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The Use of Avian Radar at Vancouver International Airport (YVR) to Quantitatively Assess and Manage Bird Strike Risk

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Avian Analyst, Accipiter Client Services
Support From: Vancouver International Airport

Presentation Overview

- The challenges related to wildlife management at YVR
- Acquisition of an Accipiter Avian Radar System
- Objectives of the Avian Radar System
- Avian Radar Installation and Configuration Process
- Novel Activities Identified Using Avian Radar (3 examples)
- Understanding Bird Abundance and Behaviour Using Avian Radar Data
- Future Work
- Current Work – Evaluating The Effectiveness of a Control Measure on Snow Geese

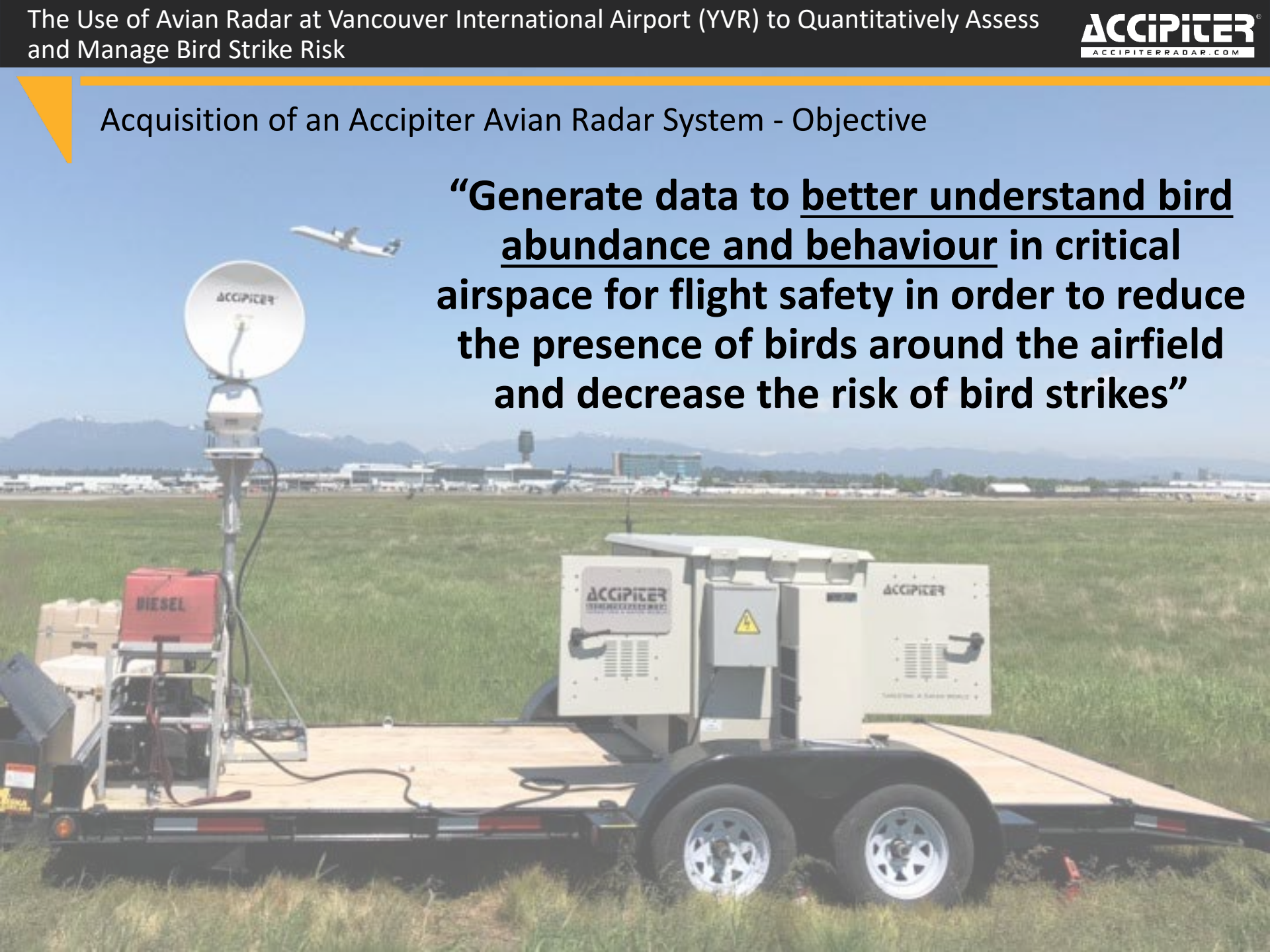
YVR – Wildlife Management Challenges

Are current wildlife management methods effective?

- Trained dogs
- Lasers
- Pyrotechnics
- Vehicles with sirens and high-powered LED lights
- Trained raptors
- Multiple boats
- Box culvert installation
- Relocation of raptors
- Management of nests and eggs (with permit)
- Other…

Acquisition of an Accipiter Avian Radar System - Objective

"Generate data to <u>better understand bird abundance and behaviour</u> in critical airspace for flight safety in order to reduce the presence of birds around the airfield and decrease the risk of bird strikes"

