# Targets of Additional Safety Improvements for Cabin Occupants

SCSI Cabin Safety, 2009
Robert Matthews, Ph.D.
Senior Safety Analyst
Office of Accident Investigation, FAA

Federal Aviation Administration

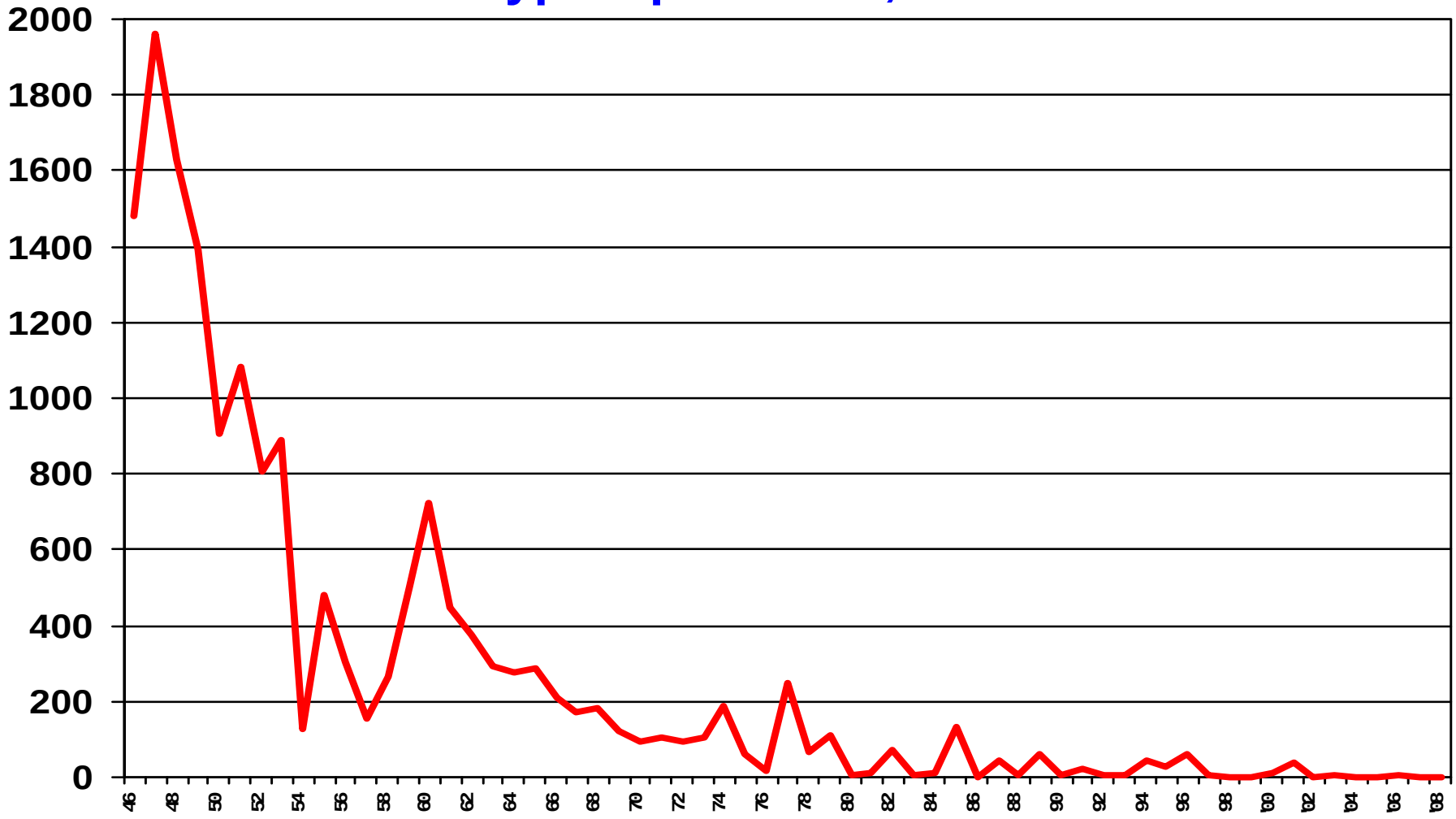
**In the past 25 years, cabin safety has improved enormously.**

