



Aviation Rulemaking Advisory Committee Rotorcraft Bird Strike Working Group

11th EASA Rotorcraft Symposium, 5-6 December 2017

ARAC RBSWG Task

The Rotorcraft Bird Strike Working Group (RBSWG) was tasked by the FAA to provide by October 2017 to the Aviation Rulemaking Advisory Committee (ARAC) with recommendations on bird strike protection for part 27 and 29 airworthiness standards.

Rotorcraft impacted	New TC	Newly manufactured	Existing fleet
Part 27	Task 1 New bird strike protection requirements	Task 2 Made task 1 requirement effective via §27.2	Task 5 Incorporate rotorcraft bird strike protection improvements and standards
Part 29	Task3 Enhance the §29.631 standard in light of increases in bird weight and increased exposure to bird strikes.	Task 4 Made task 3 requirement effective via §29.2	
	Task 6	Consider existing non-traditional bird strike protection technology for Tasks 1 through 5.	
	Task 7	Advise and make written recommendations for the associated policy and guidance	
	Task 8	Estimate what regulated parties would do differently. Estimate cost, safety improvements/benefits linked to the recommendations of tasks 1 to 6.	
	Task 9	Develop a report containing recommendations on the findings and results of the tasks	
	Task 10	Assist ARAC in responding to FAA’s questions or concerns after submitting report	

Members

► Voting members



► Non-Voting members



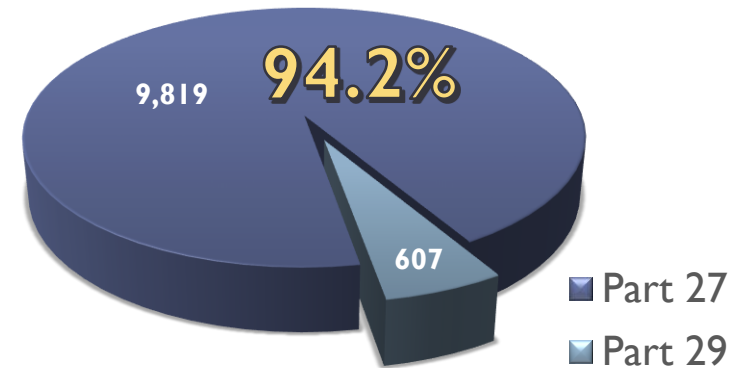
94% of Operating Rotorcraft Have No Bird Strike Regulation

▶ Part 27 normal category rotorcraft

- ▶ 9 seats or less (crew + passengers)



