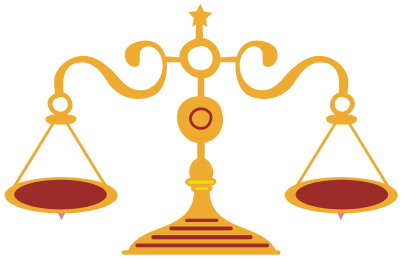
Why we need to compare wildlife strike data among airports to improve aviation safety



Richard A. Dolbeer, Sandusky, Ohio USA
Michael Begier, Washington, D.C. USA

13th North American Bird Strike Conference,
Niagara Falls, Ontario, Canada

12-16 September 2011

Coffee Break
3:00 PM – 3:30 PM — Oakes North Room & Foyer

Session 2: Bird Strike Analysis Part 1
3:30 PM – 5:00 PM — Oakes South Room
Moderator: Rolph Davis

Interspecific variation in wildlife hazards to aircraft: implications for airport wildlife management
3:30 PM
Travis L. DeVault

Understanding relative hazards of wildlife to aircraft is important for developing effective management programs. We used Federal Aviation Administration National Wildlife Strike Database records from 1990-2009 to rank the relative hazard of wildlife to aircraft. We summarized data for 77 species or species groups with >20 records where collisions occurred ≤500 ft (152 m) above ground level. We also assessed the effects of avian body mass, body density, and group size on relative hazard scores. The 3 most hazardous species or species groups in composite rankings were mule deer, white-tailed deer, and domestic dogs. "Other geese" (snow goose, brant, and greater white-fronted goose) was the most hazardous bird group, 61% as hazardous as mule deer. Ten of the 15 most hazardous bird species or species groups are strongly associated with water. Avian body mass was strongly associated with percentage of all strikes that caused damage, but not for species exceeding median body mass (1,125 g) of birds in damaging strikes. In contrast, percentage of damaging strikes increased when multiple birds were involved, but only for those species with body mass ≥1,125 g. We recommend use of exclusion (e.g., fences) for managing large mammals and habitat modifications (e.g., reductions in standing water) accompanied by hazing for reducing bird use of airports. Managers should prioritize efforts that will reduce habitat suitability for those species most hazardous to aircraft. We also recommend that evaluations of jet turbine engine performance following bird ingestions consider using multiple birds with body mass >1,000 g.

Reporting multiple-impact birdstrikes: What's in the soup?
4:00 PM
Carla J. Dove

For many years now the US military has been reporting specific impact points for multiple birdstrikes sustained to a single aircraft but civil aviation is only now beginning to inquire about the process. In FY 2010, USAF submitted 422 (11.5% of total cases) multiple impact strike cases for identification while Civil aviation only reported multiple impacts for 70 cases. USAF data show that most of the multiple impacts involve two points but one case contained 17 separate impact points. Although most of the USAF multiple impacts involved a single species, 174 of the cases involved more than one species and 37 cases contained both birds and bats. Information for accurately documenting and reporting multiple-impact strikes is critical for species identification, research and identification of mixed-species flocks, and can help explain inconsistencies in damaging costs from small birds and geograp anomalies. Civil data-entry forms (on-line 5200-7) should updated to allow reporting and identification of multiple imp points for more accurate data.

Comparison Of Wildlife Strike Data Among Airports Improve Aviation Safety
4:30 PM
Richard A. Dolbeer

The current system for managing wildlife hazards at airports in t USA is regulatory driven under 14 CFR Part 139. If an airport h conducted a Wildlife Hazard Assessment and developed a Wildl Hazard Management Plan (WHMP) acceptable to the Fede Aviation Administration, the airport is in compliance. Howev there are no objective procedures to evaluate the effectiven of the WHMP and to guide improvements. We propose th the National Wildlife Strike Database can be a key element providing objective benchmarks and for prioritizing wildlife ris (hazard level x probability of occurrence) in the context of a Saf Management System. The examination of the number of report strikes/100,000 aircraft movements at an airport in relation rates at other airports is not a valid metric because airports v in the hazard level of species struck (e.g., swallow vs. goose) a the completeness of strike reporting. Instead, we contend that t use of the "adverse effect" strike rate (strikes that cause damage a negative effect on flight/100,000 movements) is a valid metr From 2006-2010, the 100 busiest Part-139-certificated airpo (>118,000 movements/year) had a median adverse-effect stri rate of 0.86 for strikes at ≤1500 feet AGL. This median rate of 0. provides a benchmark to gauge an airport's level of risk for wildl strikes. This does not imply that an airport with an adverse-eff rate below 0.86 should not seek improvements. All airports m reevaluate WHMPs at least annually, with a focus on those speci and habitats posing the greatest risk (based on those species th have or are most likely to cause adverse effects). The goal alwa should be to reduce the adverse-effect strike rate to zero.