**Yet, some targets for additional improvement remain.**

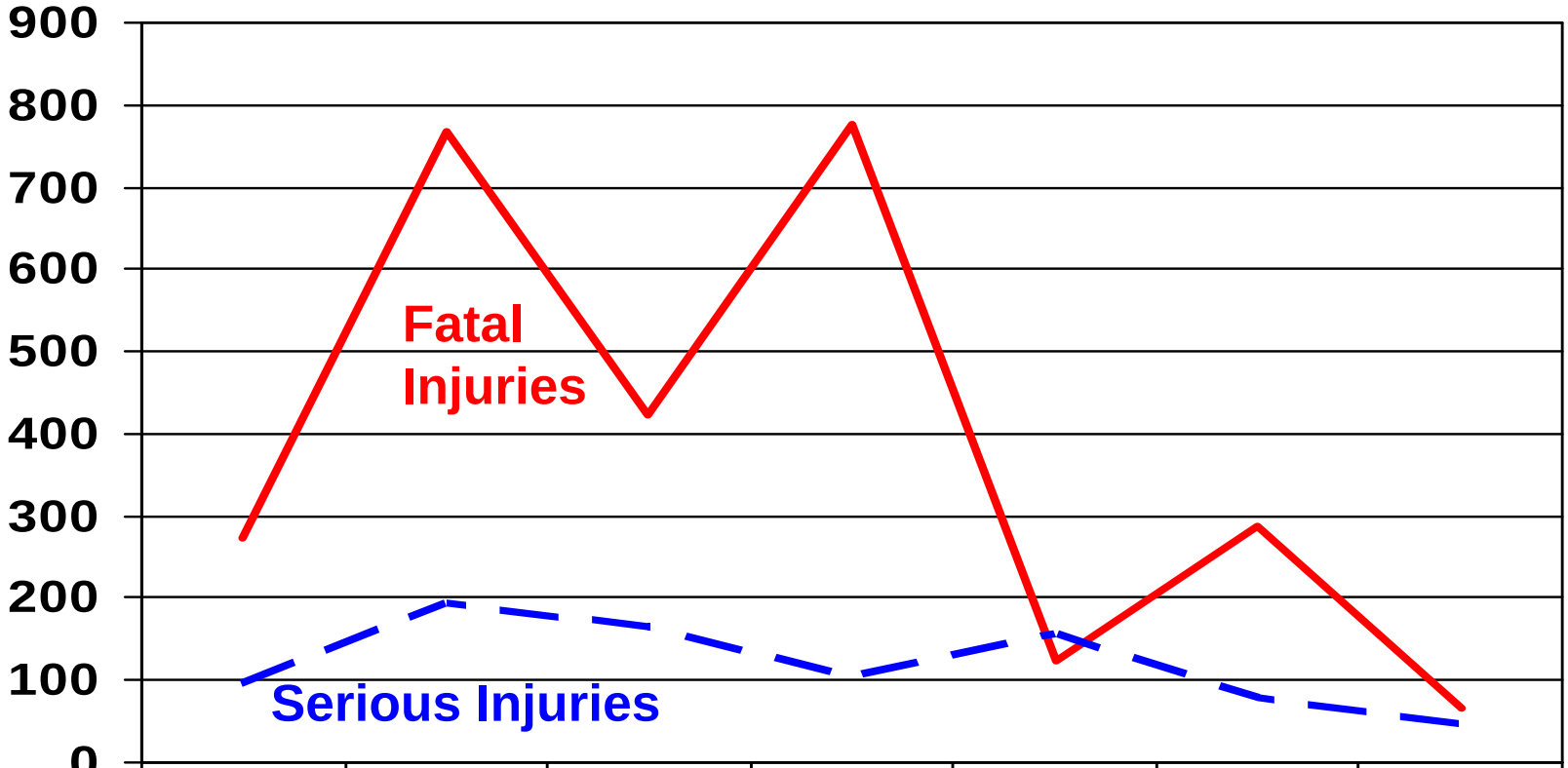
**The cabin safety community was a major contributor to past improvements and needs to remain active in pursuit of future safety improvements.**

**Start with the good news.**

# Fatalities per 100 Million Persons Onboard, Part 121-Type Operations, 1946 To 2008



# Injuries to Cabin Occupants in 4-Year Sub-Totals
# U.S. Air Carriers Accident, 1981-2008




| | 81-84 | 85-88 | 89-92 | 93-96 | 97-00 | '01-04 | '05-08 |
|---|---|---|---|---|---|---|---|
| Fatal | 272 | 768 | 422 | 777 | 125 | 288 | 66 |
| Serious | 95 | 192 | 164 | 104 | 154 | 79 | 47 |