Rotorcraft in Operation in US



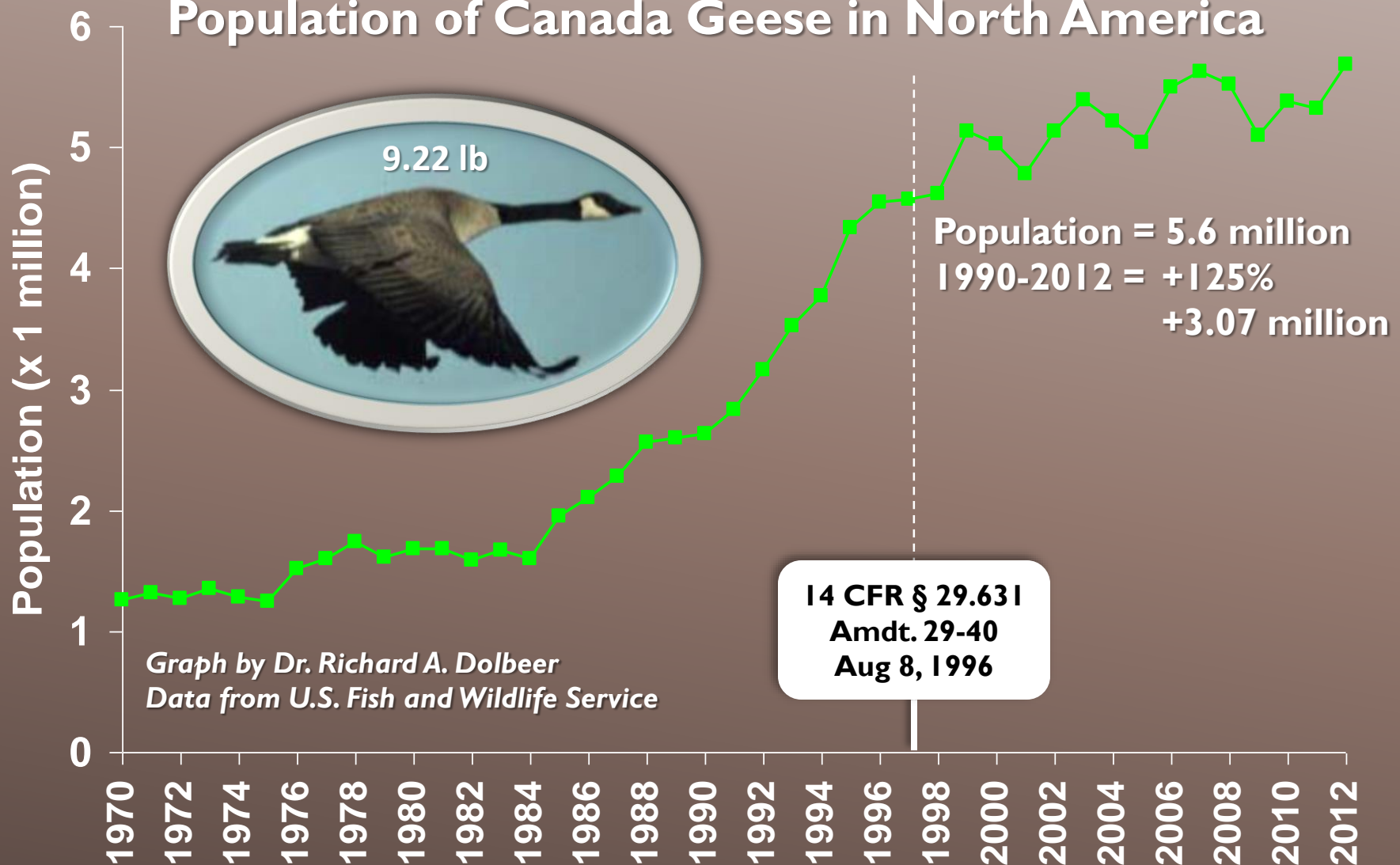
▶ Part 29 transport category rotorcraft

- ▶ 10 or more seats (crew + passengers)



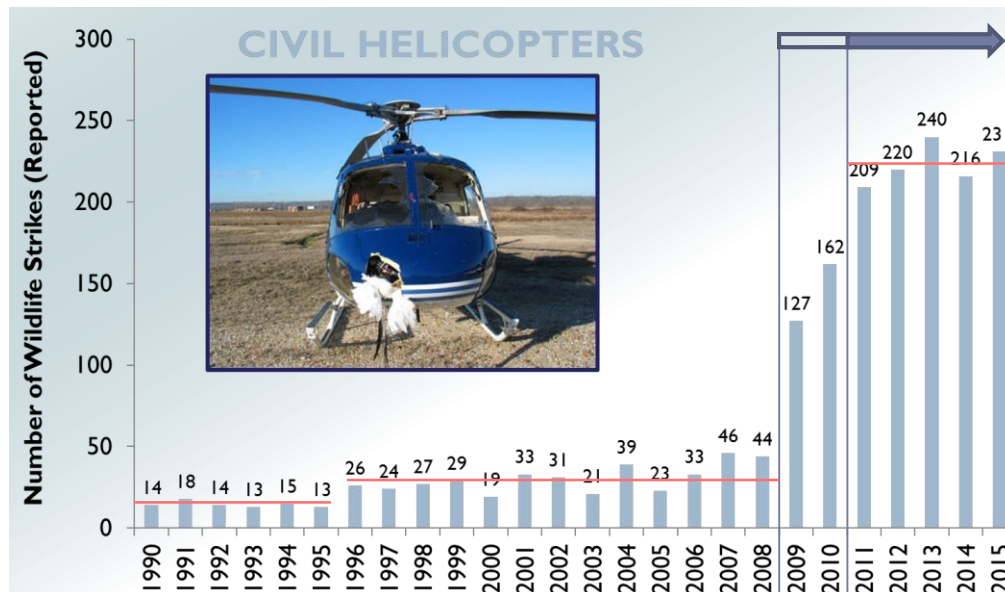
Population of Large Birds Has Grown

Population of Canada Geese in North America



Stabilized Reporting of Bird Strikes

- ▶ Step increase in bird strike reporting occurred following two significant events early in 2009 with stabilized reporting 2011 and beyond
 - ▶ Jan 4, 2009 PHI N748P fatal crash outside Morgan City, Louisiana – the *only* fatal bird strike rotorcraft accident in the FAA's Nat'l Wildlife Strike Database
 - ▶ Jan 15, 2009 US Airways Flt 1549 ditched in the Hudson River following bird strikes
- ▶ **Jan 2009 – Feb 2016** is used for RBSWG study
 - ▶ Under-reporting skews conclusions drawn from data
 - ▶ Encompasses the only fatal rotorcraft crash due to bird strike