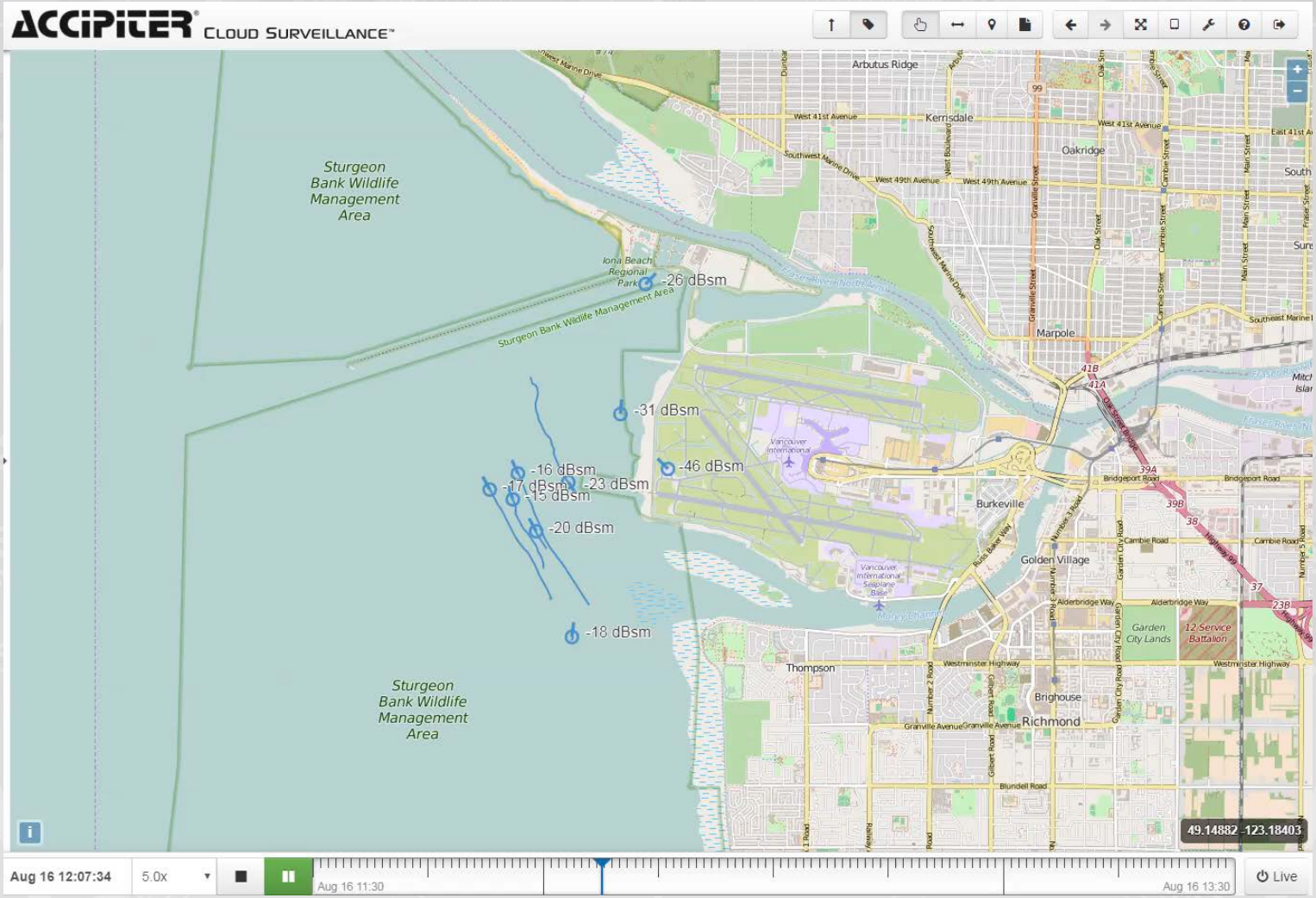


Acquisition of an Accipiter Avian Radar System - Installation

- Deployed June 2018
- Selected a location with line-of-sight to areas of primary concern
- Tested multiple elevation angles to assess best angles for coverage of critical airspace

Novel Activity Identified Using Avian Radar

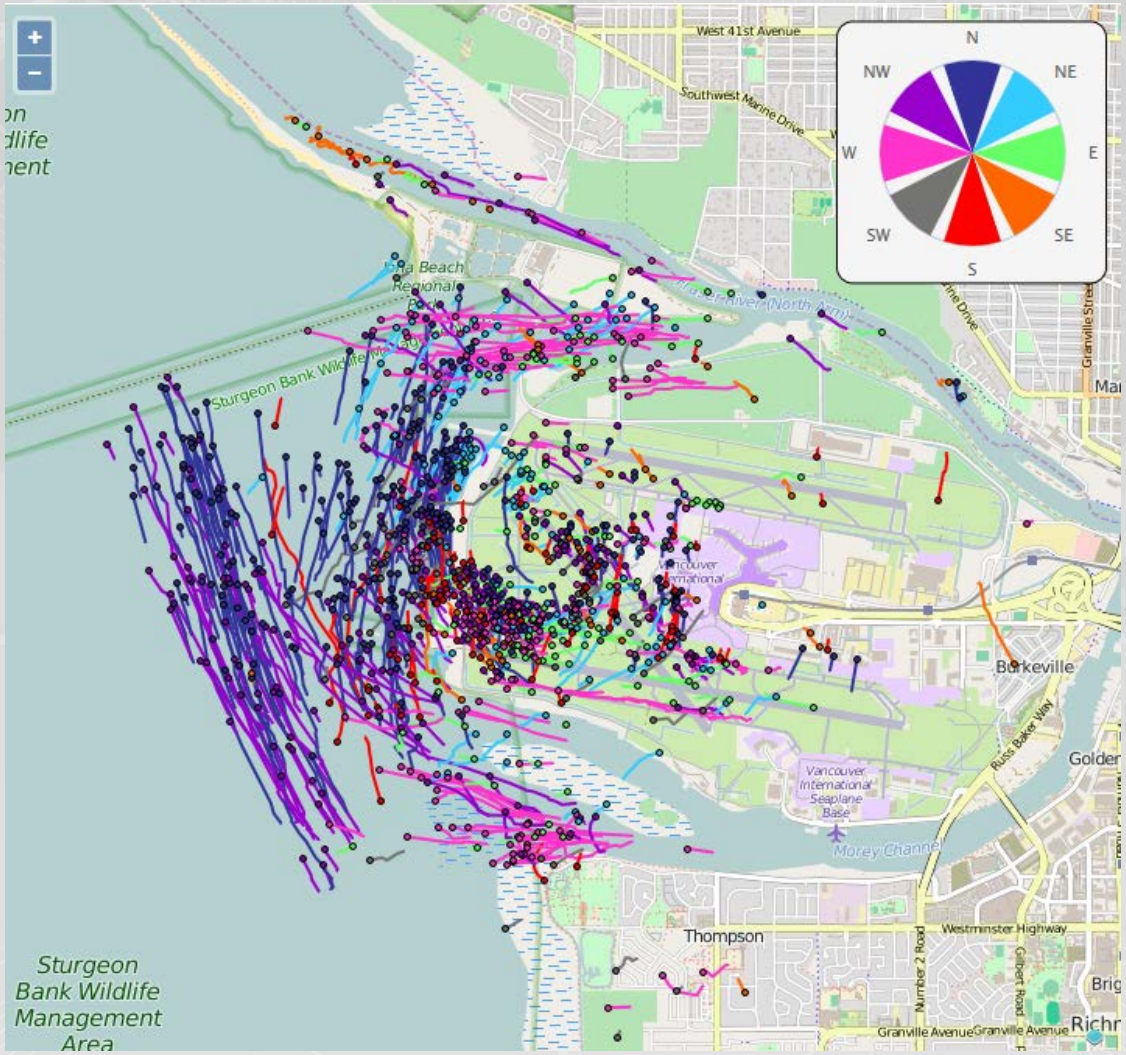
Late August northwest fly-out over the levy in the foreshore area



