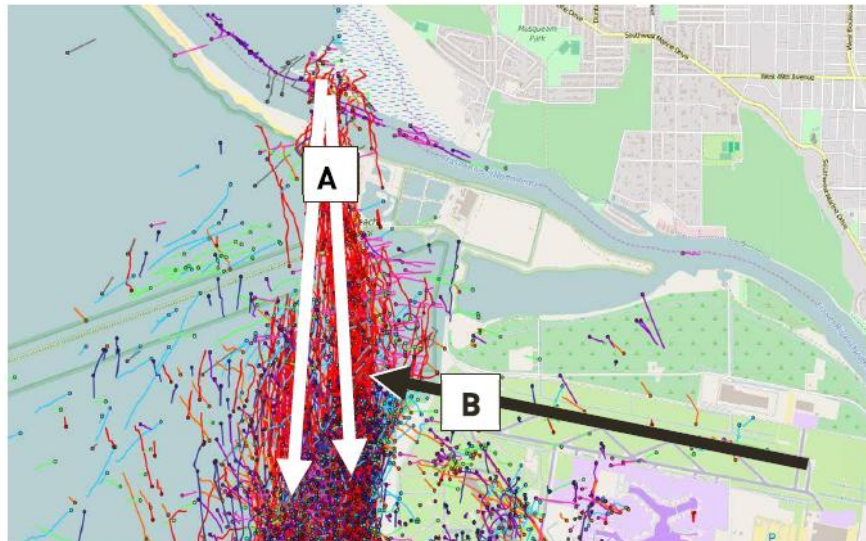
ADVISORY FOR ALL AIRCRAFT OPERATING AT NIGHT

Vancouver Airport Authority has observed significant movements of Snow Geese along the foreshore of Sea Island **at night**. This is expected to continue effective until January 15th, 2021.

The diagram below shows:

- A) The recent path of the Snow Geese **over a 1 hour period** moving southbound along the western foreshore of Sea Island. This may be sustained for 2 or more hours, observed using avian radar.
- B) The trajectory of an aircraft departing runway 26R.

AVIAN RADAR MAP



*Isn't this more useful than
"birds in the vicinity"*

CURRENT PUBLICATION INFORMATION

CYVR CFS Canada Flight Supplement CAUTION section states that there are Snow Geese present and that a significant hazard is present at or below 400 feet AGL out to 1.9 nautical miles from the thresholds of runways 08L and 08R.