Bird Strike Association of Canada Annu General Meeting
5:00 PM – 6:00 PM — Oakes South Roo
Gary Searing

Open to all Canadian delegates attending the conference. You a cordially invited to attend and participate.

Welcome Reception
6:00 PM – 8:00 PM — Oakes North Roo

Please join us in the Exhibit Hall for the Welcome Reception.

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Acknowledgements

U.S. Federal Aviation Administration

U.S. Department of Agriculture, Wildlife Services

Findings and recommendations expressed in this presentation do not necessarily represent the position of the Federal Aviation Administration

Question: How do we evaluate programs to mitigate risk of wildlife strikes at USA airports?

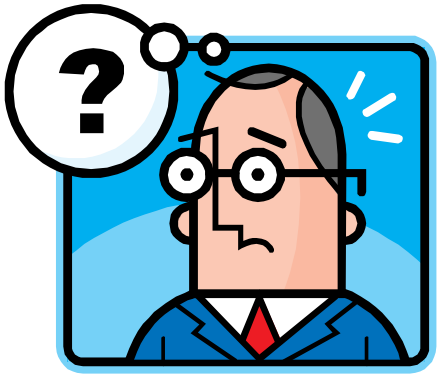
Answer: Current system is regulatory-driven under 14 CFR Part 139:

- If airport has Wildlife Hazard Management Plan (WHMP) acceptable to the FAA, the airport is in compliance.
- WHMP is reviewed annually for completion of targeted projects (e.g., drainage improvement).

- However, there are no objective procedures to evaluate effectiveness of the WHMP and to guide improvements.

The current system is the antithesis of Safety Management System (SMS) approach

Airport managers naturally want to know:



- How does our program compare to other airports?
- How good is our WHMP—are we getting good value (risk mitigation) for money invested?
- Are our priorities correct (are we directing sufficient efforts at the wildlife species posing highest risk)?

At present, the FAA has no objective process in place to provide answers!!

Is there a solution to this dilemma?

We propose that the National Wildlife Strike Database can play a key role to:

- **provide objective benchmark of airport's performance in mitigating risk compared to other airports.**

- **prioritize wildlife risks in the context of SMS.**
  Risk = hazard level of species x probability of strike

Without the database, we must base decisions upon subjective (non-quantitative) opinion!

Knowledge = Power

Objective (quantitative) knowledge

Application of knowledge →

Power (Improved WHMP)

← Data analysis

Database provides scientific foundation

Filtering the records in database (109,107) for our analysis:

Years:	2006-2010
Airports (busiest Part 139) =	100
# of strikes at top 100 airports =	25,837
# of strikes at ≤1500 ft AGL =	22,737
# of strikes w/ Adverse Effect (AE)* =	1,454