Novel Activity Identified Using Avian Radar

Late August northwest fly-out over the levy in the foreshore area

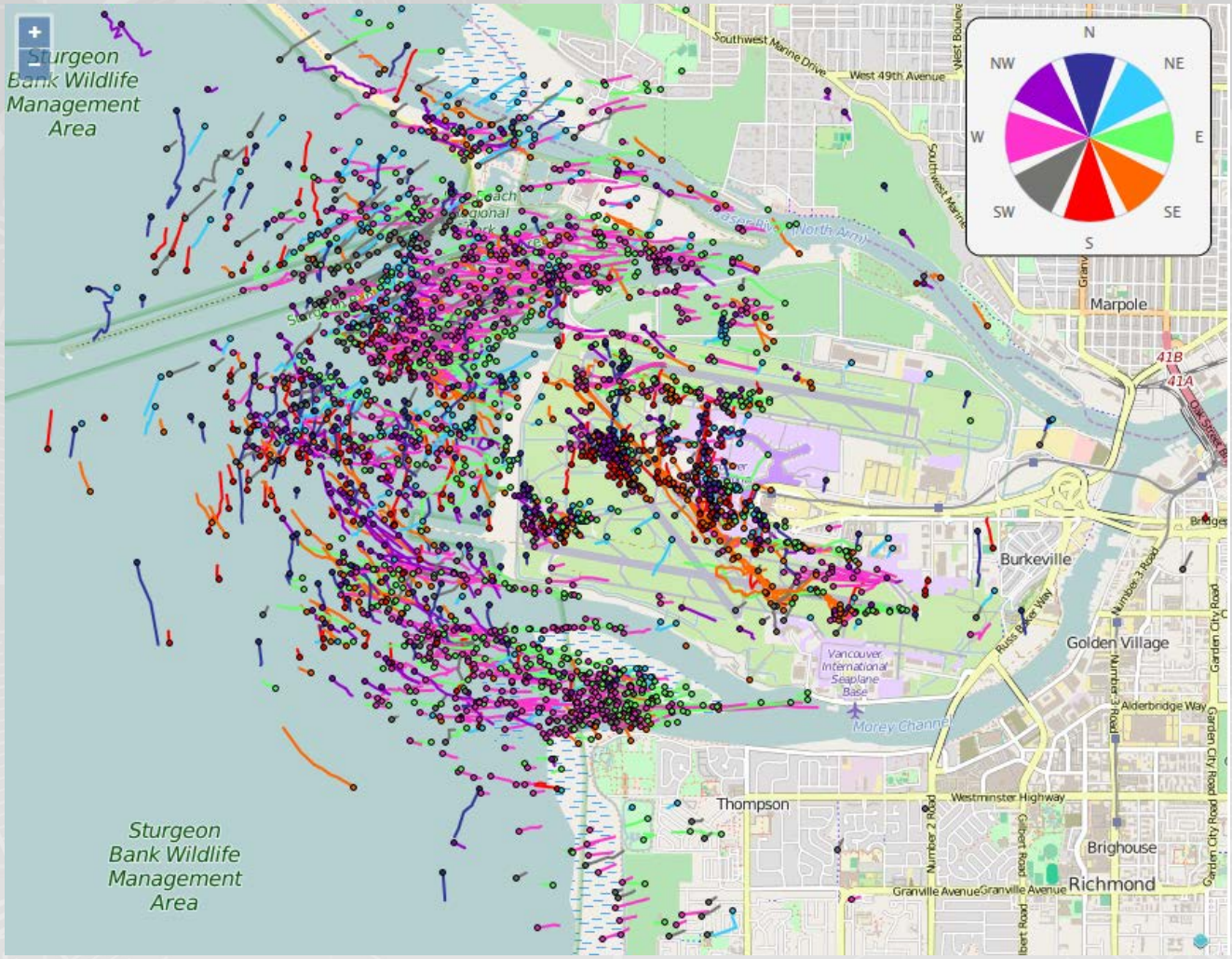
2018-Aug-16
0500 - 0600



Novel Activity Identified Using Avian Radar

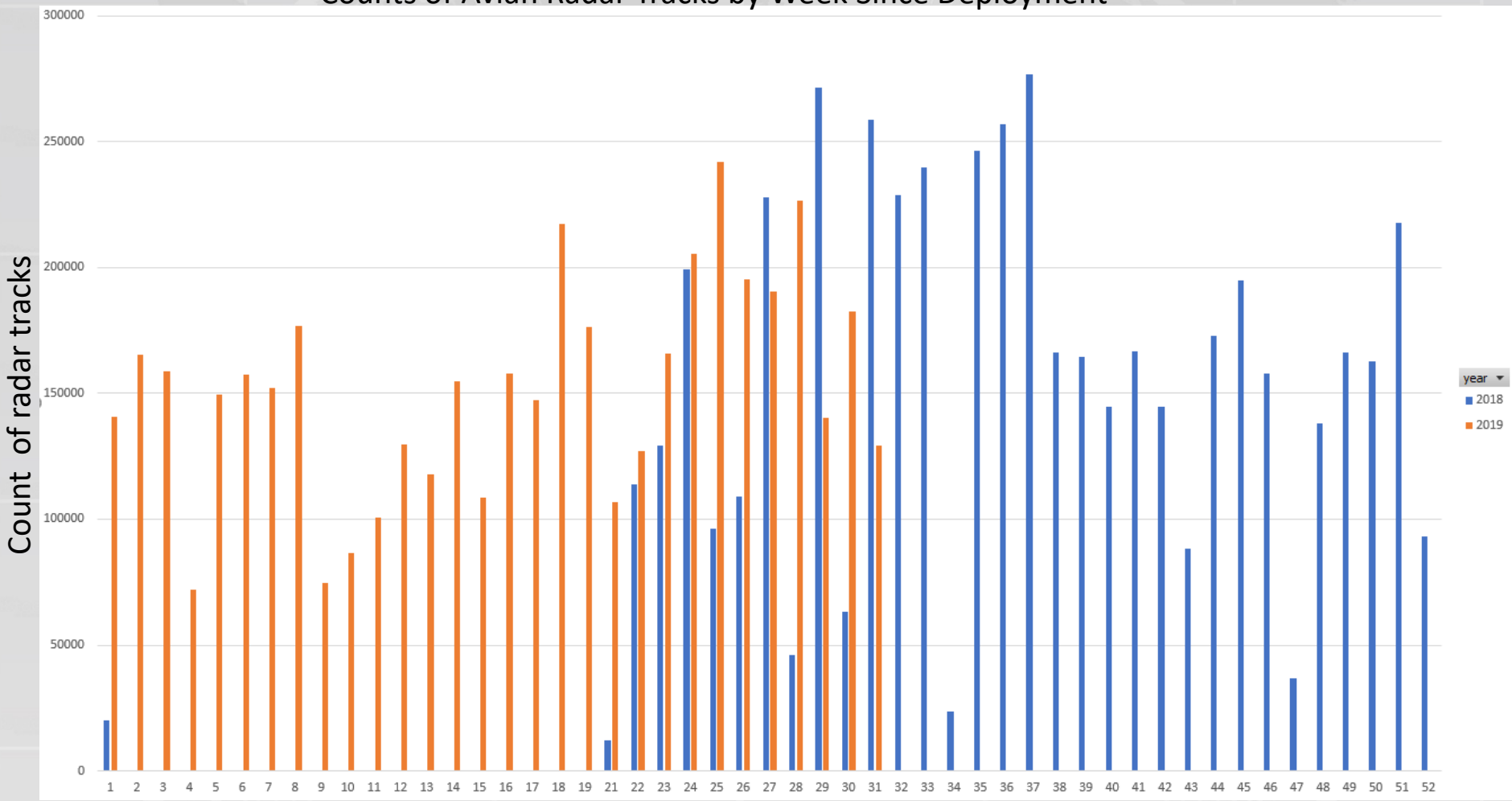
Eastward movement, from the foreshore to the Fraser River and Morey Channel

2018-July-23
0700 - 0800



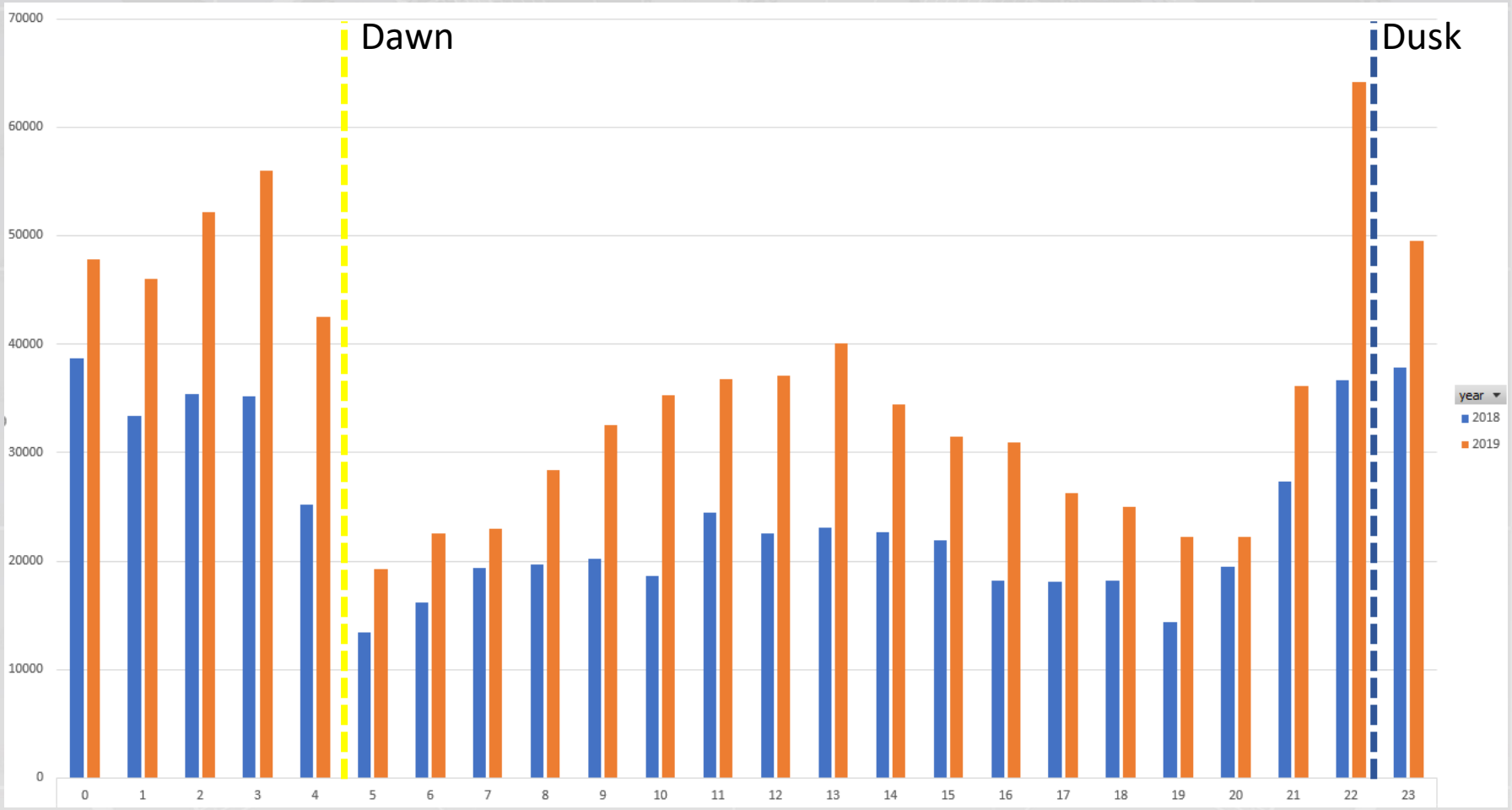
Novel Activity Identified Using Avian Radar

