Enhanced Bird Threat Information in the ATCT:

WiSC Research Update

Presented to: Bird Strike Conference 2018

By: Mark Hale, CSSI, Inc. (ANG-C54)

Date: August 21, 2018

Overview

- **Background**
  - Defining the Wildlife Surveillance Concept (WiSC)
  - Research Activities Review

- **Current Research Activities**
  - ATC Benefits Whitepaper
  - Pilot Engagement Panel (Florida Institute of Technology)

- **Next Steps**

Background

WiSC Overview

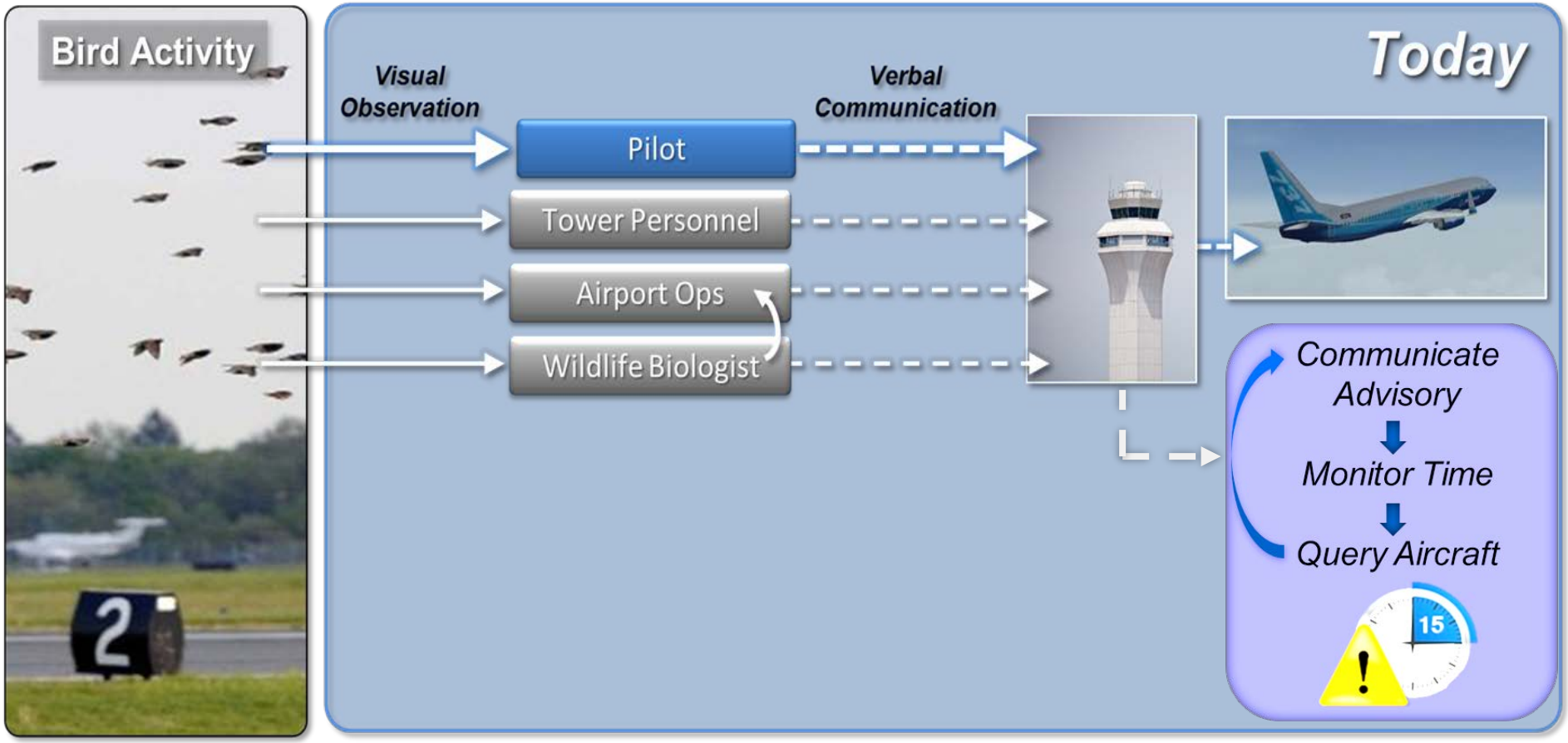
Wildlife Surveillance Concept (WiSC)