NIGHT OPERATIONS

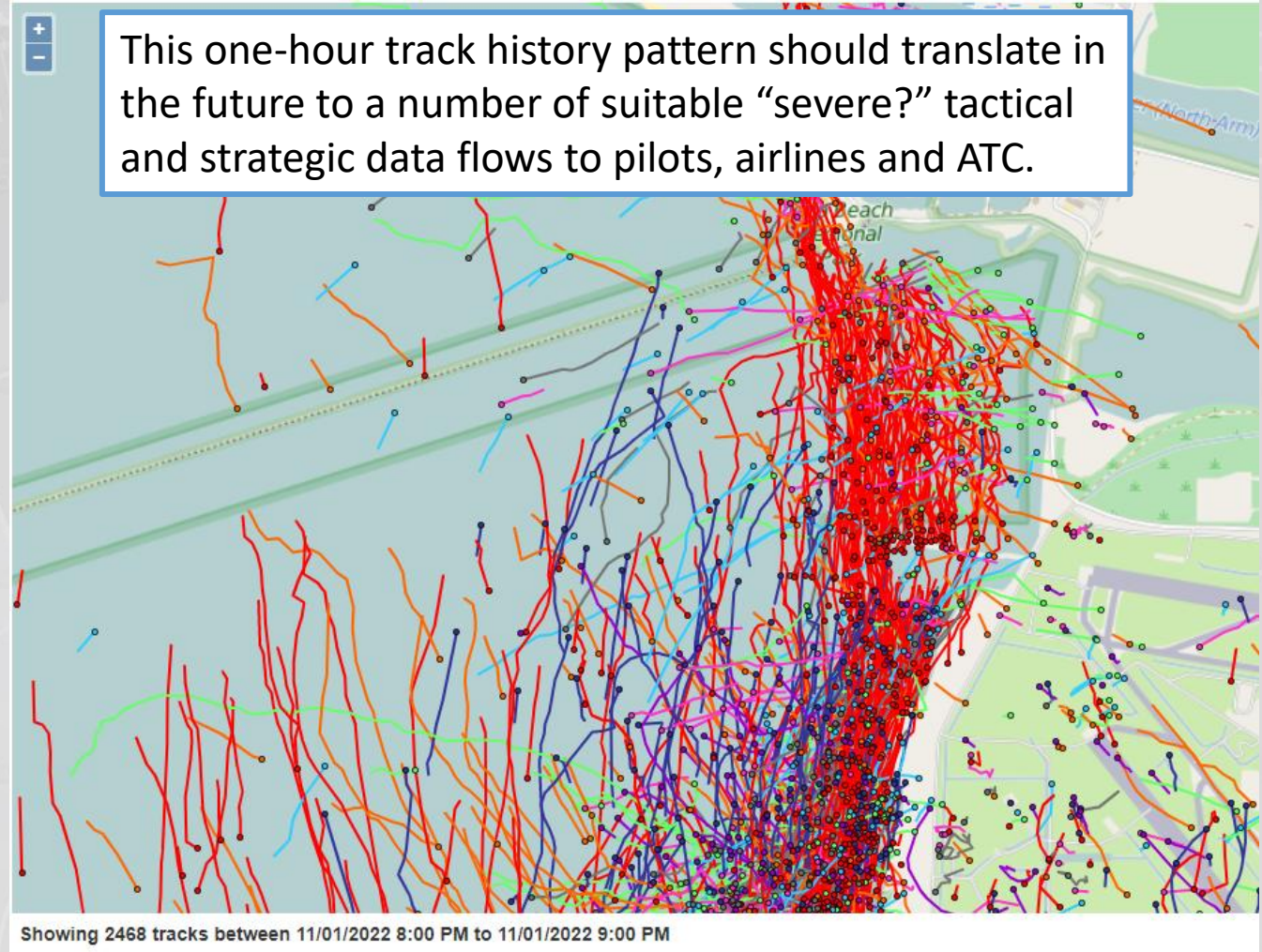
Aircraft departing runway 26R at night should consider that the Snow Geese hazard is likely to be present during the night, and Snow Geese may be encountered at or below 400 feet AGL. It should be noted that birds, including geese, have been observed flying above 400 feet AGL as well.

YVR snow geese example: we have methods to measure and predict congestion and build up