Bird abundance at YVR is greater in autumn

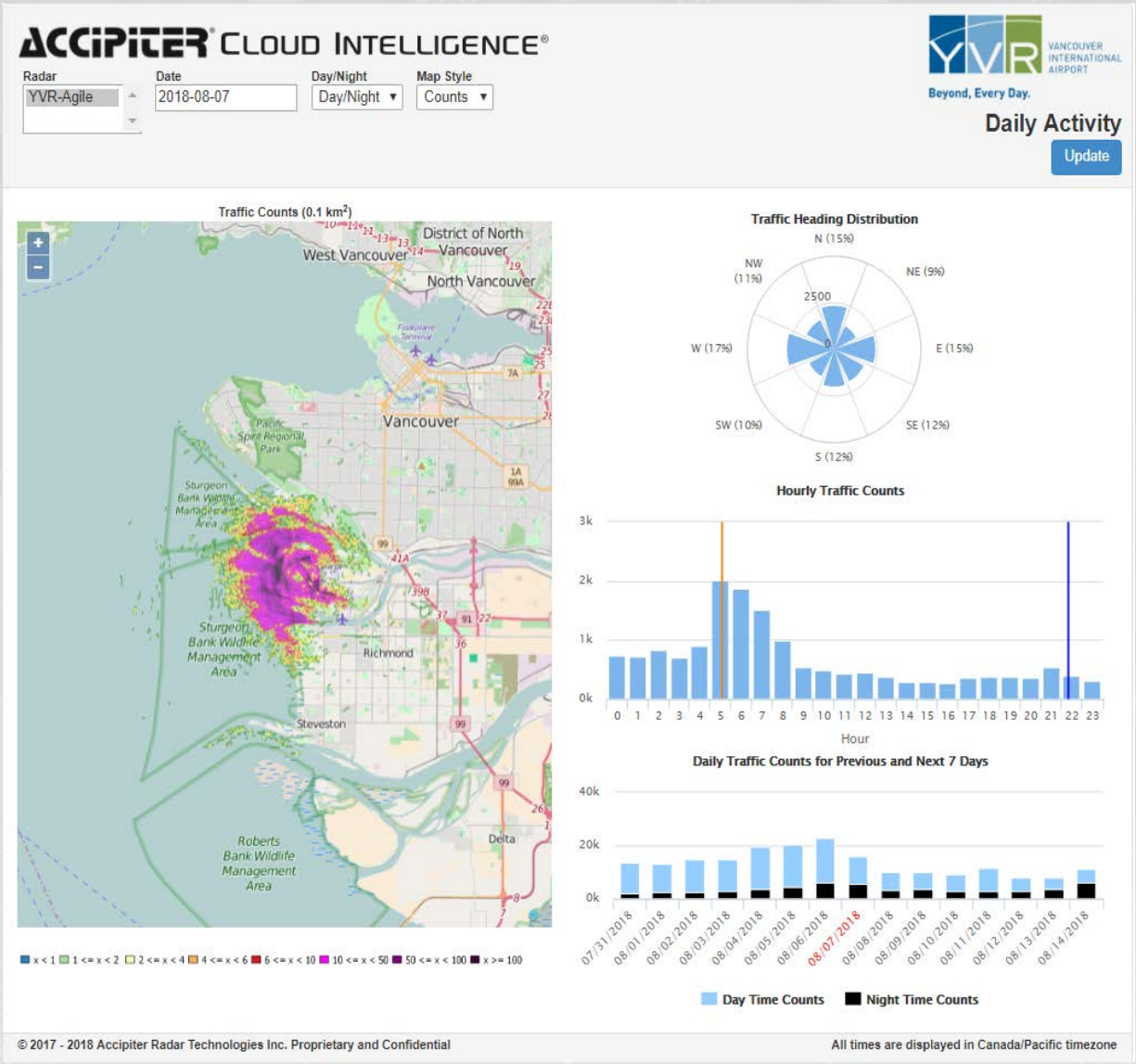


Understanding Bird Abundance and Behaviour Using Avian Radar Data

Counts of Avian Radar Tracks by Hour for June

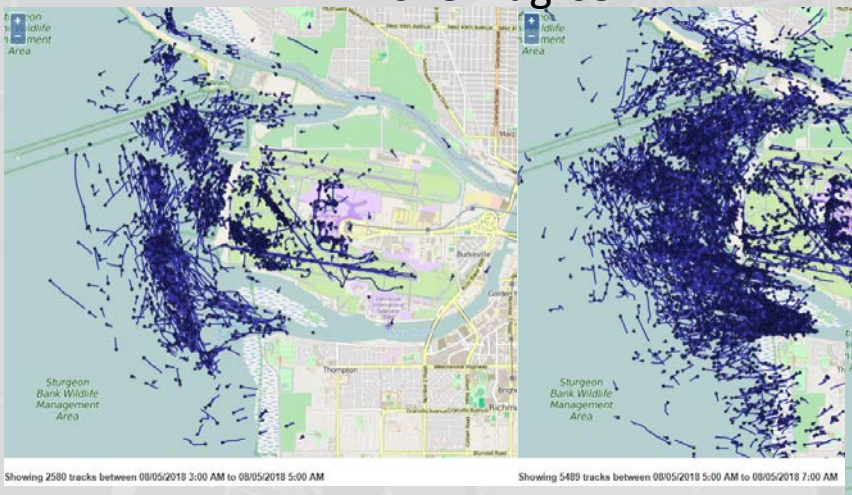


Understanding Bird Abundance and Behaviour Using Avian Radar Data

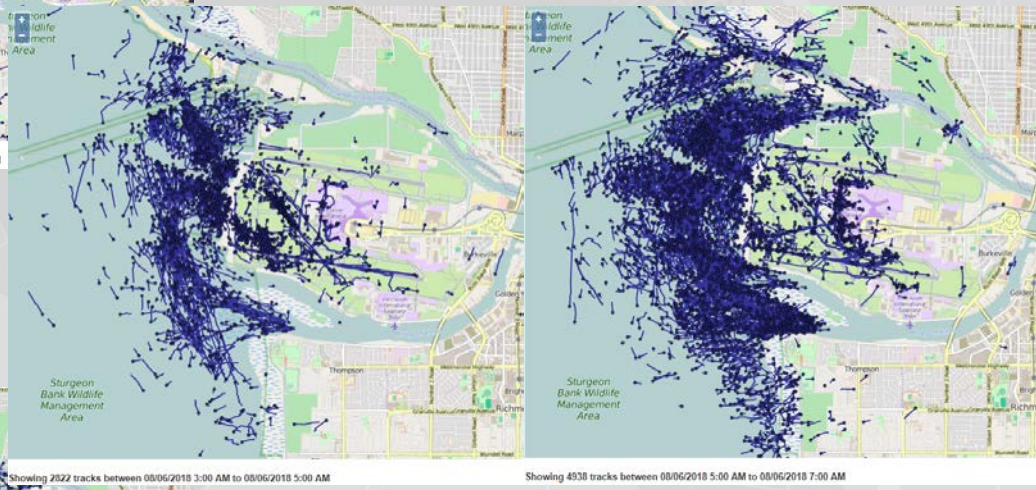


