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



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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.**

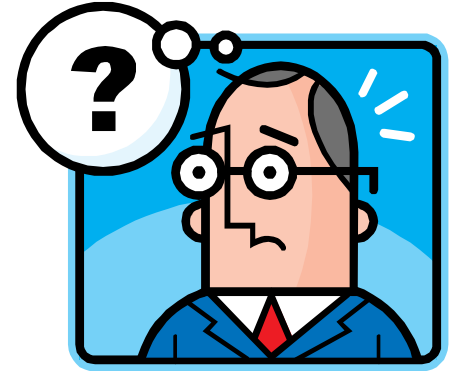


The current system is the antithesis of Safety Management System (SMS) approach



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: | <u>2006-2010</u> |
| 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**

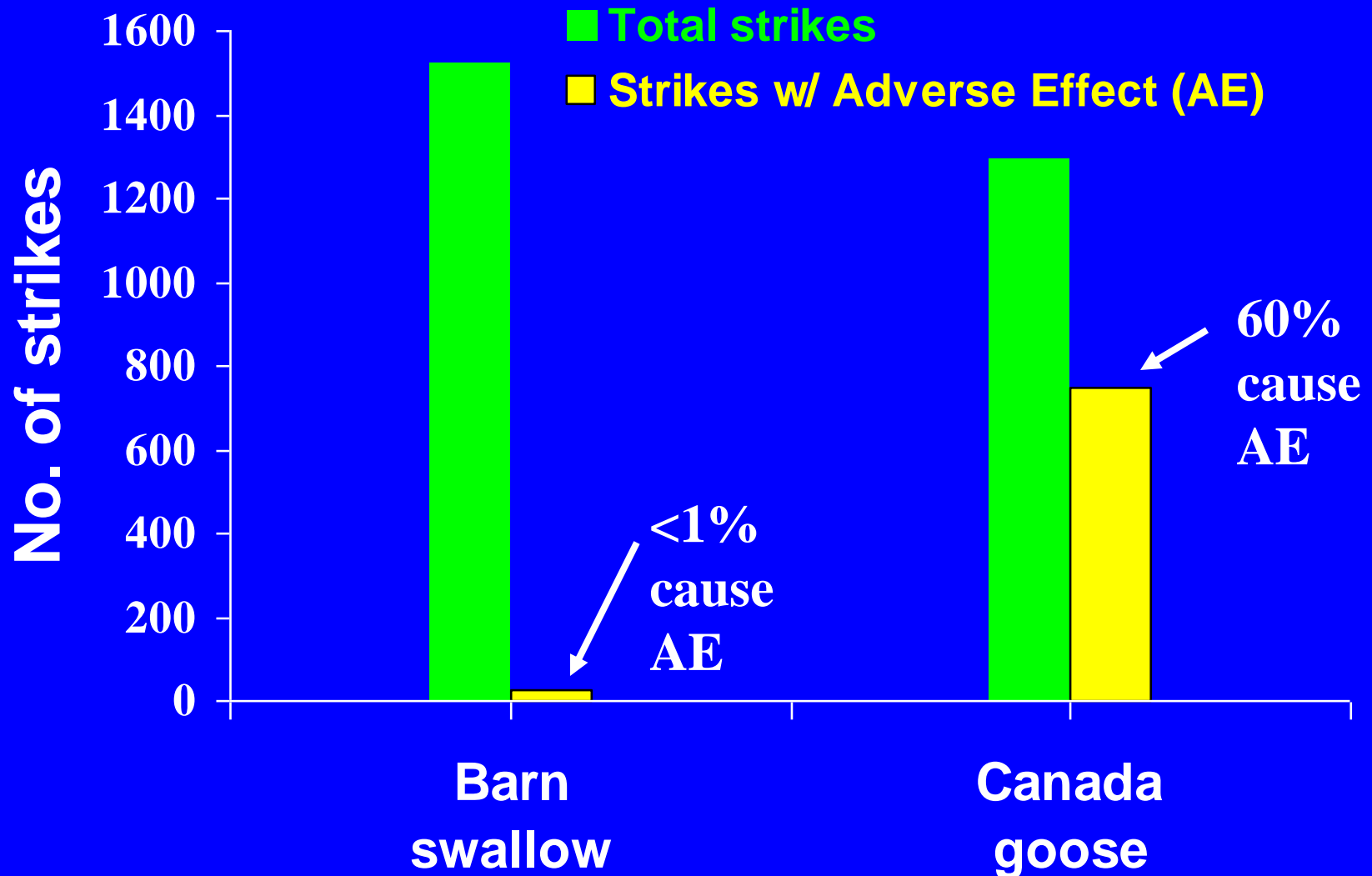
What is an objective benchmark of an airport's performance in mitigating risk?