Instantaneous snapshot of snow geese

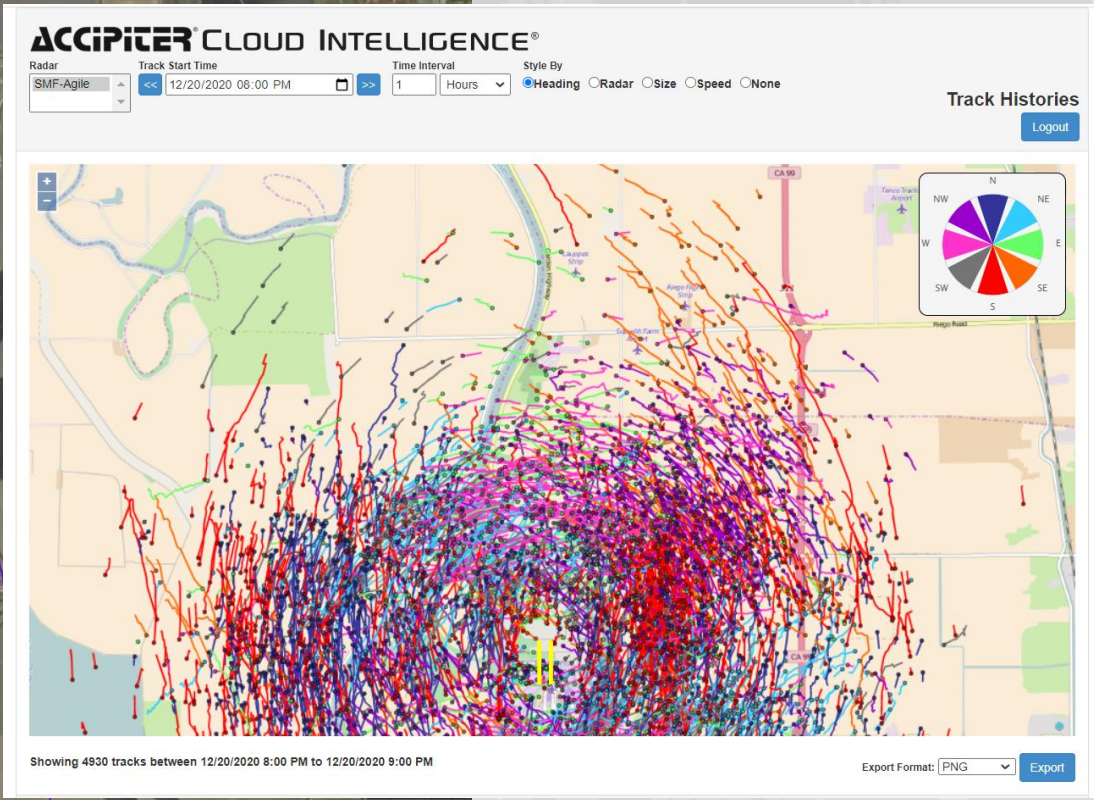
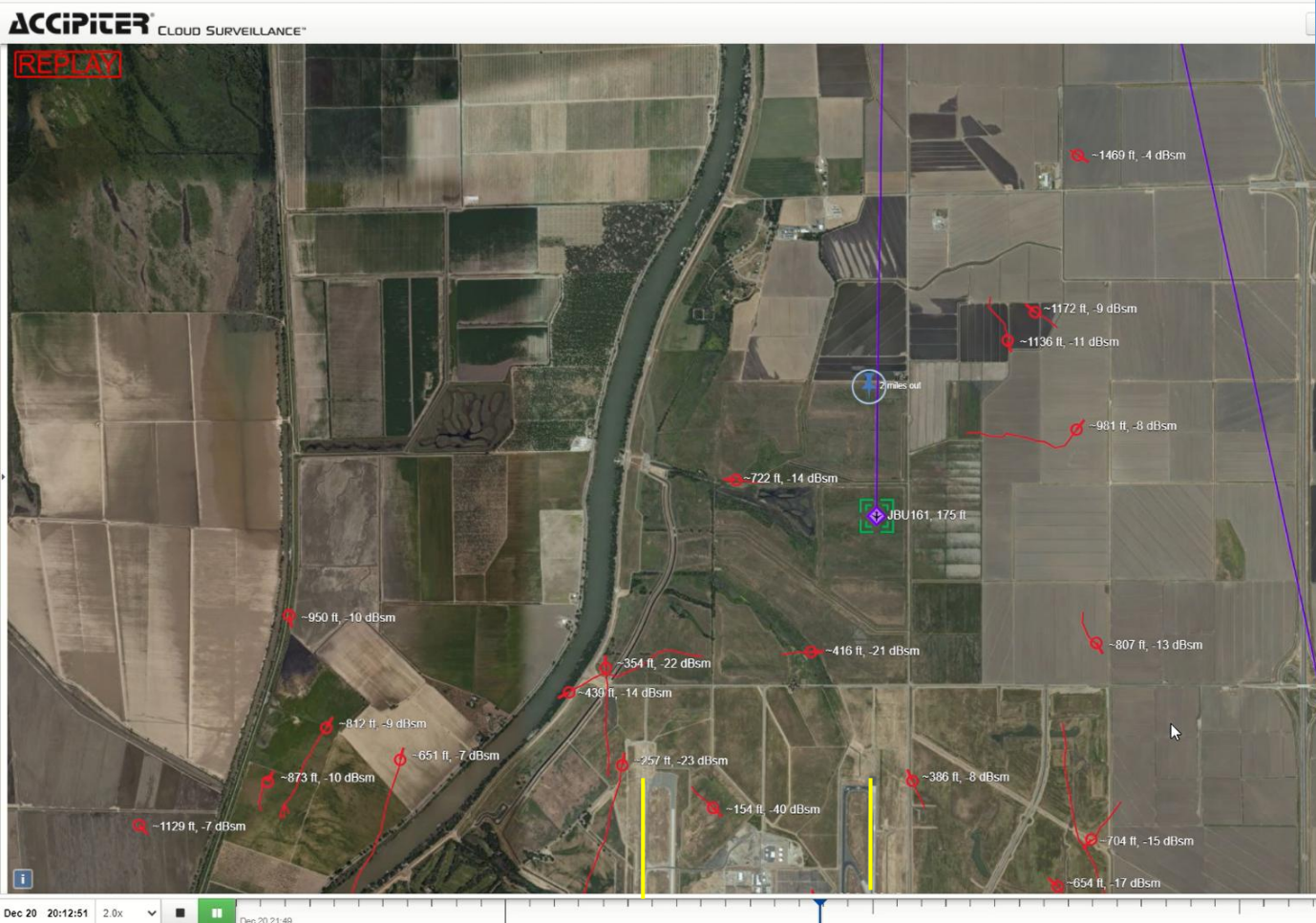