- A concept that enables the introduction of more precise bird threat information to the ATCT environment
  - Commercially available radar systems identified in AC 150/5220-25

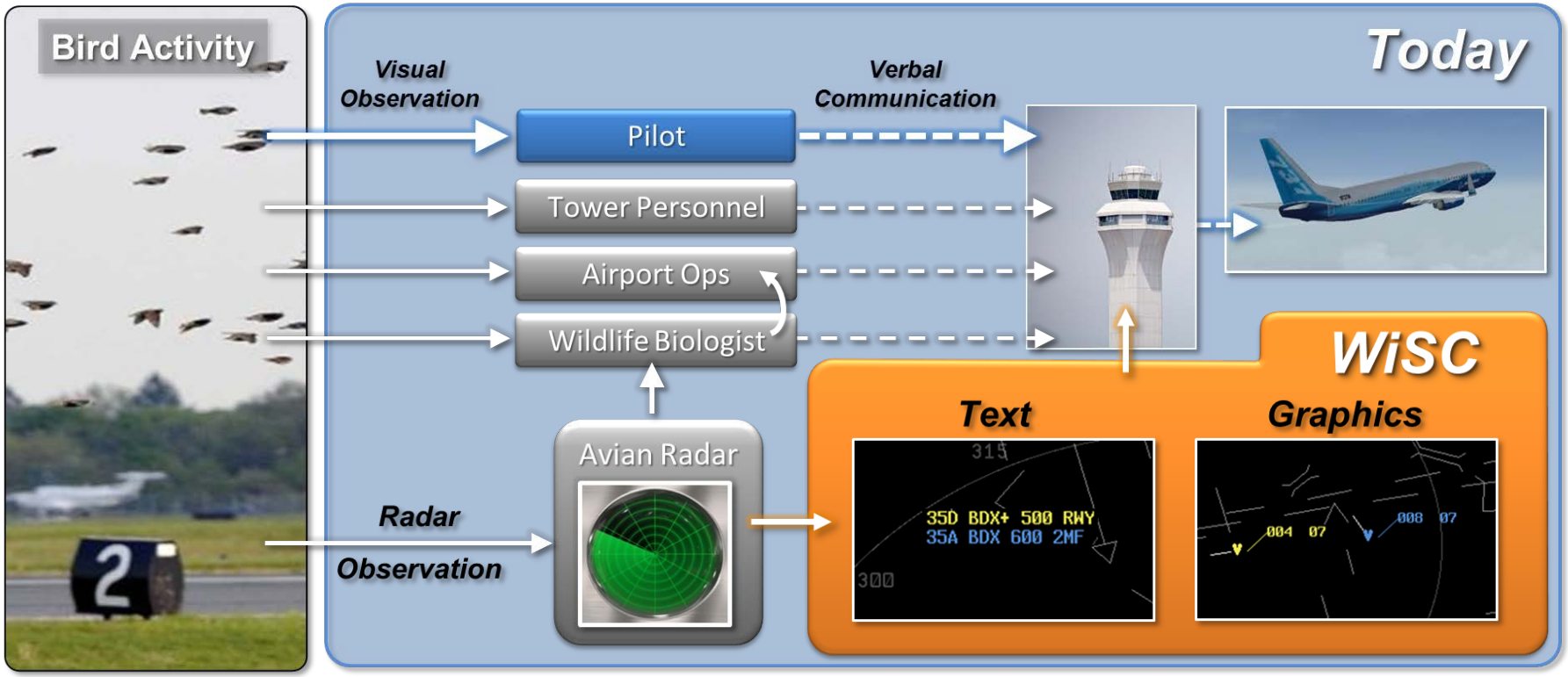
Objectives

- Increase safety by reducing the probability of damaging strikes
  - Improve bird threat detection
  - Improve bird threat information quality passed to the aircraft
  - Improve ATC procedures for disseminating avian threat information

Bird Threats - Today



Bird Threats - WiSC



WiSC Overview

Information Needs

- Bird threat characteristics
- e.g., altitude, speed, mass, etc.