Understanding Bird Abundance and Behaviour Using Avian Radar Data

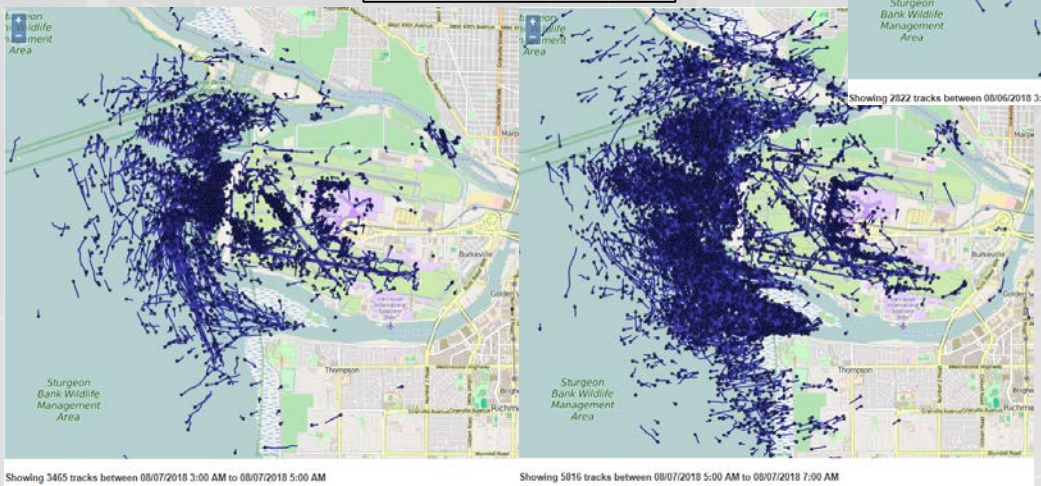
2018-Aug-05



2018-Aug-06



2018-Aug-07

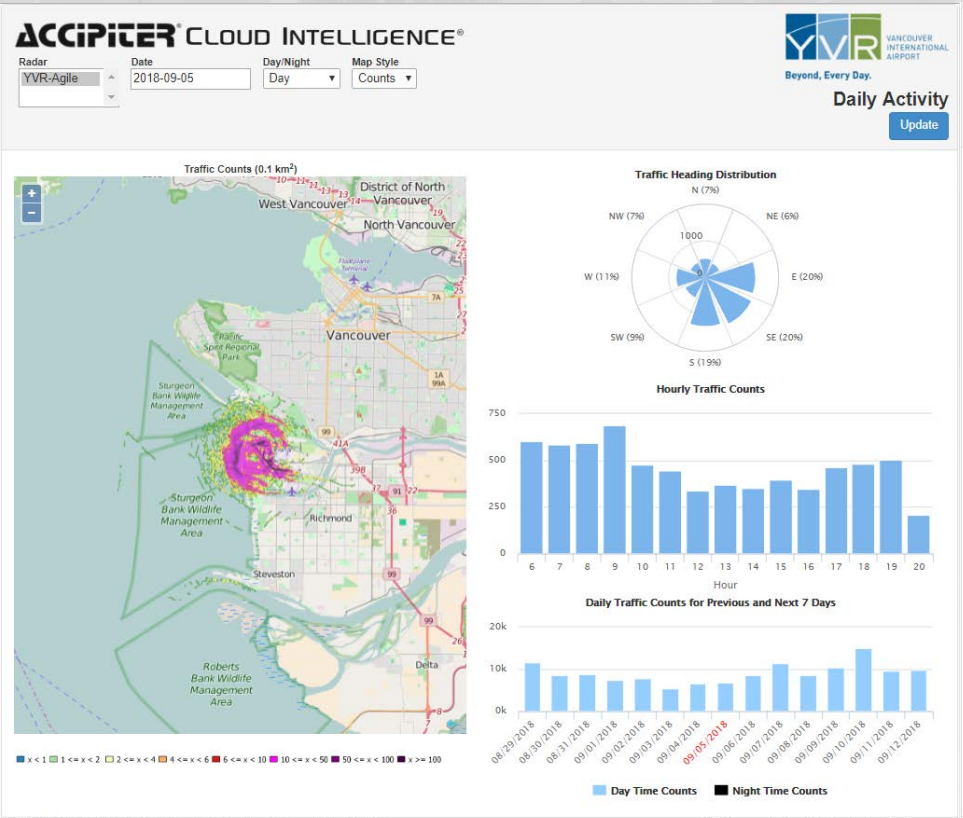


Images represent 2-hour histories before and after sunrise

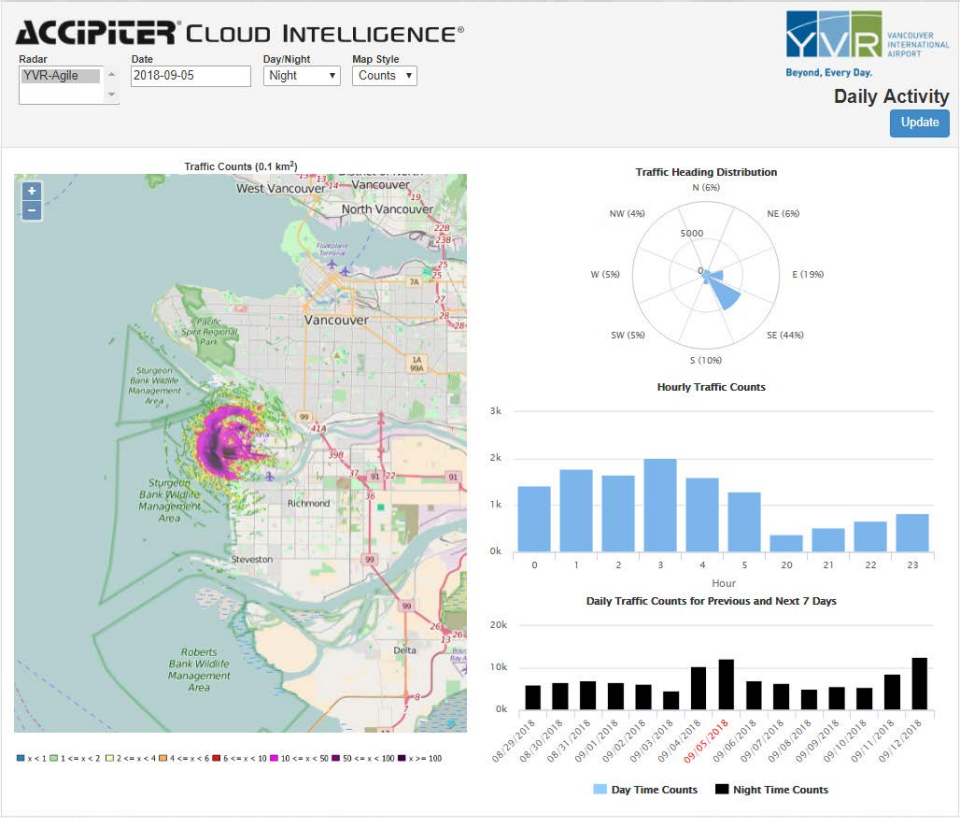
Understanding Bird Abundance and Behaviour Using Avian Radar Data