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.**

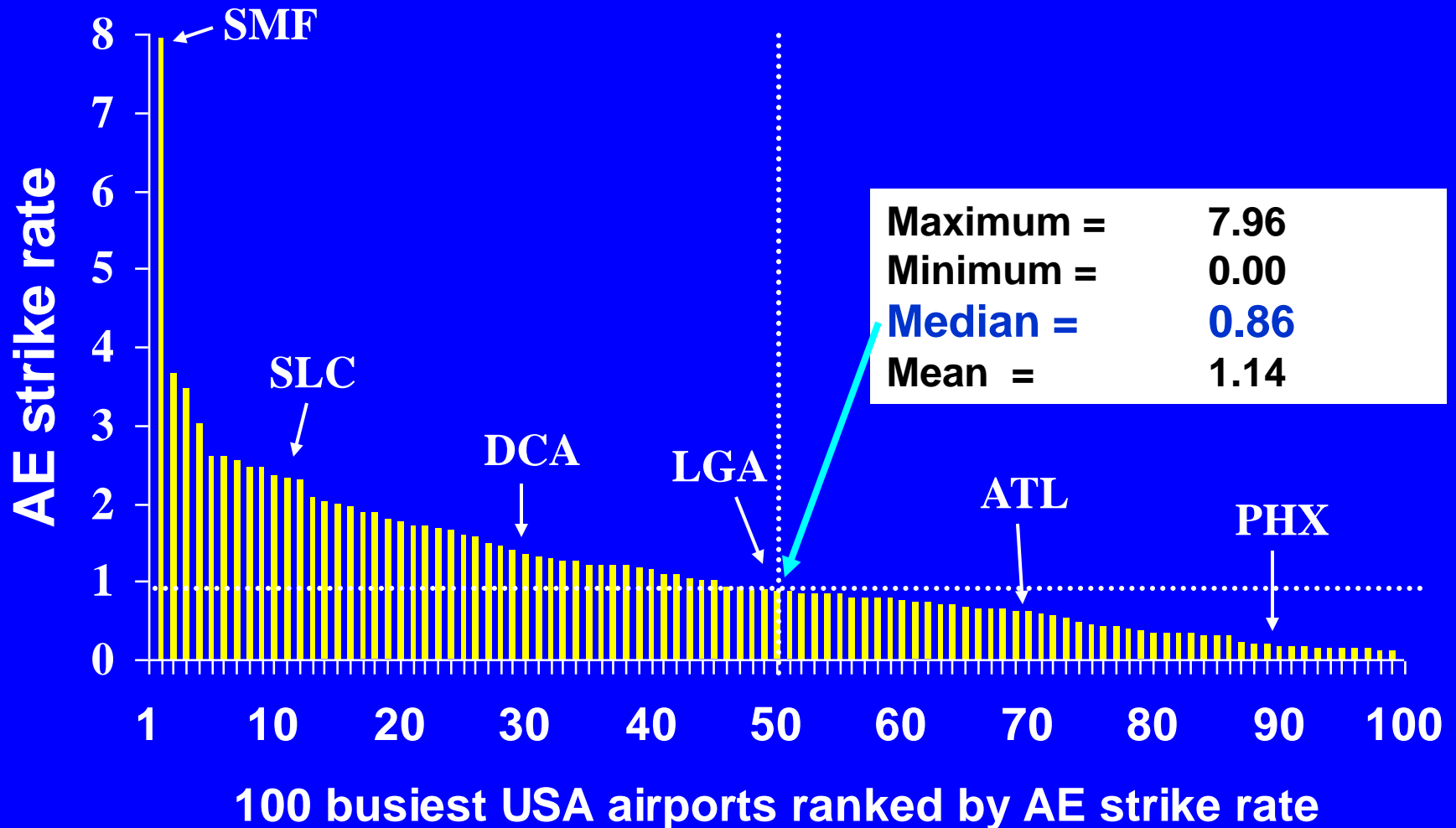
Should benchmark be the Adverse Effect strike rate?*