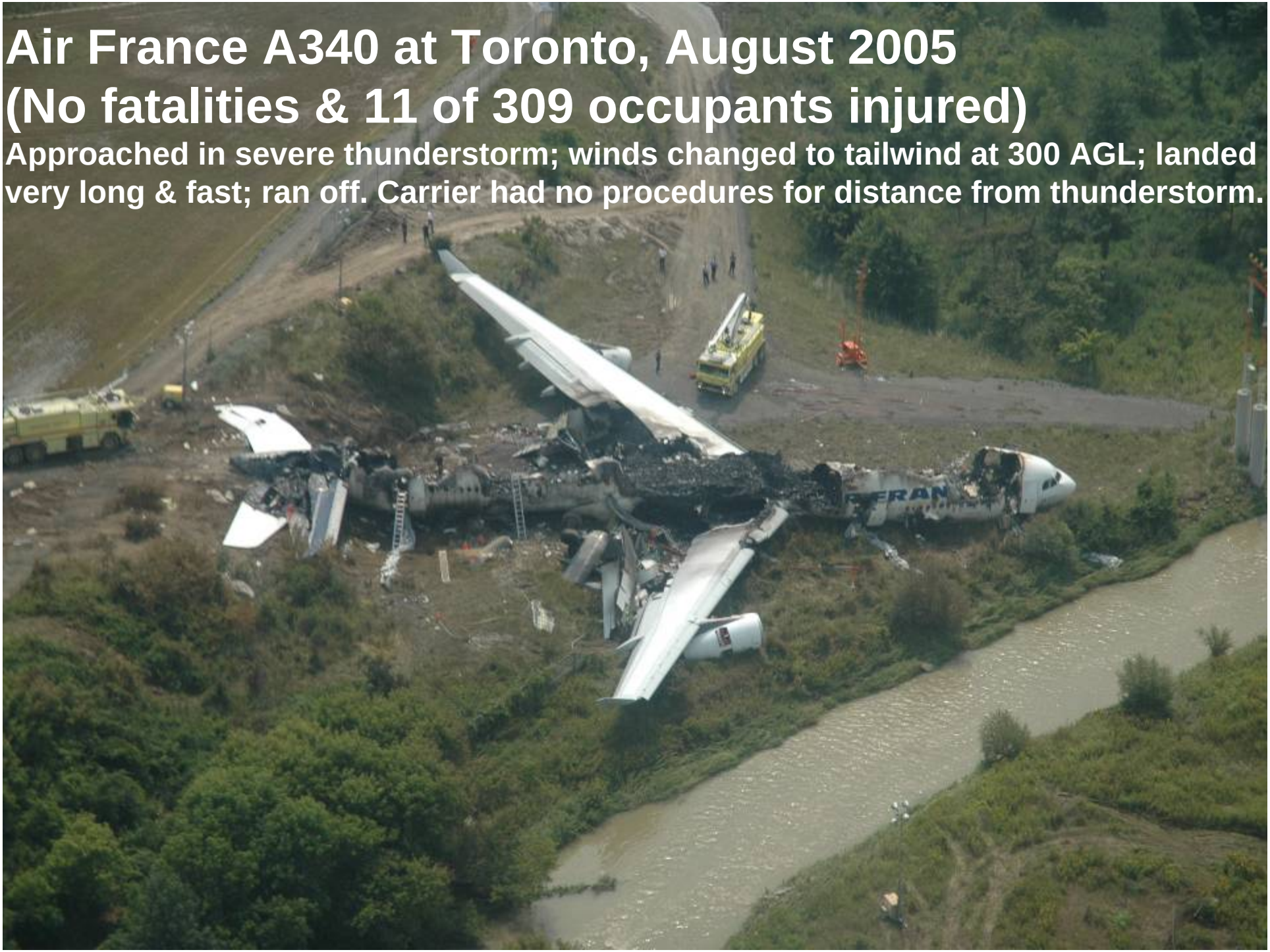
**Cabin safety & survivability have contributed significantly to steady, long-term improvements in safety.**

**The field began to receive targeted attention in the 1980s in response to 3 accidents involving airborne fires:**

- Saudi Airlines in 1980 at Riyadh (all 301 onboard died)
- Air Canada in 1983 at Cincinnati (23 of 46 onboard died)
- British Midlands at East Midlands in 1989 (47 of 126 onboard died & 74 suffered “gross” fractures).

# Air France A340 at Toronto, August 2005
# (No fatalities & 11 of 309 occupants injured)

**Approached in severe thunderstorm; winds changed to tailwind at 300 AGL; landed very long & fast; ran off. Carrier had no procedures for distance from thunderstorm.**



# British Airways 777 at Heathrow, January 2008

Lost power & landed short; of 16 crew & 136 passengers, 1 serious injury.

# Continental at Denver, 20 December 2008

Ran off left during T/O roll on 34; winds 280/27-36. Aircraft burnt out on right side; 5 serious injuries among 5 crew & 110 passengers.

# US Airways, New York, January 2009
## (1 serious Injury among 154 occupants)

Similar accidents just 25 years ago would have produced several hundred fatalities.  Instead, these 4 cases produced no fatalities & just 18 serious injuries among 730 occupants.

These were not “miracles.”  They were the result of years of hard work by lots of people, some of whom are in this room.

The bad news: despite the positive outcomes of these 4 accidents, they obviously were high-risk events.

High-risk accidents do not always turn out so well.