2018-Sep-05 A Heavy Migration Day

Daytime Activity

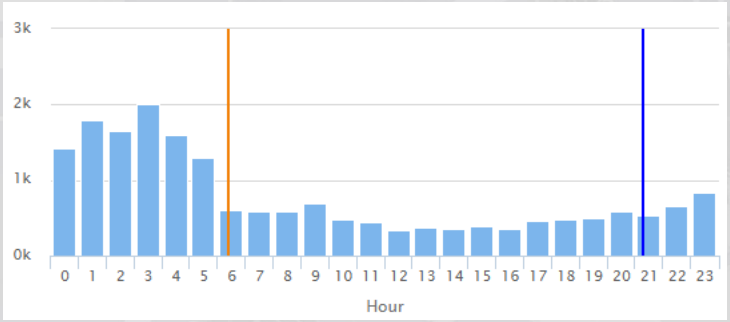


Nighttime Activity

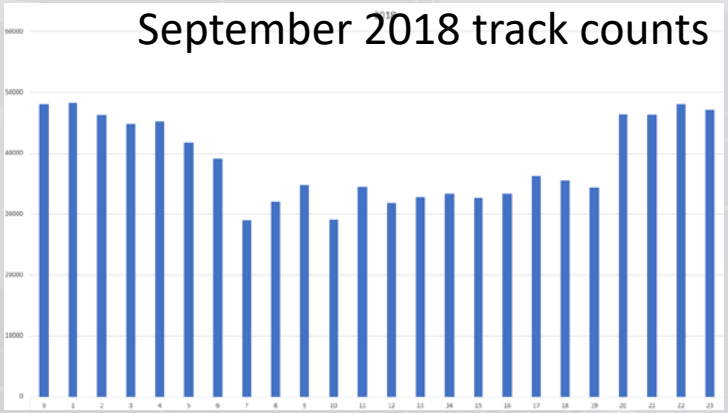


The Use of Avian Radar at Vancouver International Airport (YVR) to Quantitatively Assess and Manage Bird Strike Risk

2018-Sep-05 Heavy Migration Day



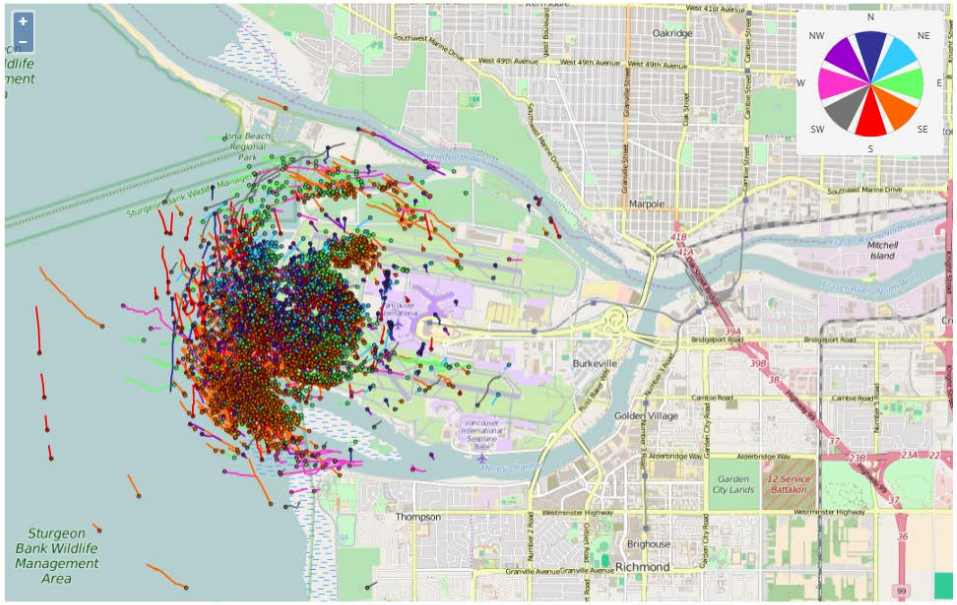
September 2018 track counts



ACCIPITER CLOUD INTELLIGENCE®

03:00

Radar: YVR-Agile | Track Start Time: << 2018-09-05 03:00 AM >> | Time Interval: 1 Hours | Style By: Heading Radar Size Speed None