*Strikes that cause damage or negative effect on flight

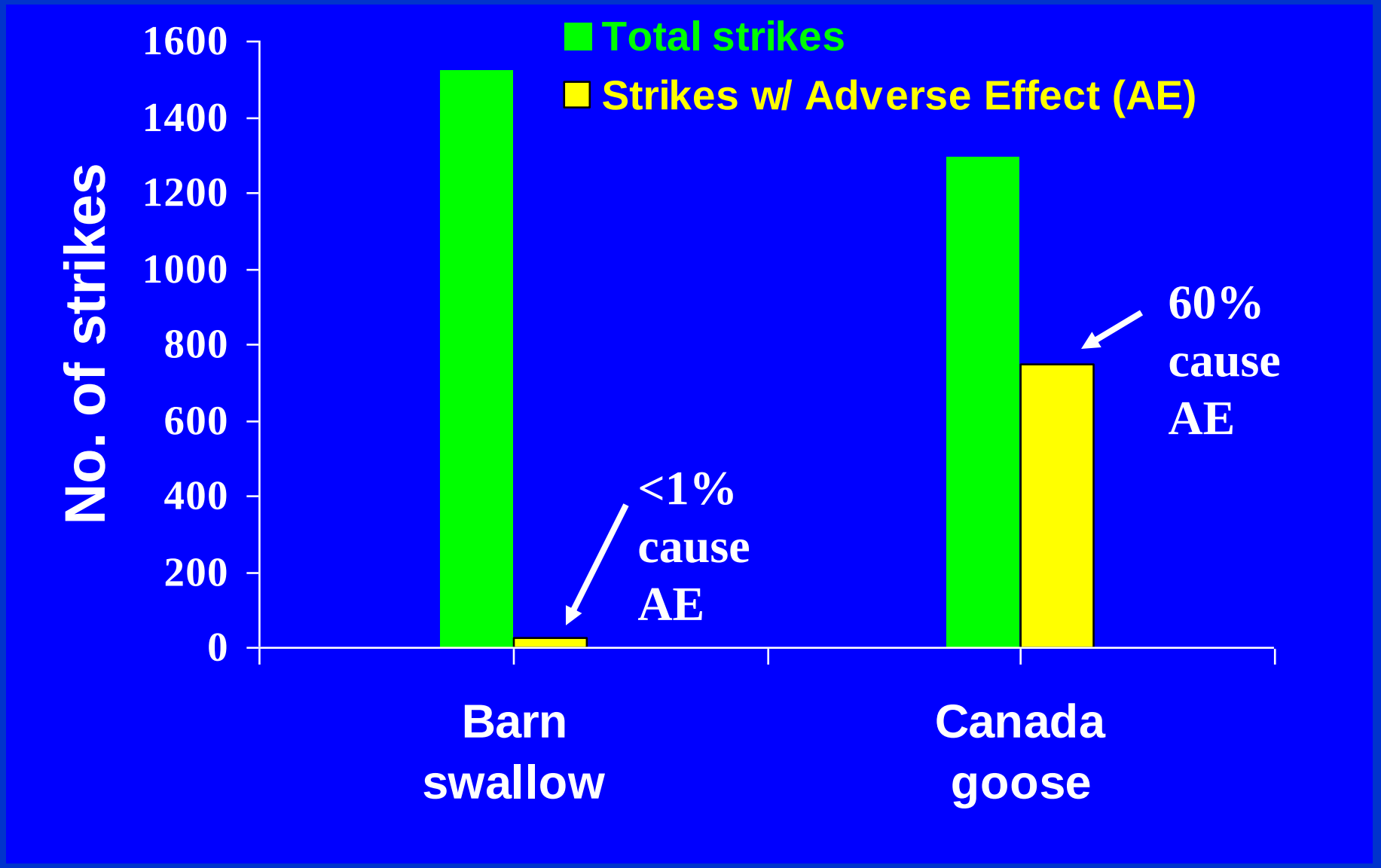
What is an objective benchmark of an airport's performance in mitigating risk?

Should benchmark be the overall strike rate (all reported strikes/100K movements)?

Answer: No. Comparison of the reported strike rate at an airport in relation to rates at other airports is not a valid metric because airports may vary in:

- **hazard level of species struck (e.g., swallow vs. goose).**
- **completeness of reporting all strikes (e.g., carcasses found on runway).**

Example: Hazard level of Barn Swallows versus Canada Geese, Civil Aircraft, USA, 1990-2010



Should benchmark include strikes on approach or departure at >1500 feet AGL?

Answer: No.