WiSC Research

- Literature Review Database
- SME Panel
- Site Visits

Phase 1

- Technical Interchange Meeting
- Shortfall Analysis
- Laboratory HITL Demonstration

Phase 2

- FAA Concept Review
- Concept Socialization
- Site Validation Activity

Phase 3

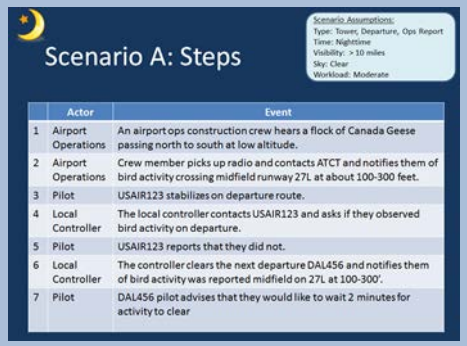
- Benefits Whitepaper
- Information Needs Whitepaper
- Final Concept of Operations

Phase 4

Subject Matter Expert Panel

- **Controllers, Supervisors, & Airline Pilots**
  - Scenario walkthroughs (5)
  - Reviewed notional interfaces (graphical, textual)
  - Rated avian threats, value of supplemental bird threat information
- **Key focus areas were identified**
  - System accuracy, ATC system options, Information Display and Interface Design Options, Procedural and Workload Considerations

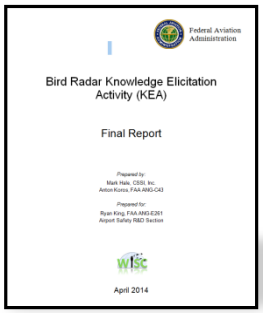
Scenarios


Scenario A: Steps

Scenario Assumptions:
Type: Tower, Departure, Ops Report
Time: Nighttime
Visibility: > 10 miles
Sky: Clear
Workload: Moderate

	Actor	Event
1	Airport Operations	An airport ops construction crew hears a flock of Canada Geese passing north to south at low altitude.
2	Airport Operations	Crew member picks up radio and contacts ATCT and notifies them of bird activity crossing midfield runway 27L at about 100-300 feet.
3	Pilot	USAIR123 stabilizes on departure route.
4	Local Controller	The local controller contacts USAIR123 and asks if they observed bird activity on departure.
5	Pilot	USAIR123 reports that they did not.
6	Local Controller	The controller clears the next departure DAL456 and notifies them of bird activity was reported midfield on 27L at 100-300'.
7	Pilot	DAL456 pilot advises that they would like to wait 2 minutes for activity to clear

Final Report


Federal Aviation Administration

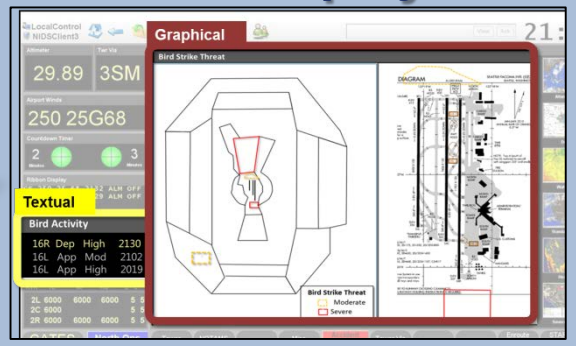
Bird Radar Knowledge Elicitation Activity (KEA)

Final Report

April 2014

Feb 2014

Notional Displays



Site Visits

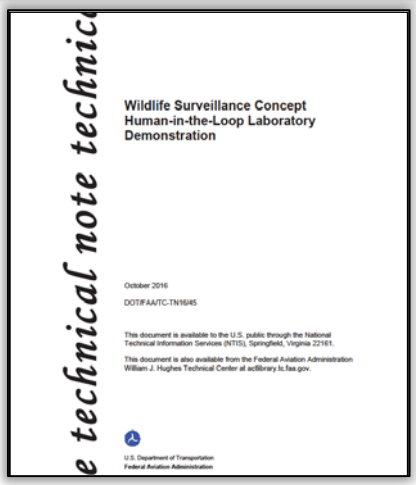
- Interviewed airport ops. personnel, supervisors, & controllers
- ATC & mgmt. responded favorably to the concept and noted the need/utility for more precise information

Aug/Sep 2014

Human-in-the-Loop Lab Demo

Tower Simulator (Human Factors Laboratory)

- 270-degree OTW virtual ATCT
- 5 controllers from facilities with known bird strike issues
- Researched novel methods of displaying bird threat information to controllers
- Examined measures of preference, workload, situation awareness, and communications
- FAA technical report published October 2016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Wildlife Surveillance Concept
Human-in-the-Loop Laboratory
Demonstration

October 2016

DOT/FAA/TC-TN16/45

This document is available to the U.S. public through the National Technical Information Services (NTIS), Springfield, Virginia 22161.