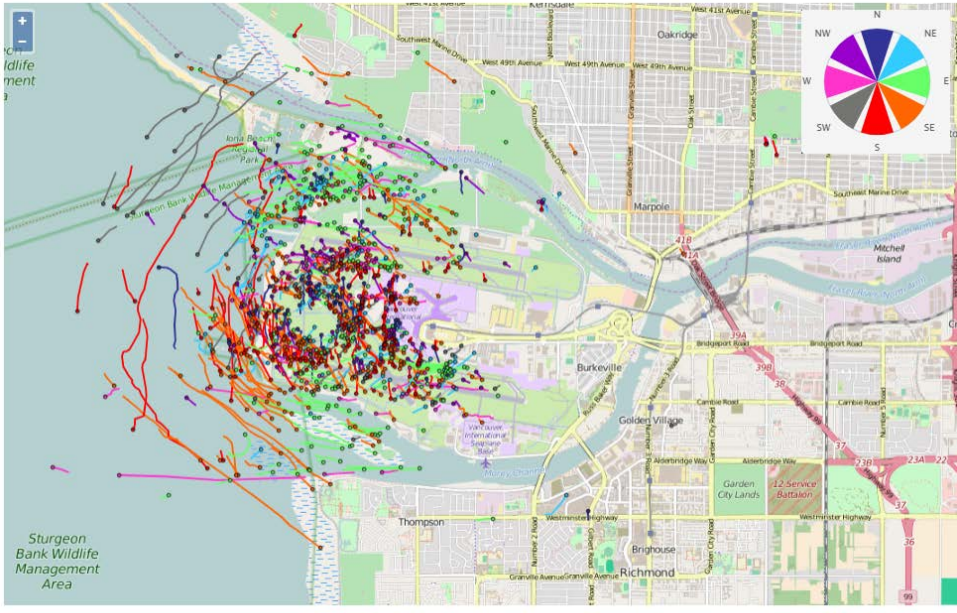


Showing 4656 tracks between 09/05/2018 3:00 AM to 09/05/2018 4:00 AM

ACCIPITER CLOUD INTELLIGENCE®

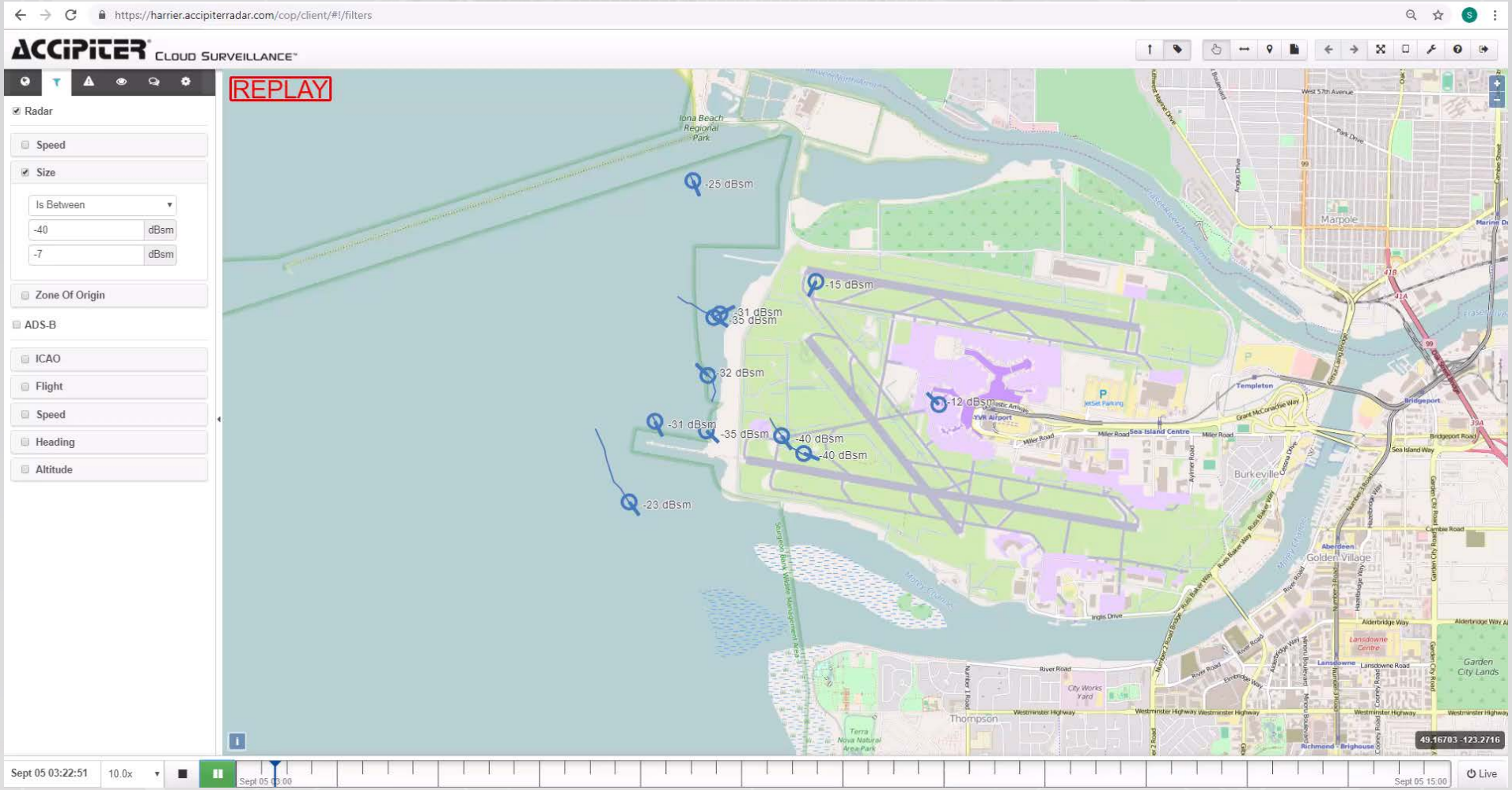
09:00

Radar: YVR-Agile | Track Start Time: << 2018-09-05 09:00 AM >> | Time Interval: 1 Hours | Style By: Heading Radar Size Speed None



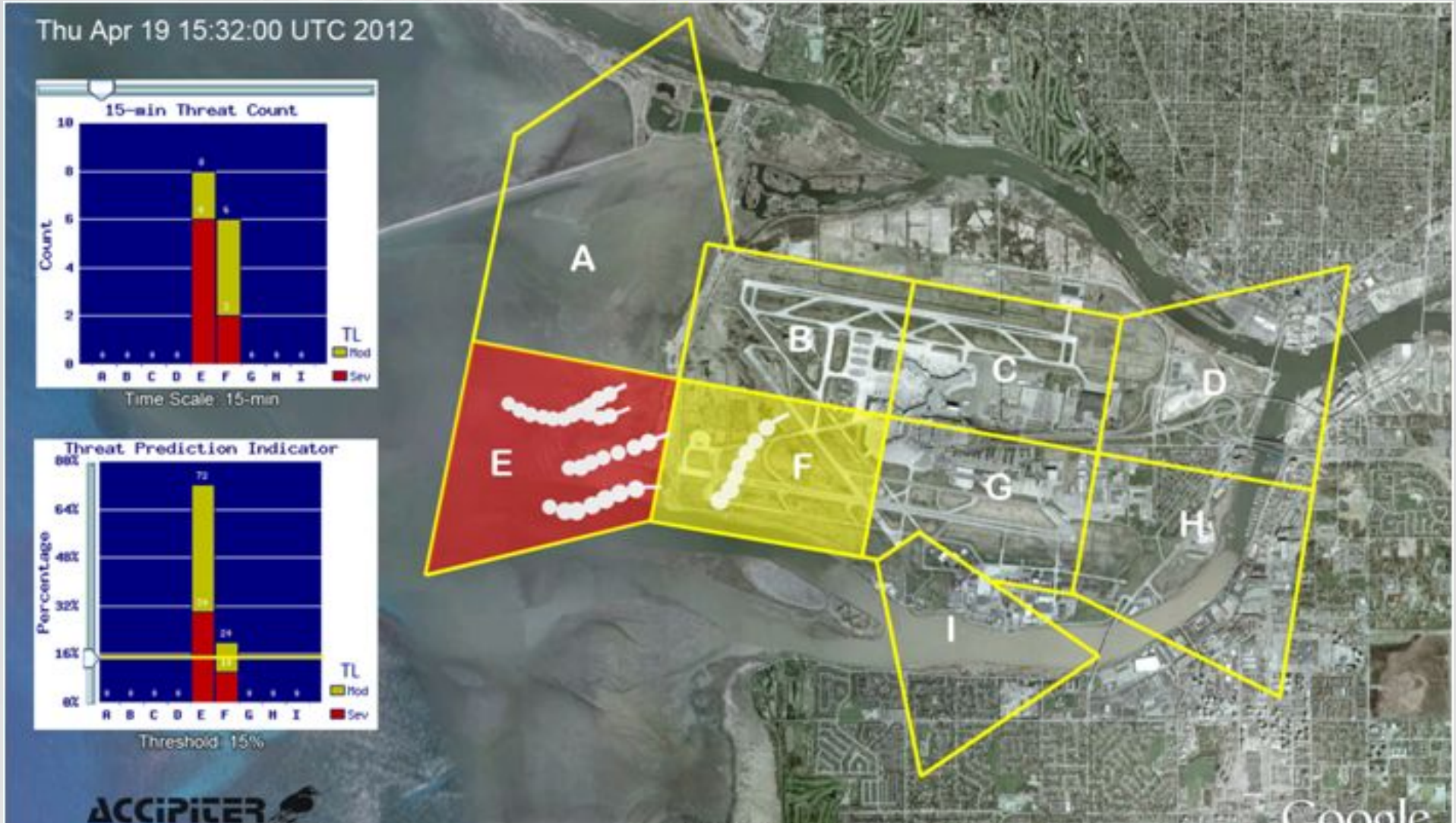
Showing 1390 tracks between 09/05/2018 9:00 AM to 09/05/2018 10:00 AM