- **These strikes are almost always >5 miles from AOA.**
- **These strikes are important for risk analysis and mitigation related to radar, flight crews, and ATC…...**
- **But these strikes should not be "counted" in analyses related to an airport's WHMP.**

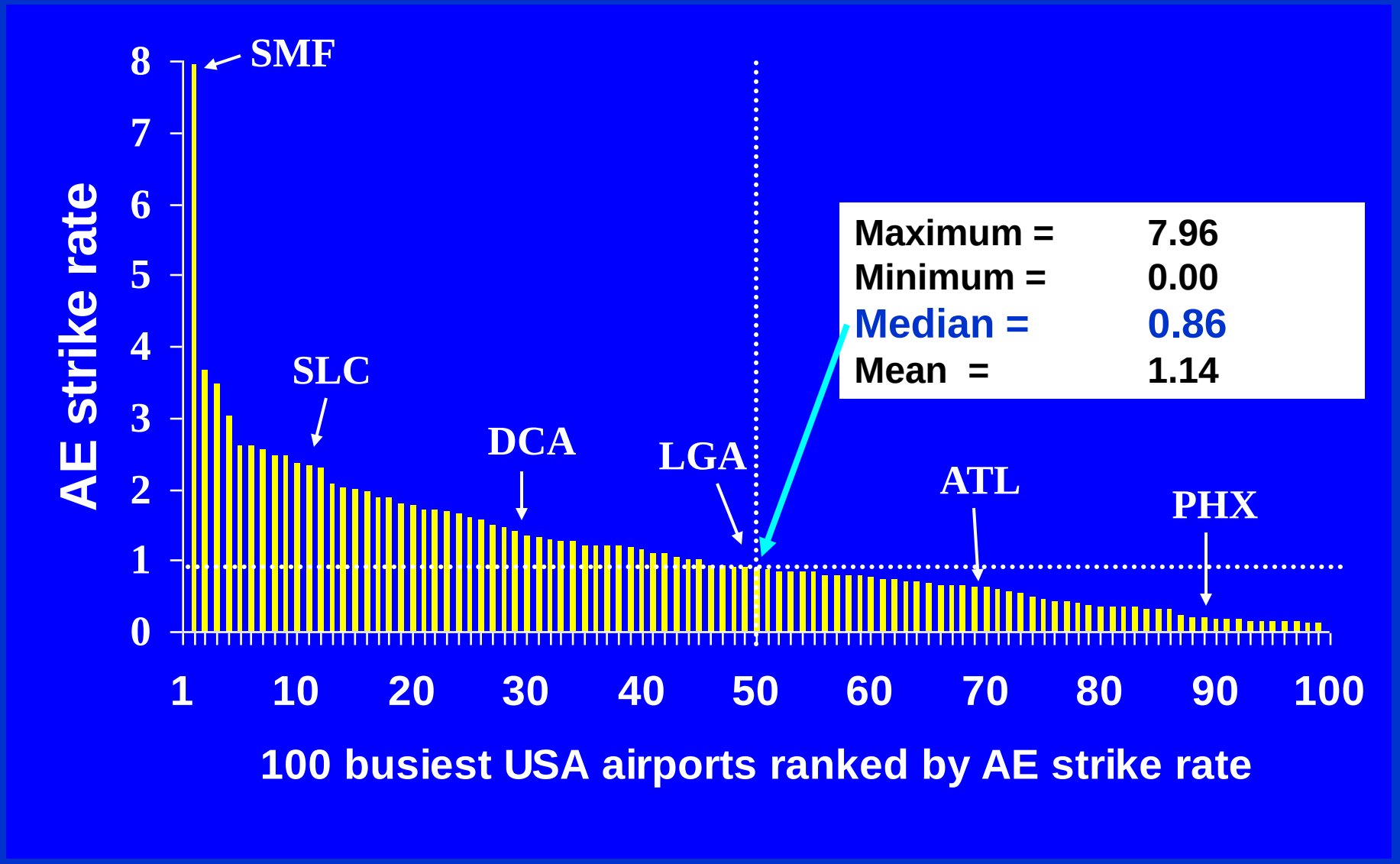
Should benchmark be the Adverse Effect strike rate?*

Answer: Yes. Comparison of AE strike rate at airport in relation to rates at other airports is valid metric:

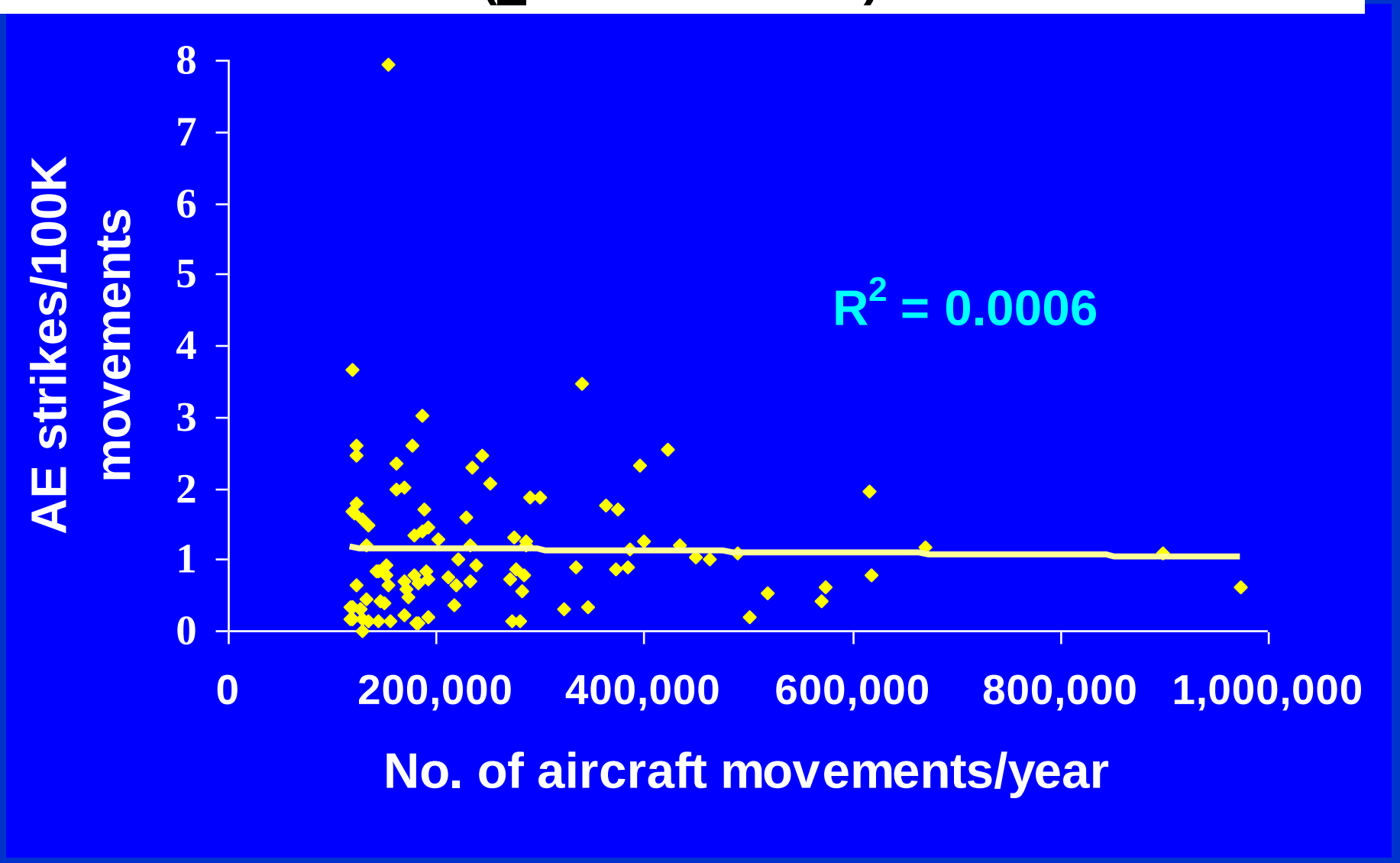
- **AE strike rate incorporates hazard level of species struck (e.g., swallow vs. dove vs. goose).**
- **There is much less bias among airports in reporting AE strikes compared to all strikes.**
- **Bottom line of WHMP is to reduce AE strikes.**

***Strikes at ≤1500 ft AGL that cause damage or negative effect on flight/100K movements**

Adverse Effect (AE) Wildlife Strikes/100K Movements (≤ 1500 feet AGL), 2006-2010



No relationship between movements and Adverse Effect Strike Rate for 100 busiest airports, USA, 2006-2010 (≤ 1500 feet AGL)



Does this mean that if my airport is below the median AE strike rate (0.86), I don't need to improve anything to mitigate risk?