This document is also available from the Federal Aviation Administration William J. Hughes Technical Center at actlibrary.tc.faa.gov.

U.S. Department of Transportation
Federal Aviation Administration

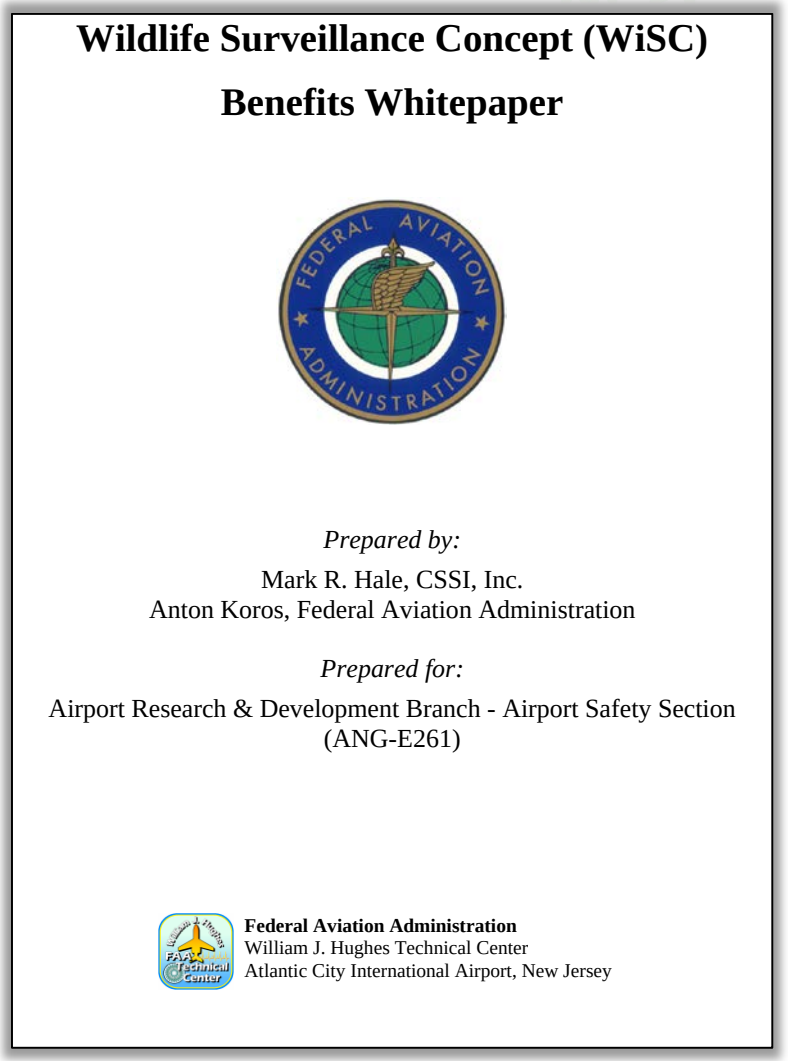
Activities & Updates

Benefits Whitepaper

WiSC Benefits Whitepaper

- Whitepaper focused on the controller benefits of adding more precise bird threat information to ATC
- Delivered final paper to FAA, ANG-E61 in July 2018
- Document link:

https://www.dropbox.com/s/pbyjsyasvycuuhz/WiSC%20Benefits%20Whitepaper%20Final.docx?dl=0



Wildlife Surveillance Concept (WiSC)

Benefits Whitepaper

Prepared by:

Mark R. Hale, CSSI, Inc.
Anton Koros, Federal Aviation Administration

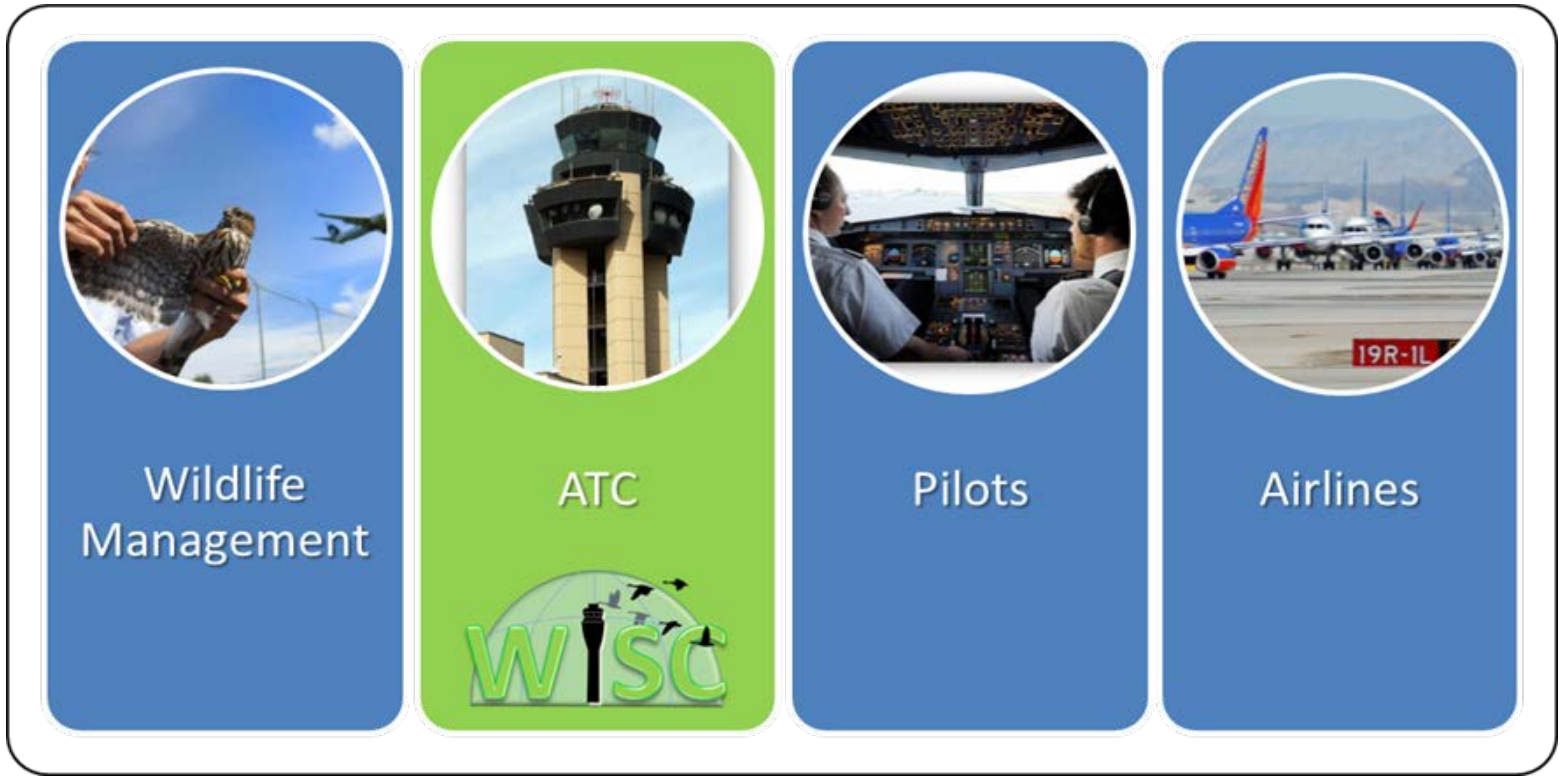
Prepared for:

Airport Research & Development Branch - Airport Safety Section (ANG-E261)

Federal Aviation Administration
William J. Hughes Technical Center
Atlantic City International Airport, New Jersey

WiSC Benefits Whitepaper

- **Benefits Pool**
  - Avian radar benefits divided into 4 areas
  - WiSC is a portion of potential avian radar benefits pool