One hour snapshot of snow geese activity in the dark



Sacramento (SMF) bird congestion example that resulted in a bird strike on approach

This one-hour track history pattern should translate in the future to a number of suitable “severe?” tactical and strategic data flows to pilots, airlines and ATC.

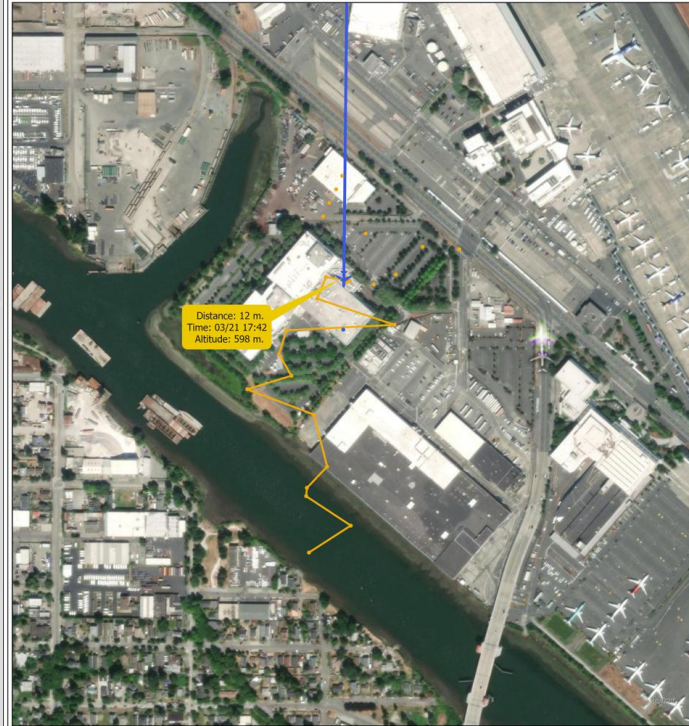


Two examples of CPA reports – off-airport aircraft each coming very close to a bird track

We have developed and automated Closest Point of Approach (CPA) reporting as a promising tool for use in off-airport risk assessment.