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

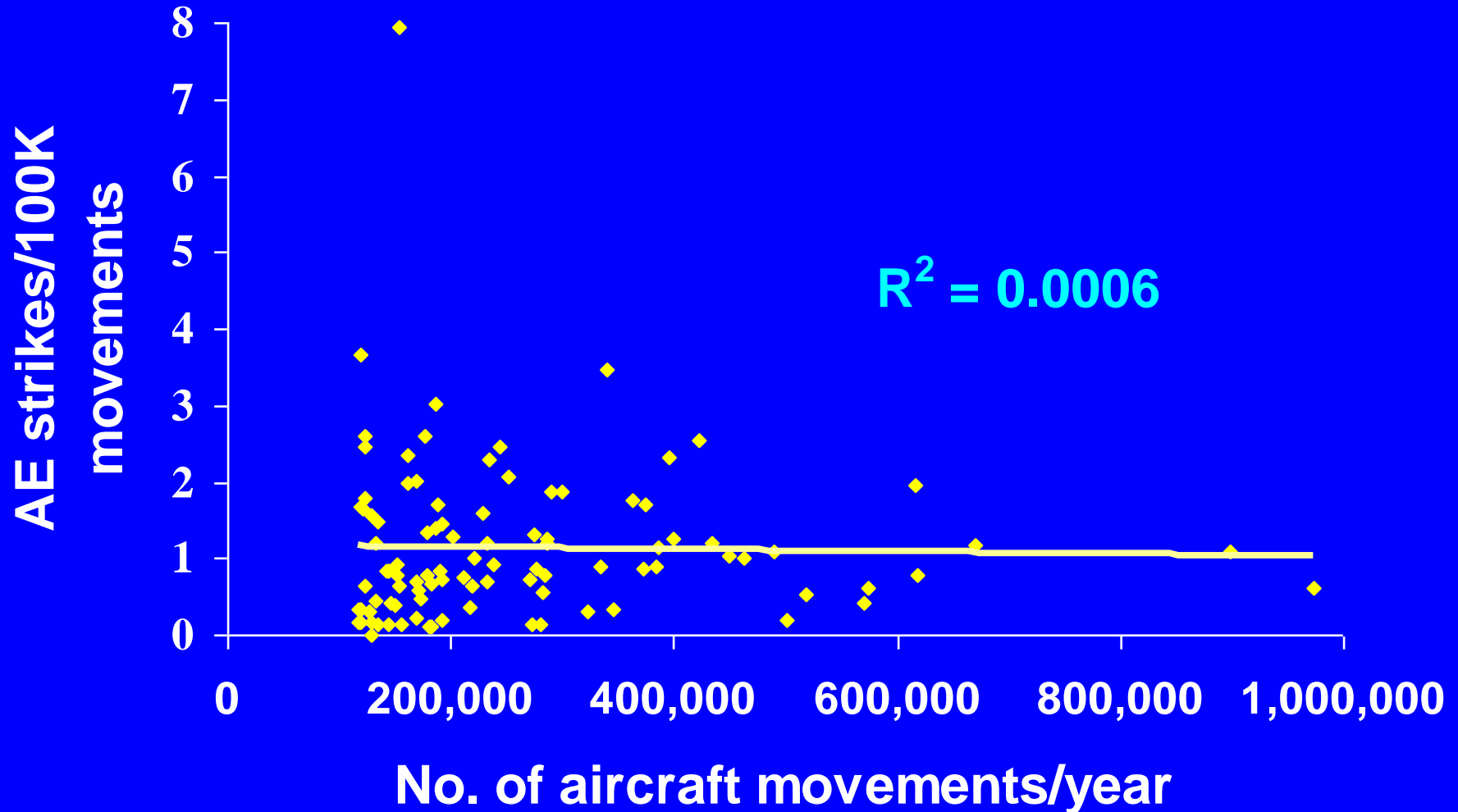
- AE strike rate incorporates hazard level of species struck (e.g., swallow vs. dove vs. goose).**
- There is much less bias among airports in reporting AE strikes compared to all strikes.**
- Bottom line of WHMP is to reduce AE strikes.**

***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. Every airport should strive for an AE strike rate of 0.

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:

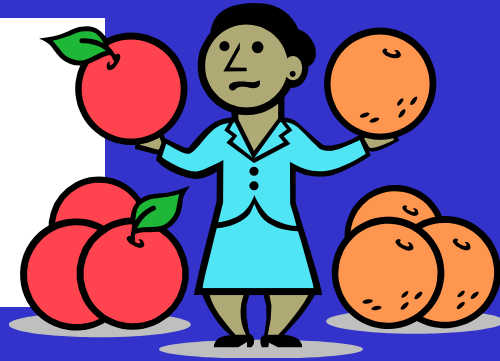
- a) Inherent “birdy” geographic or site-specific location.
- b) An inferior WHMP; poorly trained or motivated staff.



However, 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) Reactively:

b) Proactively:



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 priority |
|------------------------------------|---------------------------|--------------------------|-------------------------|------------------------|
| 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.**