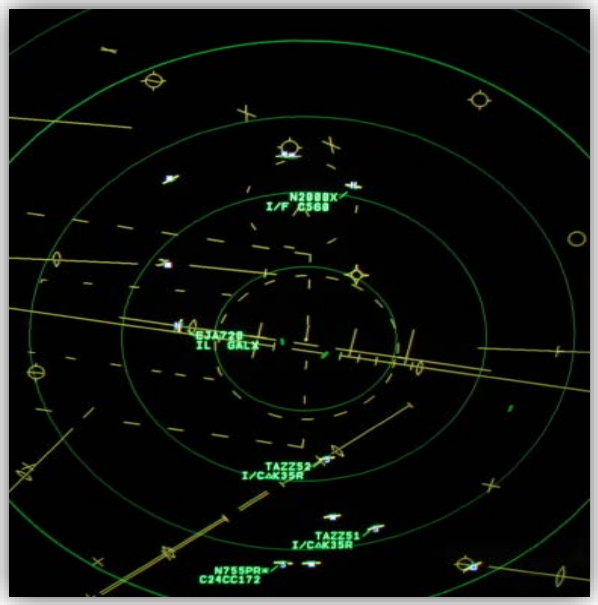


WiSC ATC Benefits

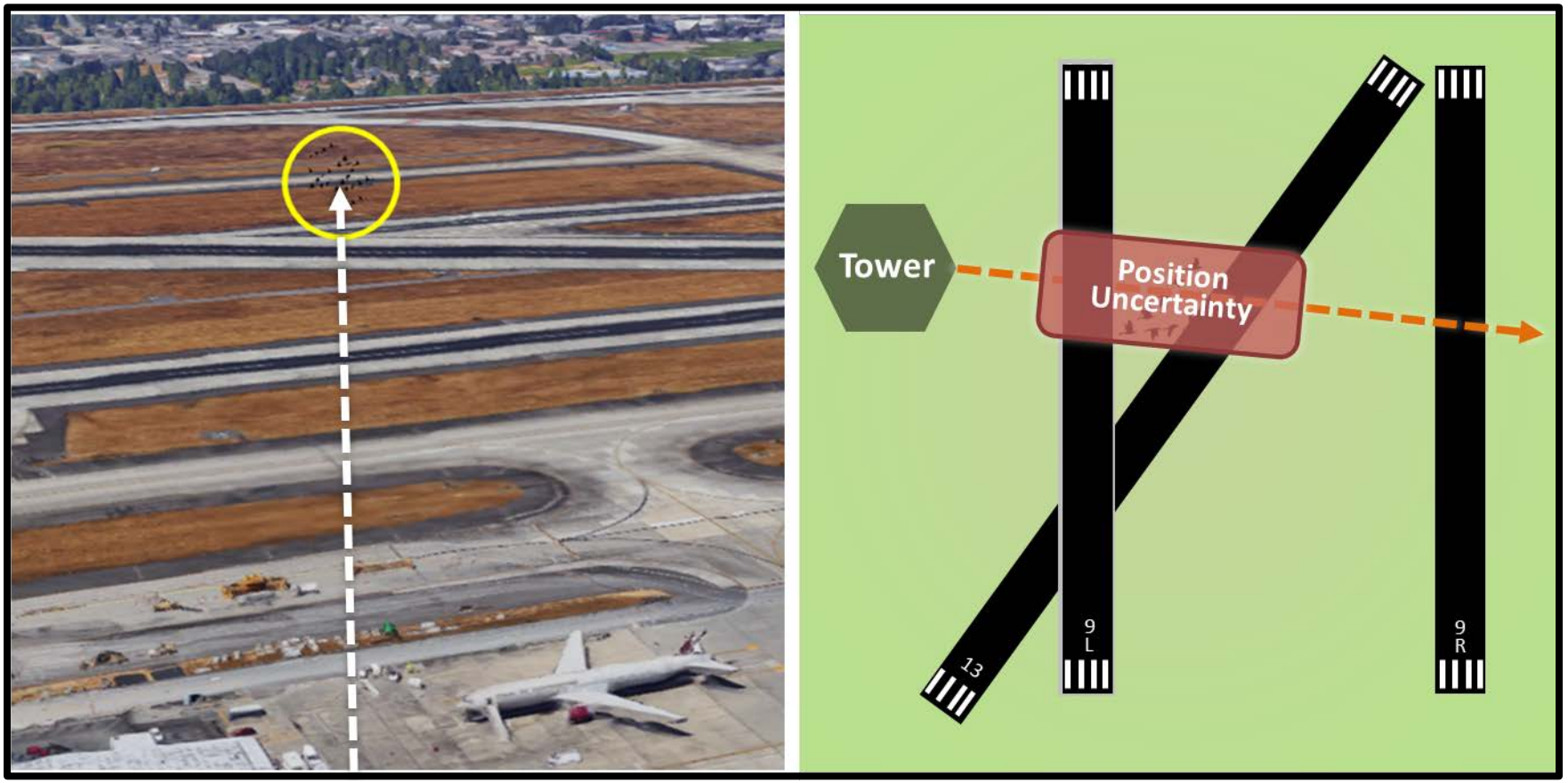
- **Improved threat detection**
  - Bird threat information is obtained by the controller sooner allowing them to be proactive as opposed to reactive
  - Eliminates the reliance on visual observation/confirmation of birds
  - Allows bird detection during low visibility/night operations
  - Reduces cognitive demand