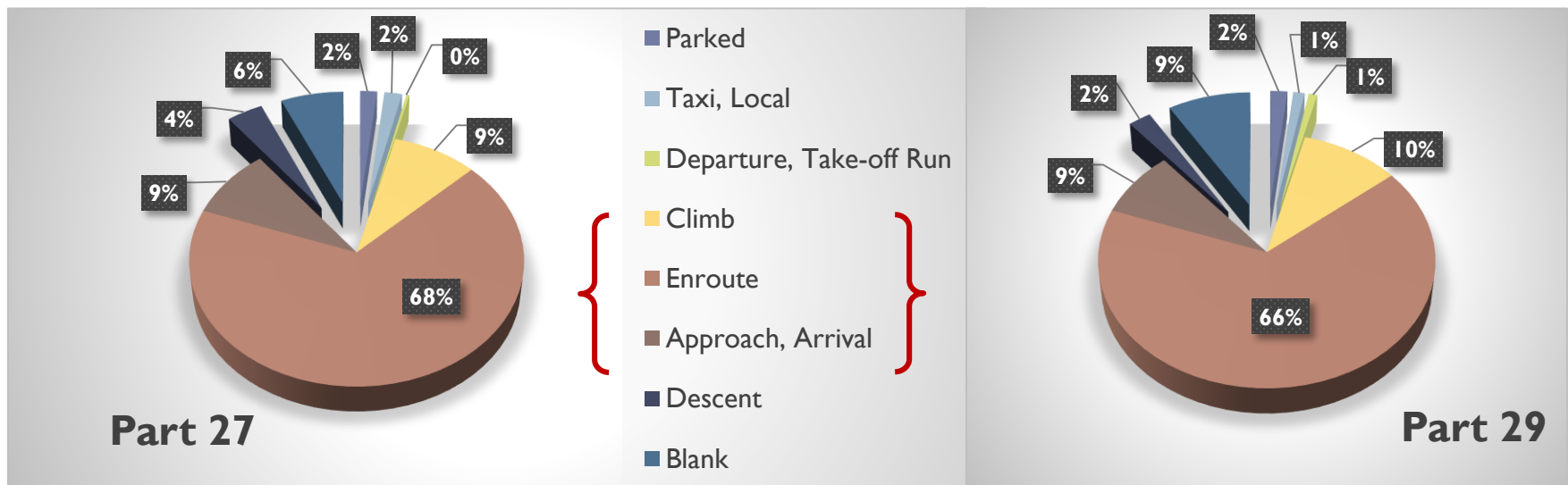
1990-1996 Mean = 14.5 strikes
 1996-2008 Mean = 30.4 strikes
 2011-2015 Mean = 223.2 strikes

**FAA's National
Wildlife Strike
Database (NWSD)**



Phase of Flight for Rotorcraft Bird Strikes

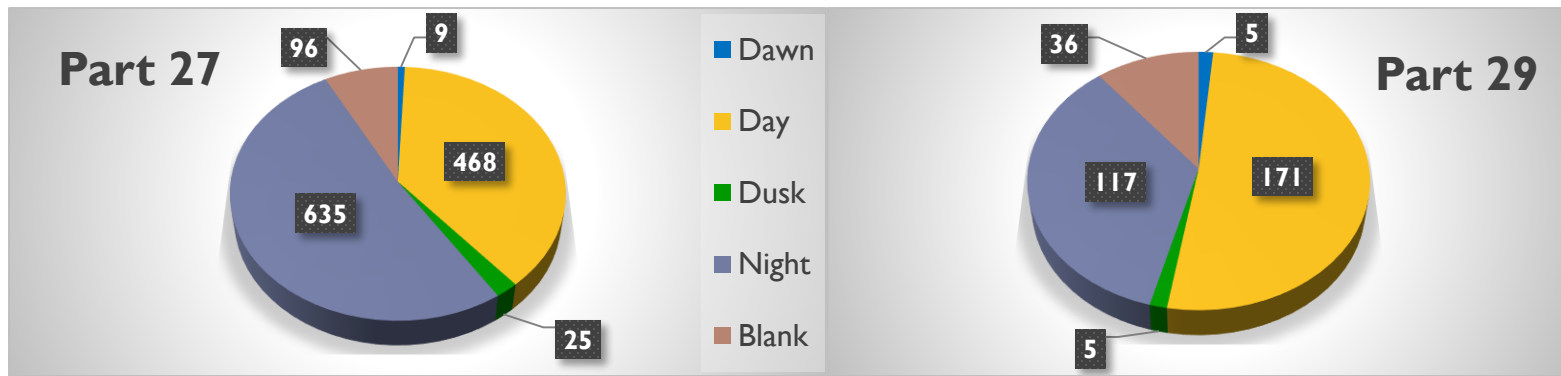
- ▶ All bird strikes in FAA's Nat'l Wildlife Strike Database between Jan 1990 – Feb 2016
 - ▶ Two out of three (66-68%) occurred during the enroute phase → *Highest airspeed (kinetic energy)*
 - ▶ 8-9% during approach
 - ▶ 9-10% during climb
- While most frequent for Fixed Wing Aircraft, less than 1 out of 5 for Rotorcraft, yet significant since time spent in these phases is minority of flight time*
- ▶ These three flight phases contain **85%** of the reported bird strikes