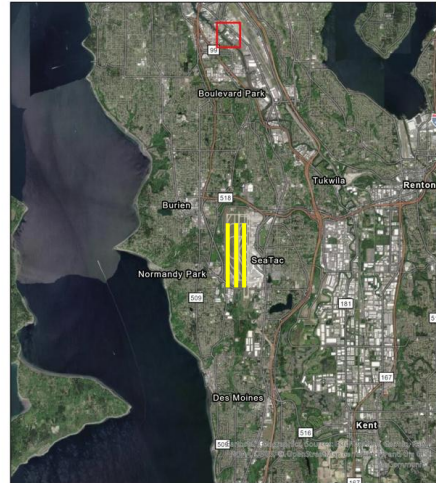
Aircraft approaching SEA from the north

Closest Point of Approach: QXE2117

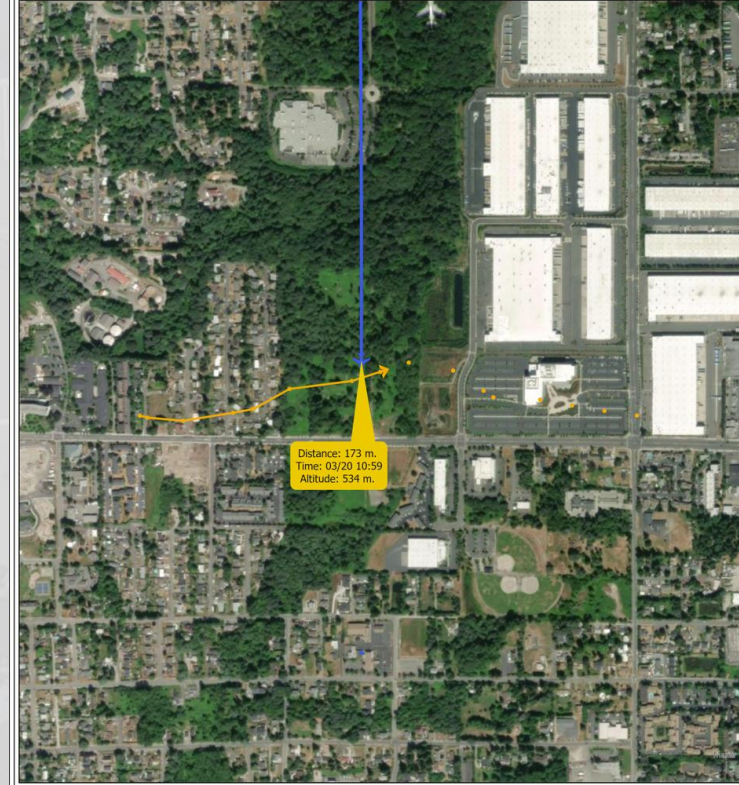


ACCIPITER
TARGETING A SAFER WORLD®
ICAO: A86A66
Flight: QXE2117
Time: 2025-03-21 5:42:05 PM
Distance: 12.134181 m.
Altitude: 597.963238 m.

Port
of Seattle®

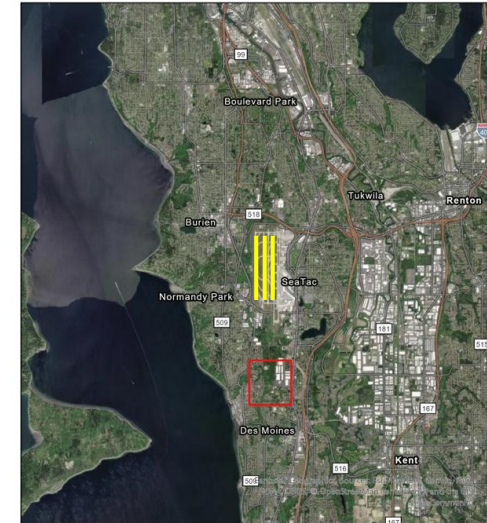


Closest Point of Approach: ASA647



ACCIPITER
TARGETING A SAFER WORLD®
ICAO: A97608
Flight: ASA647
Time: 2025-03-20 10:59:57 AM
Distance: 173.312031 m.
Altitude: 534.486655 m.