WiSC ATC Benefits

- **Improved information quality**
  - More precise position and altitude information
  - More accurate size (biomass) and direction of flight information
  - Controllers communicate with only the affected aircraft



Which runway is impacted?

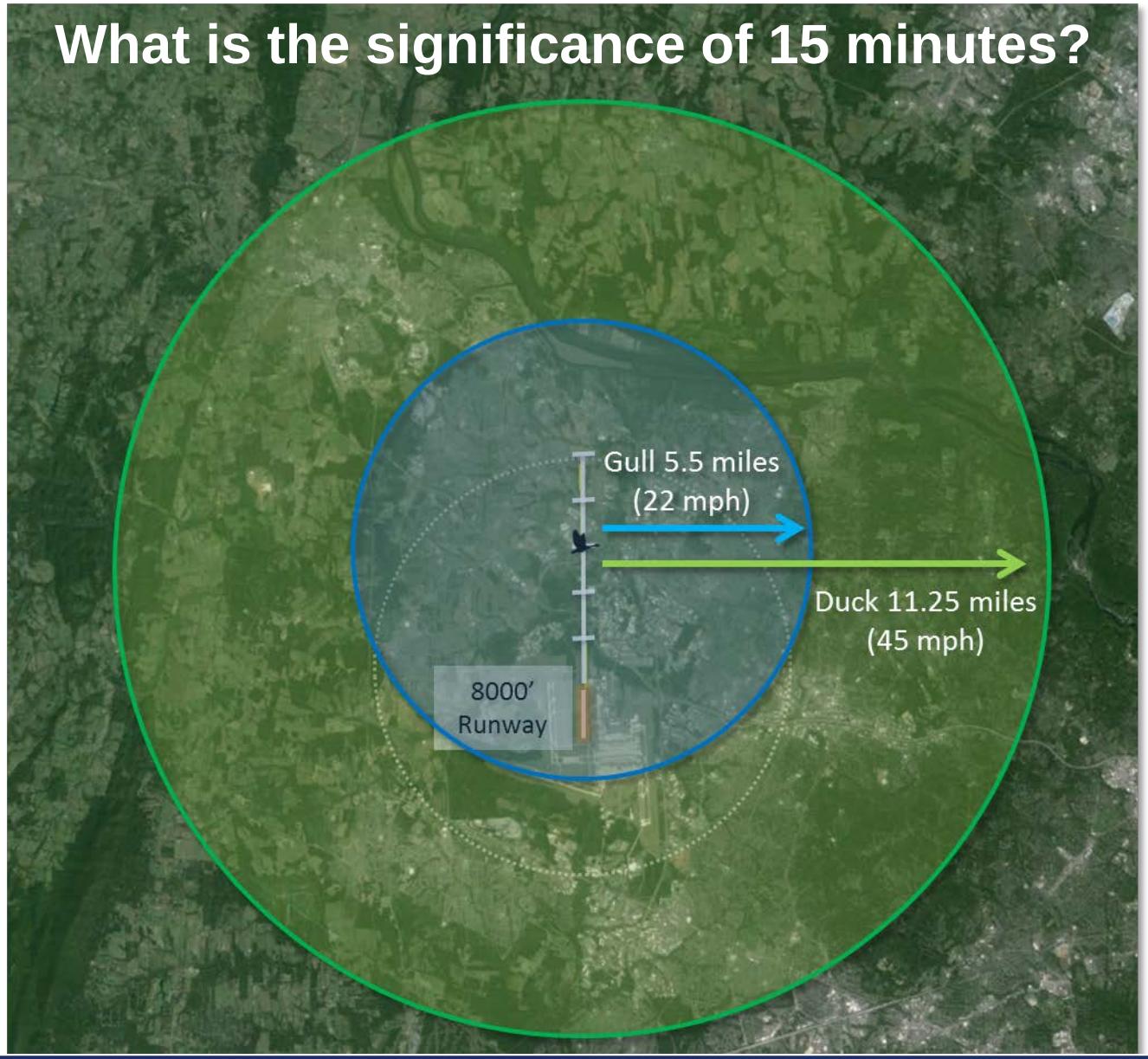


WiSC ATC Benefits

- **Improved procedures**
  - Display only significant avian threats to controller
  - Relieve 15 minute reporting period when possible
  - May reduce bird-related communications over the frequency
  - Reduced workload related to bird threat management

Not Significant

What is the significance of 15 minutes?

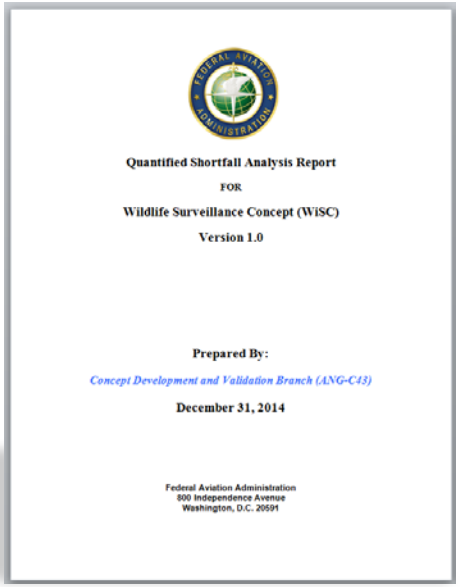


Avian Radar Benefits

- **Wildlife Management & Airport Operations Benefits**
  - Improved Wildlife Hazard Analysis (WHA) & Wildlife Hazard Mitigation Plan (WHMP)
  - Improved understanding of wildlife trends (daily, monthly, seasonal, etc.)
  - Near real time bird threat information for active mitigation of threats on airport
  - Improved understanding of attractants and areas to be remediated

Potential Operational Benefits

- Analysts applied industry-standard values (damage, injuries, delays, etc.) to project a monetized shortfall related to the inability to identify birds and mitigate strikes.
- Leveraged data from FAA Wildlife strike database
- Based on 20 year lifecycle
- Average annual costs **$337M***
  - This is likely a conservative estimate



Quantified Shortfall Analysis Report

FOR

Wildlife Surveillance Concept (WiSC)

Version 1.0

Prepared By:

Concept Development and Validation Branch (ANG-C43)

December 31, 2014