2018-Sep-05 Migration Video



Future Work

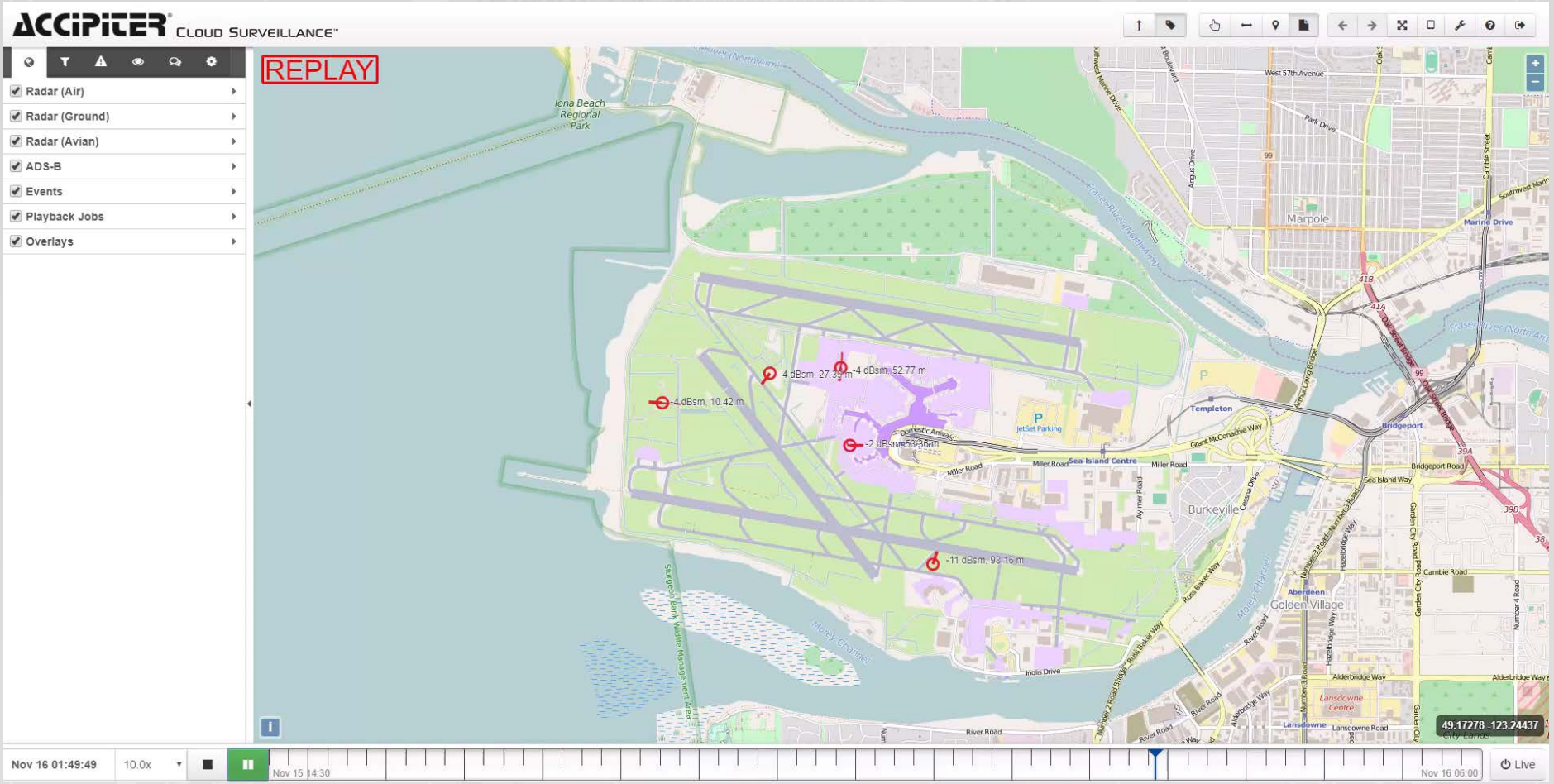
Use the data to inform configuration of a real-time alert system



Future Work

- Use the data to inform configuration of a real-time alert system
- Increase coverage by adding an additional avian radar system
- Correlate avian radar data with visual observations, **control data**, and strike data
- Address further research questions from YVR biologists
- Sharing data with other stakeholders

Snow Geese Response to Green Laser Control Measure



Current Work – Evaluating the effectiveness of a control measure

Influence of Control Measures on Snow Goose Behavior Preliminary Study

Objective(s)

- Develop a procedure to evaluating the effect of a control measure on snow goose behaviour.
- Begin to understand the effect of doing no control measures on snow goose behaviour.
- Assess the risk to aircraft from doing no snow goose harassment

Research Question(s)

- Is it within an acceptable tolerance of risk to do 3 nights without any control measures?
- Is there a difference in snow goose behaviour when control measures are used vs. not used?
- Altitude band occupied by snow geese (in relation to the altitude band occupied by aircraft).
- Spatial distribution of snow geese.
- Abundance of snow geese.
- Temporal distribution of snow geese in an area.

Current Work – Evaluating the effectiveness of a control measure

Influence of control measure on snow goose behaviour

Procedure 1 (2018-Dec-03 – 2018-Dec-04)

Control measures were used as per normal SOP. Wildlife personnel recorded which measures were deployed when as well as any observed bird activity and response.

Procedure 2 (2018-Dec-05)

Wildlife personnel recorded observations of snow geese throughout the night. No control measures were used, except if deemed necessary for the safety of an arriving or departing aircraft.

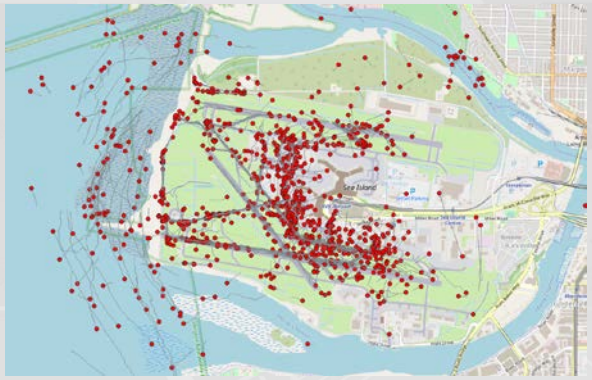
Current Work – Evaluating the effectiveness of a control measure

Preliminary Results

Date	Number of Times Control Measures Were Used	Types of Control Measures Used	Number of Nighttime Avian Radar Tracks Recorded
2018-Dec-03	12	6	10,307
2018-Dec-04	12	2	8,600
2018-Dec-05	0	0	**10,725**

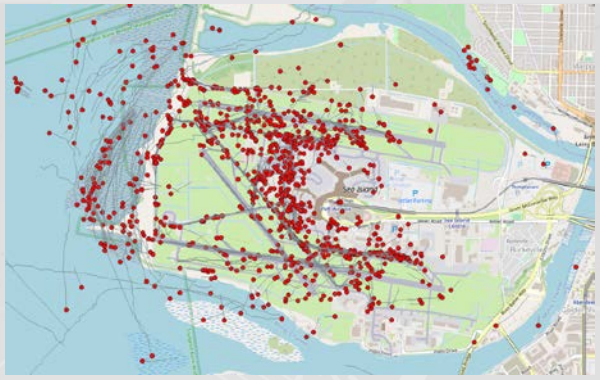
✓ Test procedure was developed and worked effectively

2018-Dec-03



2018-Dec-04

2018-Dec-05



Current Work – Evaluating the effectiveness of a control measure

Next Steps

- Finish reviewing the data to answer the initial set of research questions.
- Expand methods to longer durations of each condition to improve sample size
- Use mobile version of the COP to tag snow goose radar tracks to be used in additional analyses.

Procurement of an Accipiter Avian Radar System

YVR's Objective

"Generate data to better understand bird abundance and behaviour in critical airspace for flight safety in order to reduce the presence of birds around the airfield and decrease the risk of bird strikes"

YVR's Findings

"The *avian radar system (ARS)* is capable of producing a significant amount of credible and useful data on the number and movement of birds around the airfield and their response to control measures. Significantly, the ARS can track birds in the most critical airfield areas as well as over the foreshore, a primary source of problem birds at YVR"

Thank you to YVR for their support on this presentation

Thank You

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