Port
of Seattle®

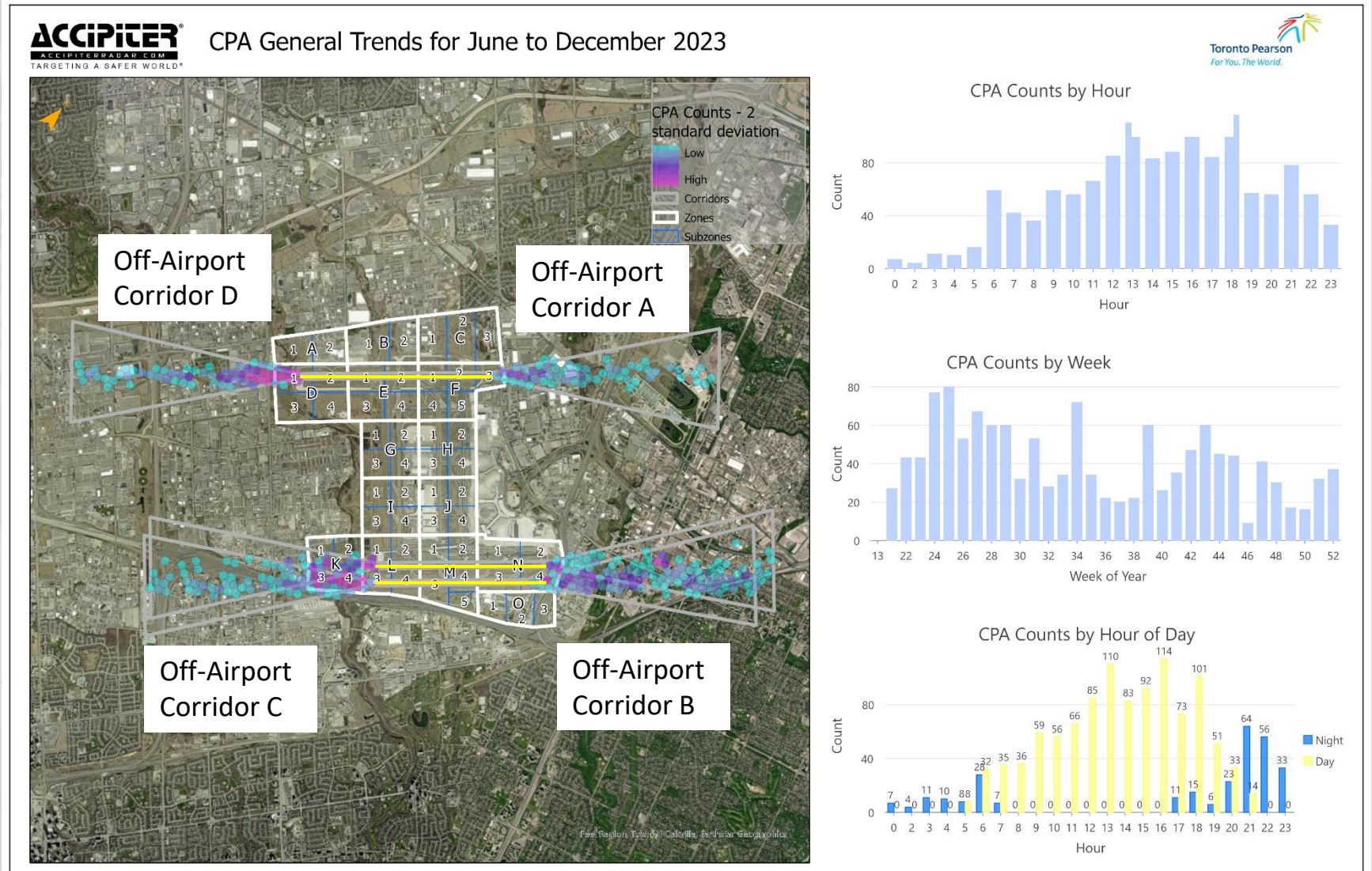


Aircraft departing SEA heading south

Loss of separation in the four general flight corridor areas – preliminary analysis at YYZ

Can CPA counts help us mitigate off-airport bird strike risk?

- All four off-airport corridors show loss of separation using CPA, and can support real-time alerts to pilots (ATS communications or “app”)
- We have evidence of sufficient CPA data to support (sub-)hourly trends with flight corridor differentiation (e.g. for ATIS messages.) Not just “birds in the vicinity”
- We have evidence of sufficient CPA data to support NOTAMs with seasonal, time of day and flight corridor information.



Corridor B: nighttime & daytime loss of separation example where a bird strike was also reported