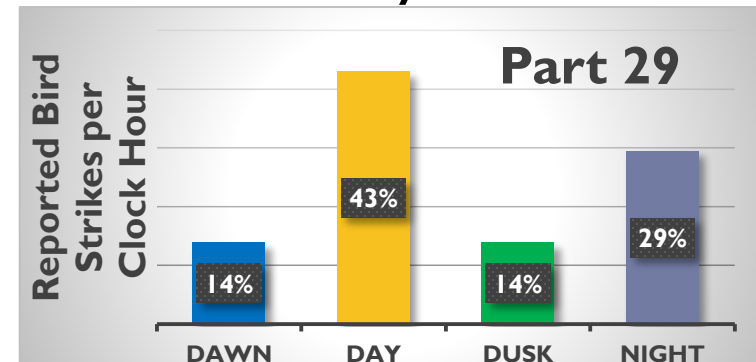
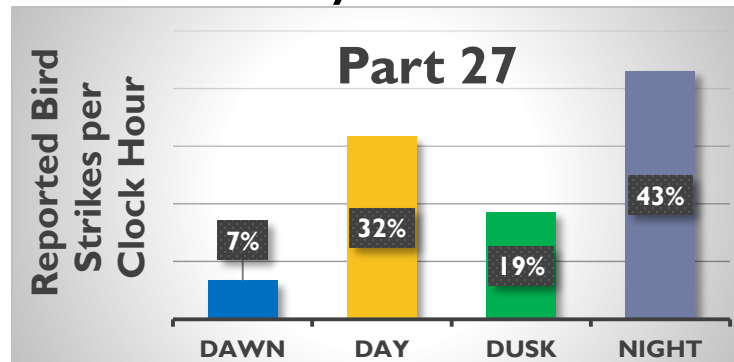
Rotorcraft bird strikes could best be best mitigated, not at airport, but with inflight detection: by bird (rotorcraft lights); by flightcrew (inflight radar)

When Do Most Bird Strikes Occur

- ▶ Bird strikes in FAA's NWSD between Jan 1990 – Feb 2016



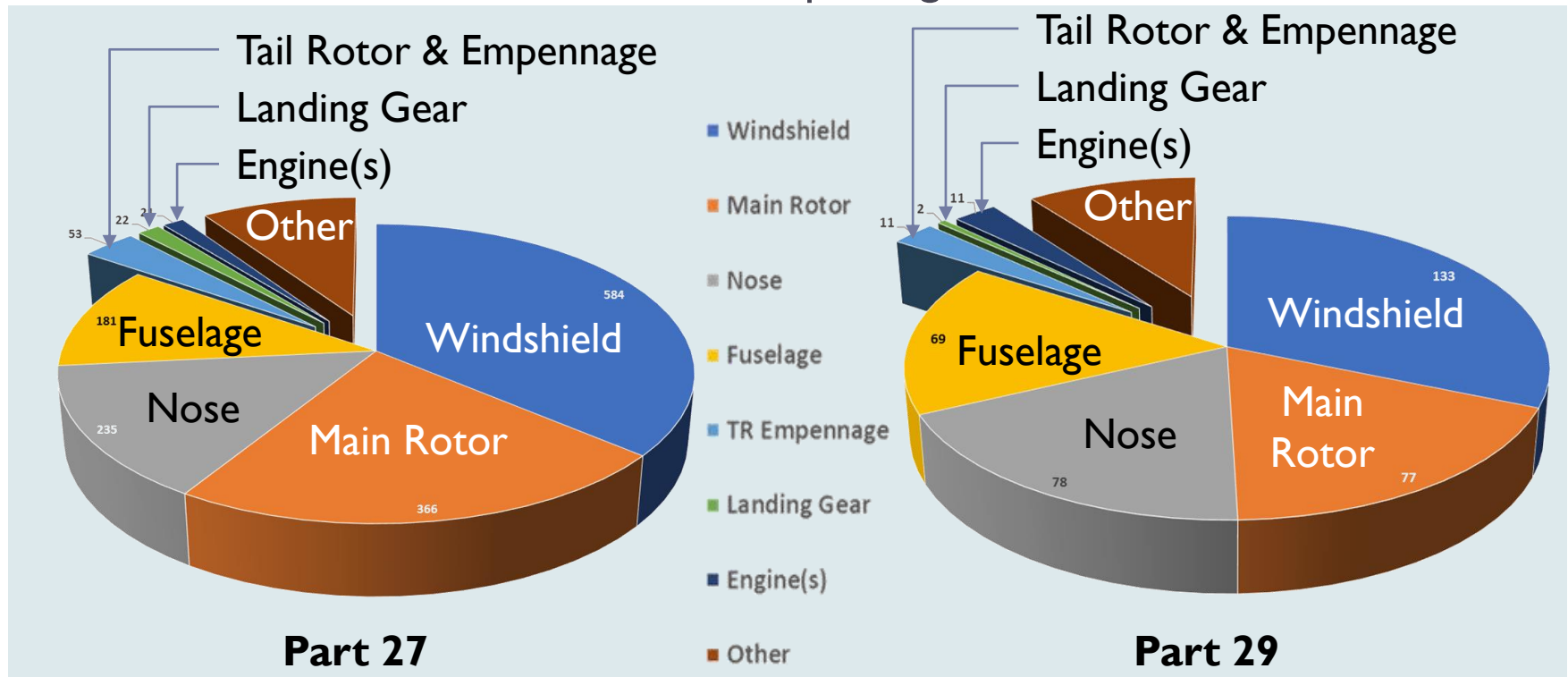
- ▶ Normalized by the duration of each time of day



Part 27 rotorcraft operate at all hours day & night as air medical transport, law enforcement, etc. Part 29 rotorcraft mostly used during day for OGP transportation.