Answer: No. <u>Every airport should strive for an AE strike rate of 0.</u>

Your airport may have a lower risk than many other airports because of:

a) Inherent geographic or site-specific location.

b) Superior WHMP and personnel.

Knowing your airport's AE strike rate provides a "benchmark" or goal to measure future progress or setbacks.

If my airport is above the median AE strike rate (0.86), should I be criticized/penalized?

Answer: Not necessarily. Your airport may have a higher risk because of:

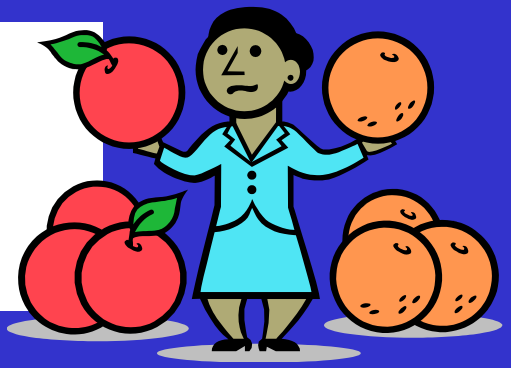
a) Inherent "birdy" geographic or site-specific location.

b) An inferior WHMP; poorly trained or motivated staff.

<u>However</u>, a high AE strike rate is a red flag; the WHMP needs to be evaluated to lower the rate.

The AE strike rate simply shows where your airport stands in relation to other airports and provides a "benchmark" or goal to measure future progress.

Is it really fair to compare airports when one airport has more wildlife inherently present than another airport?



Answer: Yes. The FAA compares airports for other safety-related issues (e.g., runway incursions) and then:

a) Identifies high-risk airports and pin-points problems.

b) Prioritizes ($) mitigation efforts to reduce risk.

Why should we not do this for wildlife risks?

If we refuse to measure and compare risk, how can we wisely manage to mitigate the risk?

OK. I now know where my airport stands in relation to other airports regarding risk from wildlife strikes.

How can the database be used to help prioritize actions to be taken to further reduce the AE strike rate?

Answer: The database can be used:

a) <u>Reactively</u>:

b) <u>Proactively</u>:

Reactive use of database to help prioritize actions - SLC

Ranking of risk (2006-2010)	Species causing AE strikes at SLC (≤1500 ft AGL)	2006-2010			2010 only	
		No. of AE strikes	% of total known		No. of AE strikes	% of total known
1	Ducks & geese (10 species)	16	52		4	80
2	Hawks and owls (4 species)	7	23		1	20
3	Gulls (1+ species)	2	6			
4	American white pelican	1	3			
4	White-faced ibis	1	3			
4	American coot	1	3			
4	American avocet	1	3			
4	Common raven	1	3			
4	Horned lark	1	3			
	Total known birds	31	100		5	100
	Unknown birds	6			2	
	Total-known + unknown	37			7	

Proactive use of database to help prioritize actions - SWF

Species observed during WHA	# times on AOA (A)	Hazard level* (B)	Risk index (A*B)	Action prior-ity
Canada goose	112	0.58	65.0	1
W.-tailed deer	22	0.90	19.8	2
Mute swan	15	0.61	9.2	3
Gulls	38	0.14	5.3	4
Ducks	13	0.28	3.6	5
E. starling	38	0.08	3.0	6
Wild turkey	6	0.47	2.8	7
Red-tailed hawk	4	0.20	0.8	8
Killdeer	3	0.03	0.1	9

* Fraction of strikes causing AE (from national database)

Conclusions:

Data Rules!

- **The National Wildlife Strike Database has always provided overview of problem from a national perspective.**
- **The database has matured. It now enables objective evaluation and guidance at individual airports.**

We propose annual reports for each Part 139 airport:

1. **The AE strike rate for past 5- and 1-year periods in relation to national and regional median values (benchmarks).**
2. **AE strike data ranked by species group to help reactively prioritize management actions to reduce risk under SMS.**

Proactively, the hazard level of wildlife species observed on airport should be incorporated into Wildlife Hazard Assessments.


If you cannot measure it,
you cannot manage it!
Safer skies for all who fly!
Thank you.