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TARGETING A SAFER WORLD

Daily Summary of Closest Points of Approach - 2023-07-15

Number of CPA's: 20 Night Count: 15 Day Count: 5 Average Distance: 129 m.

Toronto Pearson
For You. The World.

A summer example

CPA and loss of separation
are very promising as
elements for off-airport
deconfliction.

15:04

Toronto Pearson International Airport

Strike: 23:24

14:05 23:23 22:55 15:55 21:09 23:12 23:12 22:33 22:33 23:04 22:55 11:24

Etobicoke

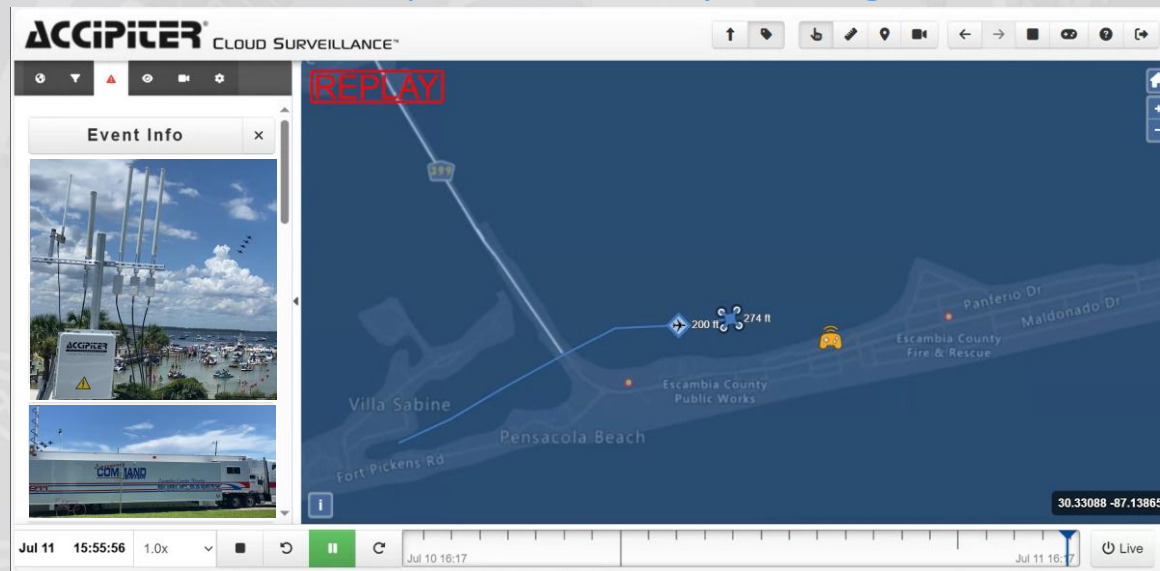
Off-Airport Corridor B

City of Toronto, Province of Ontario, East Canada, Est. 10m/ton, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDO, VACen, Parks Canada