Federal Aviation Administration
800 Independence Avenue
Washington, D.C. 20591

Activities & Updates

Pilot Engagement Panel

Pilot Engagement Panel (PEP)

- **Florida Institute of Technology (FIT) Aviation**
  - Developed & convened a pilot Subject Matter Expert (SME) Panel
  - Conducted in Melbourne, FL on 7/24/18 & 7/25/18

- 10 pilots participated
  - Commercial, general aviation, and military domains
  - 1 participant was currently employed in airport operations
- Validated scenarios, identified benefits, and provided guidance on operational implementation
- Participants responded favorably to WiSC

Pilot Engagement Panel (PEP)

- **Preliminary Findings**
  - Bird threat advisories needs to be as specific as possible to provide actionable information to pilots
    - Threat magnitude (biomass, number of birds)
    - Altitude
    - Position (distance from aircraft)
  - Pilots need bird information prior to being on stabilized approach (arrival) or before 80 knots (departure)

  - Standardized threat levels so pilots can understand the potential effect on their aircraft
    - 3-5 levels of bird threat suggested

Next Steps

Next Steps

Current Scope of Work

- **White Paper**: Information Needs and Interface Requirements
- **Concept of Operations**: WiSC ConOps (Version 3.0)
- **Site Validation Activity:** Summary of findings
- **Initiate Concept Transfer**: briefing operations and air traffic organizations on maturity and project status
- **Concept socialization**: Bird strike presentation, technical publication, etc.

Questions?

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