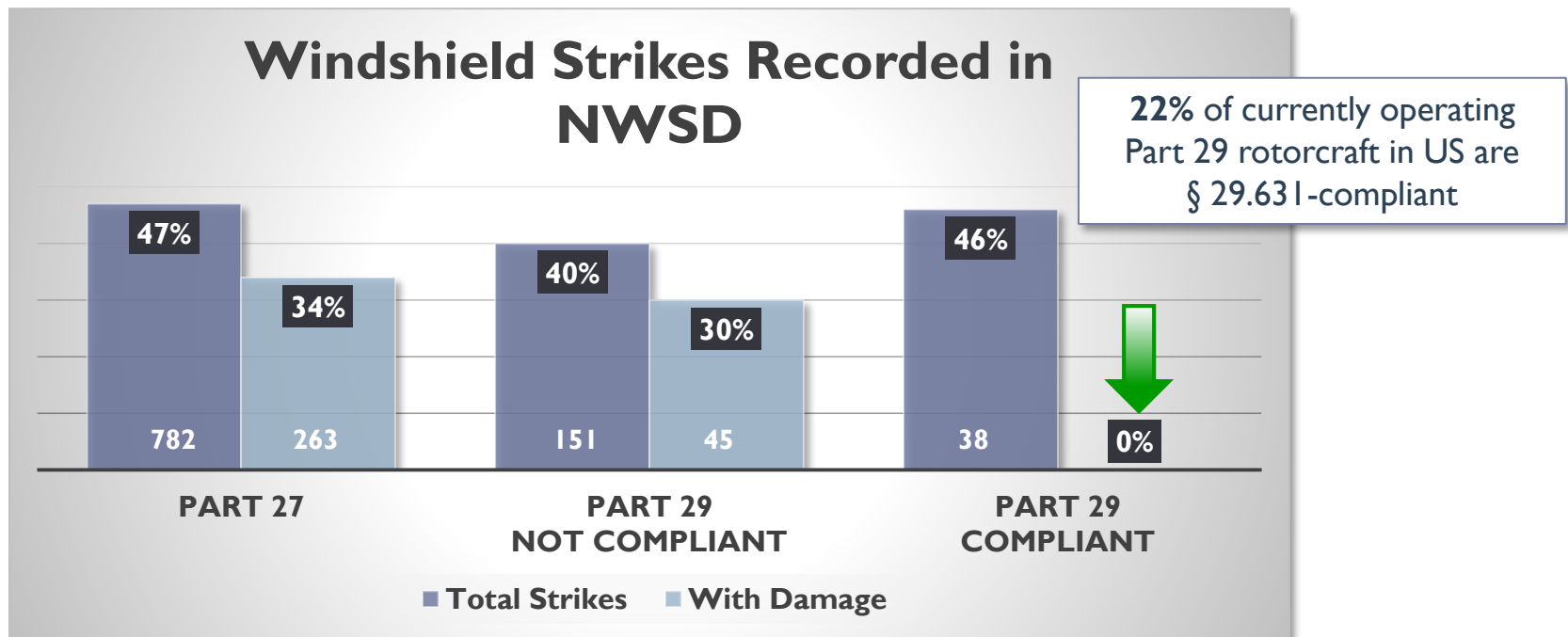
Where Do Most Bird Strikes Occur

- ▶ Of all bird strikes in the FAA's Nat'l Wildlife Strike Database between Jan 1990 – Feb 2016
 - ▶ 84-85% of all bird strikes occur forward of the main rotor mast
 - ▶ 3-4% occur on the tail rotor or empennage