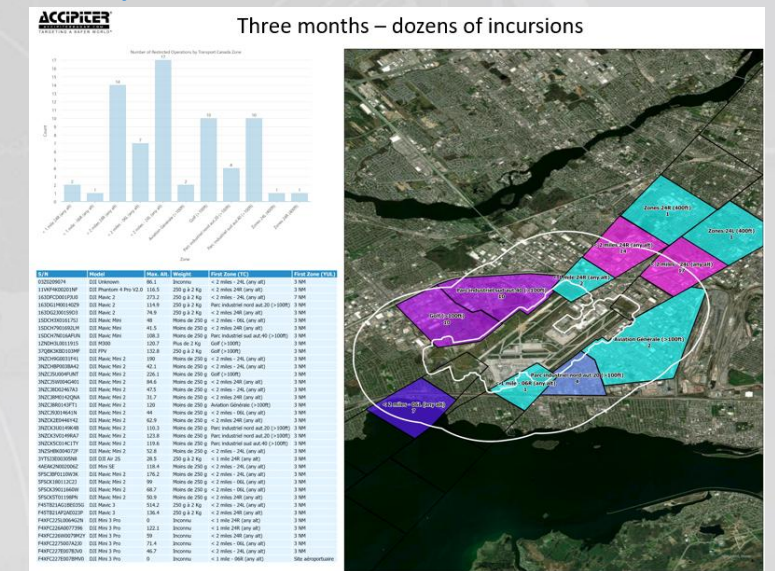
We can easily extend the bird awareness capabilities to include off-airport drones

- Drones are like hard birds. On approach and departure, pilots must be told by ATC in real-time if a drone is in their path. Real-time displays and alerts are similar to those for birds.
- If patterns of hazardous drone activity are apparent in airport corridors, ATC and/or Airport Ops will need to take action to mitigate that risk. Some strategic tools have already been developed for this purpose.

Example with U.S. Navy Blue Angels, 2025



Example with drones critical ATC corridors



It all begins with good 3D avian radar data collection at a number of key airports

- Maybe 5-10 leading airports could participate for a one-year deployment of a portable, off-grid, 3D avian radar that can be quickly deployed with no construction or required utilities to cover key arrival/departure corridor(s).
- The selected airports would hopefully be located on the west coast, central and east coast in both the U.S. and Canada to capture north-south migration patterns and coastal and inland patterns.
- Accipiter would work collaboratively with a stakeholder working group at each airport including a wildlife representative along with representatives from ATC, ALPA, key airlines and airport operations.
- We would tune and post-process the 3D avian radar data for stakeholder-specific tactical and strategic decision support as described herein, sharing with stakeholders at quarterly working group meetings, and responding to feedback from stakeholders.
- We would organize a one-day workshop at 6-months where all participating airport working groups would attend to share respective experience, discuss challenges, and gain consensus on improvements needed.
- We would draft a report for each airport and meet with its working group for feedback.
- We would organize a one-day final workshop where all participating airport working groups would attend to share respective experience, discuss challenges, and gain consensus on improvements needed.
- We would prepare a final report for each airport informed by airport feedback and final workshop feedback.
- We would work with the participating airports to present the results at relevant conferences including the next U.S. Aviation Wildlife Management Conference and the Canadian BSAC Conference.
- If you or your airport is interested in participating in this effort, please reach out to me at tnohara@accipiterradar.com or drop by our booth and speak to one of my team members.

*We are ready to go
with step 1 of a multi-
year, industry effort.*

Richard & I would be happy to take some questions



[Return](#)

- Thank you for attending this session
- You can reach us at:
 - Tim J. Nohara tnohara@accipiterradar.com
 - Richard Dolbeer Richard.Dolbeer@usda.gov