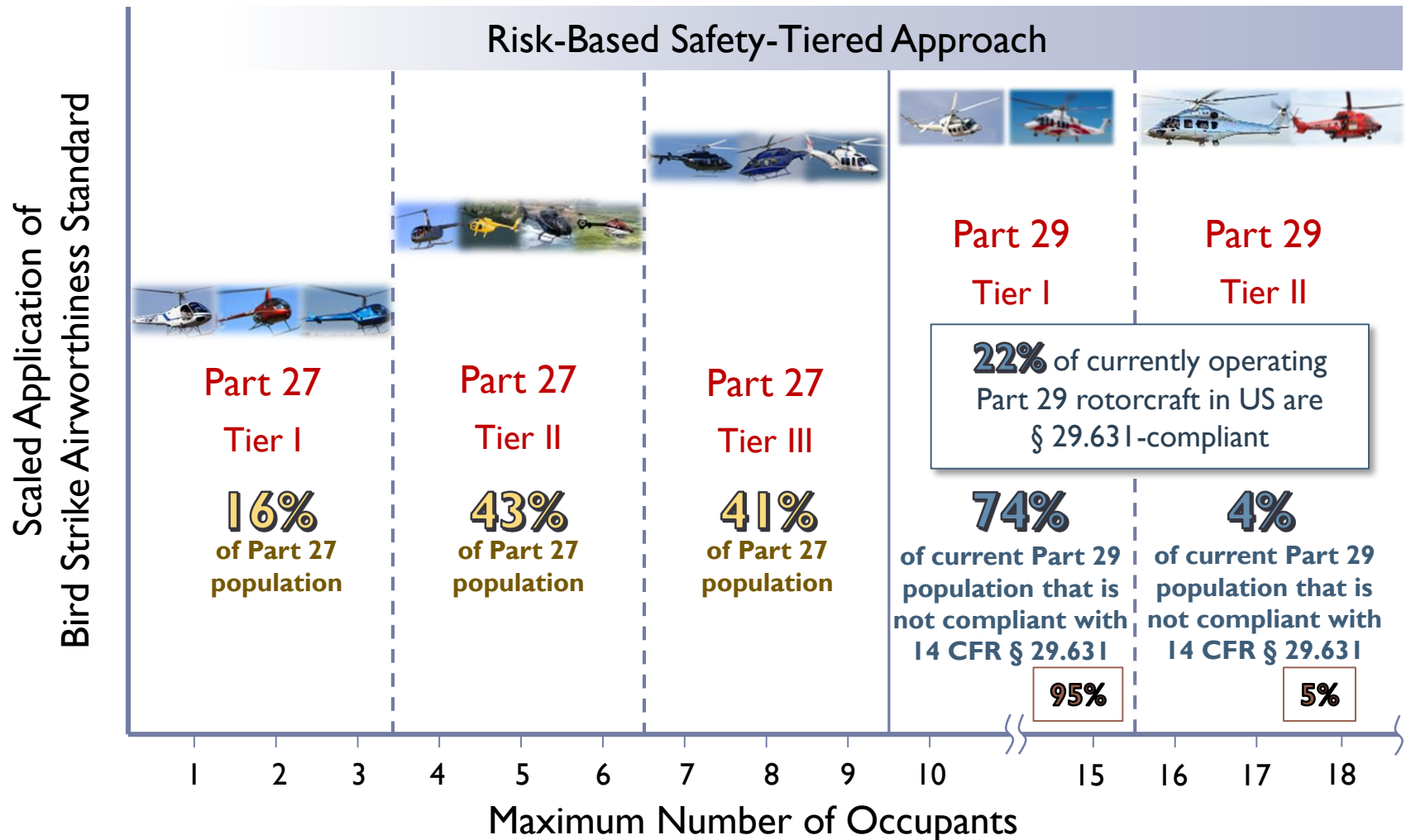
How Effective is Current Rule?

- ▶ 40-47% of reported bird strikes occurred on windshields for all rotorcraft during Jan 1990 – Feb 2016
 - ▶ No statistical difference between Part 27 & Part 29 helicopters
- ▶ 30-34% of strikes onto windshields resulted in damage for rotorcraft that were not certified to FAA bird strike airworthiness standard
- ▶ ZERO strikes onto windshields certified to § 29.631 resulted in damage (i.e., penetration) – *THIS IS STATISTICALLY SIGNIFICANT*



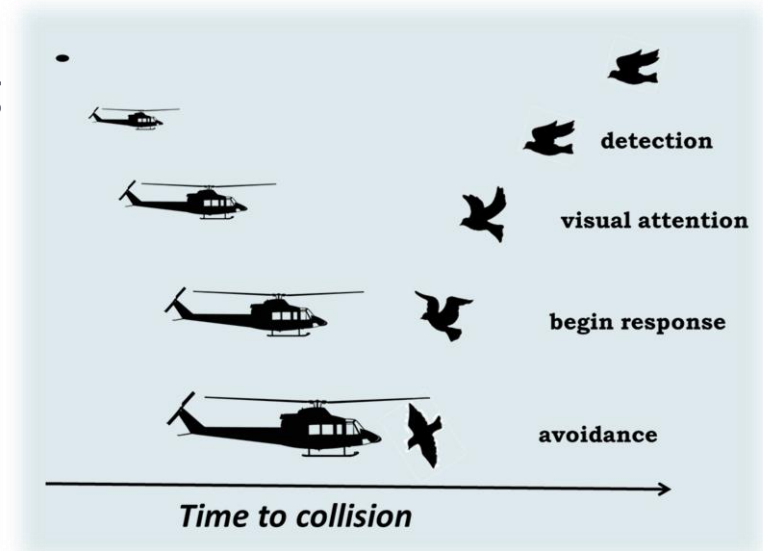
Proposed Safety Continuum Tiered Approach

ARAC RBSWG



Non-Traditional Means: Speed

- ▶ Speed matters
 - ▶ Below 50-85 knots birds detect approaching rotorcraft and initiate evasion
 - ▶ Laboratory-based research indicates birds are less likely to avoid oncoming aircraft successfully as aircraft speed increases
 - ▶ NWSD data indicates 77.1% of bird strikes for which airspeed was reported occurred above 80 knots

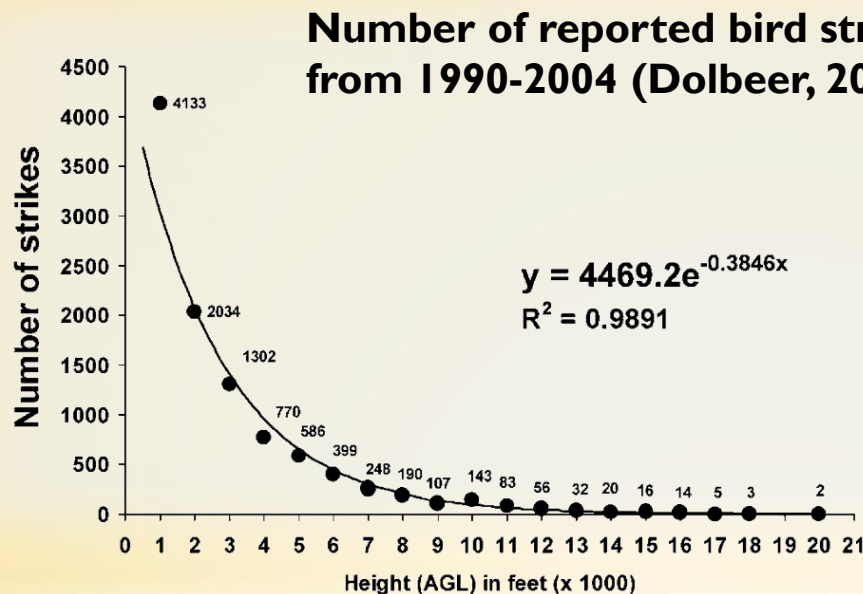


CAUTION
In areas of known high
avian concentration, avoid
airspeeds above 80 knots
when possible

Non-Traditional Means: Altitude

▶ Altitude matters

- ▶ 93% of all bird strikes occur below 3,500 ft AGL
- ▶ Presence of birds (i.e., threat) declines 32% for each 1,000-ft in altitude above 500 ft AGL

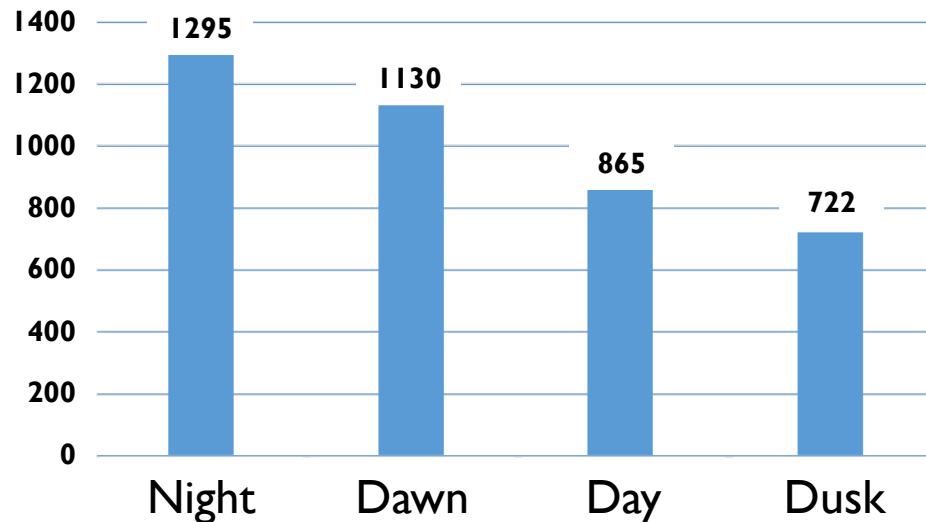


Richard A. Dolbeer (2006). Height Distribution of Birds Recorded by Collisions with Civil Aircraft, Wildlife Damage Management, Internet Center for USDA National Wildlife Research Center. *Internet Center for Wildlife Damage Management, USDA National Wildlife Research Center, Staff Publications, University of Nebraska – Lincoln, 1345-1350*

Non-Traditional Means: Altitude (concl'd)

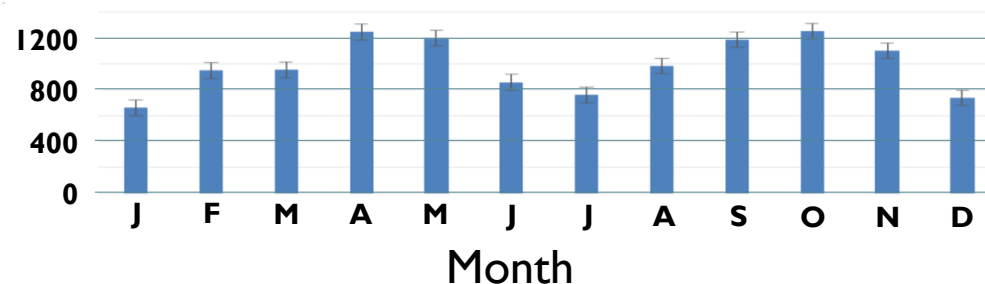
- ▶ Altitude tends to be higher at night (most likely due to lack of visibility of threats)

Mean Height
for Bird Strikes
AGL (ft)



- ▶ Altitude tends to be higher in spring and fall (probably due to migration)

Mean Height
for Bird Strikes
AGL (ft)



Non-Traditional Means: Visual Lighting Aid

- ▶ Lighting (pulsing, lasers, etc.)
 - ▶ Research suggests enhanced avian detection of approaching vehicle with appropriate contrast of vehicle to background conditions
- ▶ Use taxi and/or landing lights
 - ▶ Use continuous mode during sunny conditions and at night, when practical
 - ▶ Use 2-Hz pulsed mode during partly cloudy conditions, when practical

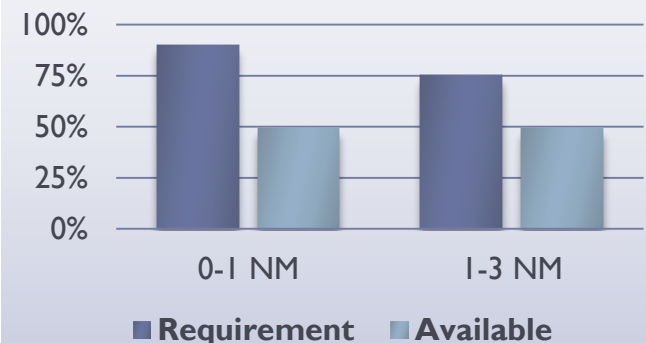


Non-Traditional Means: Detection

- ▶ **Electronic Devices for avoidance radar & inflight bird detection**
 - ▶ Research to date does not yet support a recommendation for this technology
 - ▶ Gerringer, Lima, & DeVault (2016) showed:
 - ▶ Commercially available radar systems were able to track a large bird at 4 NM but less than 50% of the time.
 - ▶ Dish antenna (narrow beam) radar systems demonstrated 49% probability that a large bird in the beam was tracked within 3 NM.
 - ▶ FAA Advisory Circular on Avian Radar requires the ability to detect a medium bird (crow-sized target) with:
 - ▶ 90% confidence level up to 1 NM
 - ▶ 75% confidence level from 1 NM to 3 NM

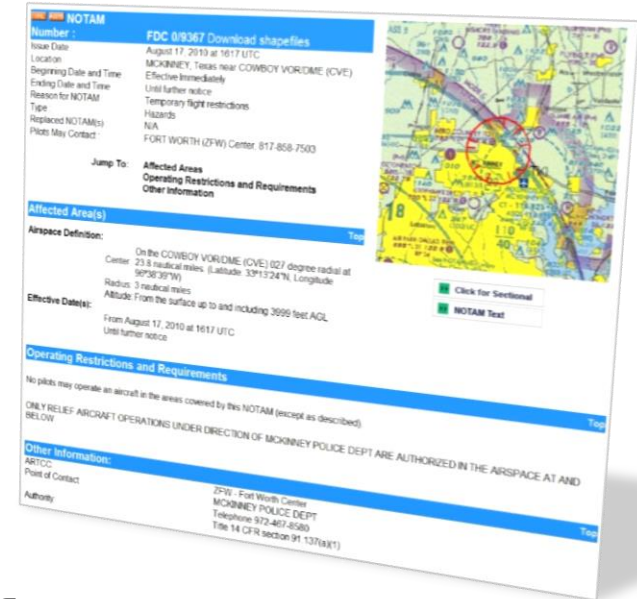


Tracking Reliability



Non-Traditional Means: Awareness

- ▶ Training
 - ▶ Preflight planning should include brief on:
 - ▶ Location of bird concentrations during seasonal migrations
 - ▶ Local bird nesting and roosting habitats
 - ▶ Recent bird strike events
 - ▶ Locations of high probability of avian concentrations should be:
 - ▶ Published by FAA FSDO in Flight Service Briefing
 - ▶ Included in alert bulletins and flight service notifications to airmen (NOTAMs)
- ▶ Personal Protective Equipment (PPE)
 - ▶ When possible flight crews should use helmets and visors
 - ▶ Not applicable for all operations (e.g., tour operators)



Final Report Submitted to the ARAC