# Comair CRJ-100, Lexington; August 2006
# Took off on wrong runway; 49 of 50 occupants fatal

# TAM, July 2007 at Sao Paulo: Overran, crossed adjacent roadway & into Tam Corporate Building; all 187 occupants fatal &12 ground fatalities

# Spanair, August 2008 at Madrid; 154 of 171 occupants fatal (No-Flap T/O; stall warning but no configuration alert)

# So, where should the cabin safety community focus its efforts?

# First Target: Continue to Minimize Major Impacts

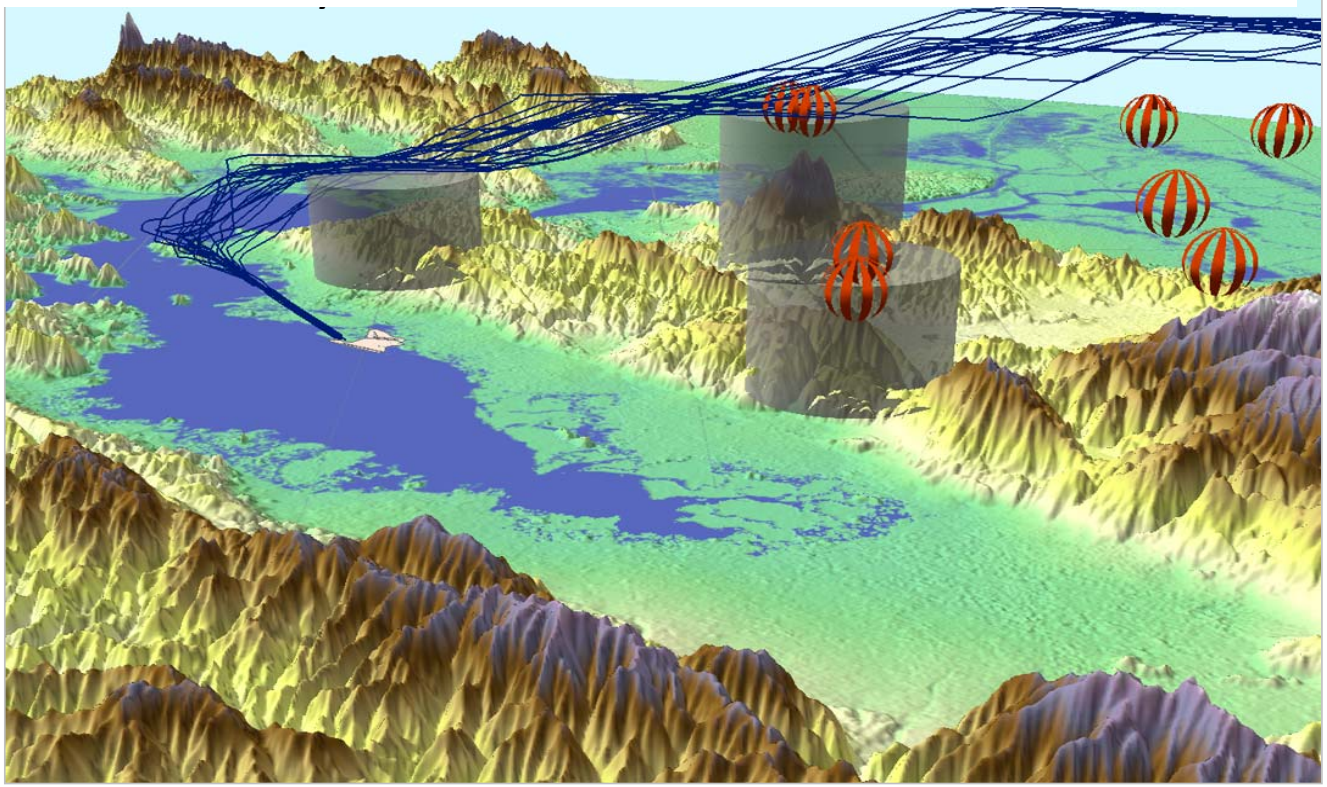
**American Flight 587, Rockaway (Queens), NY**
**Nov. 12, 2001 (260 On-Board Fatal & 5 Fatal on Ground)**

# Steps Toward Minimizing Major Impacts

- Actively support training & emphasis on SOPs for all aviation professionals: pilots; cabin crew; mechanics; & dispatchers..
- GPS TAWS (up-grading RNAV TAWS to GPS TAWS)
- RNP (New aircraft or upgrade avionics on existing fleet)
- Support runway Incursion technology; own-ship moving map
- Monitor your carrier's fuel inerting efforts
- Pay attention to efforts to replace halon
- Monitor mechanically-related diversions & turnbacks

  Different issues on different fleets
- FOQA/ASAP & ATC Data (advocate company program)

# Example of Using FOQA & ATC Data: TAWS Analysis of Arrivals at Oakland

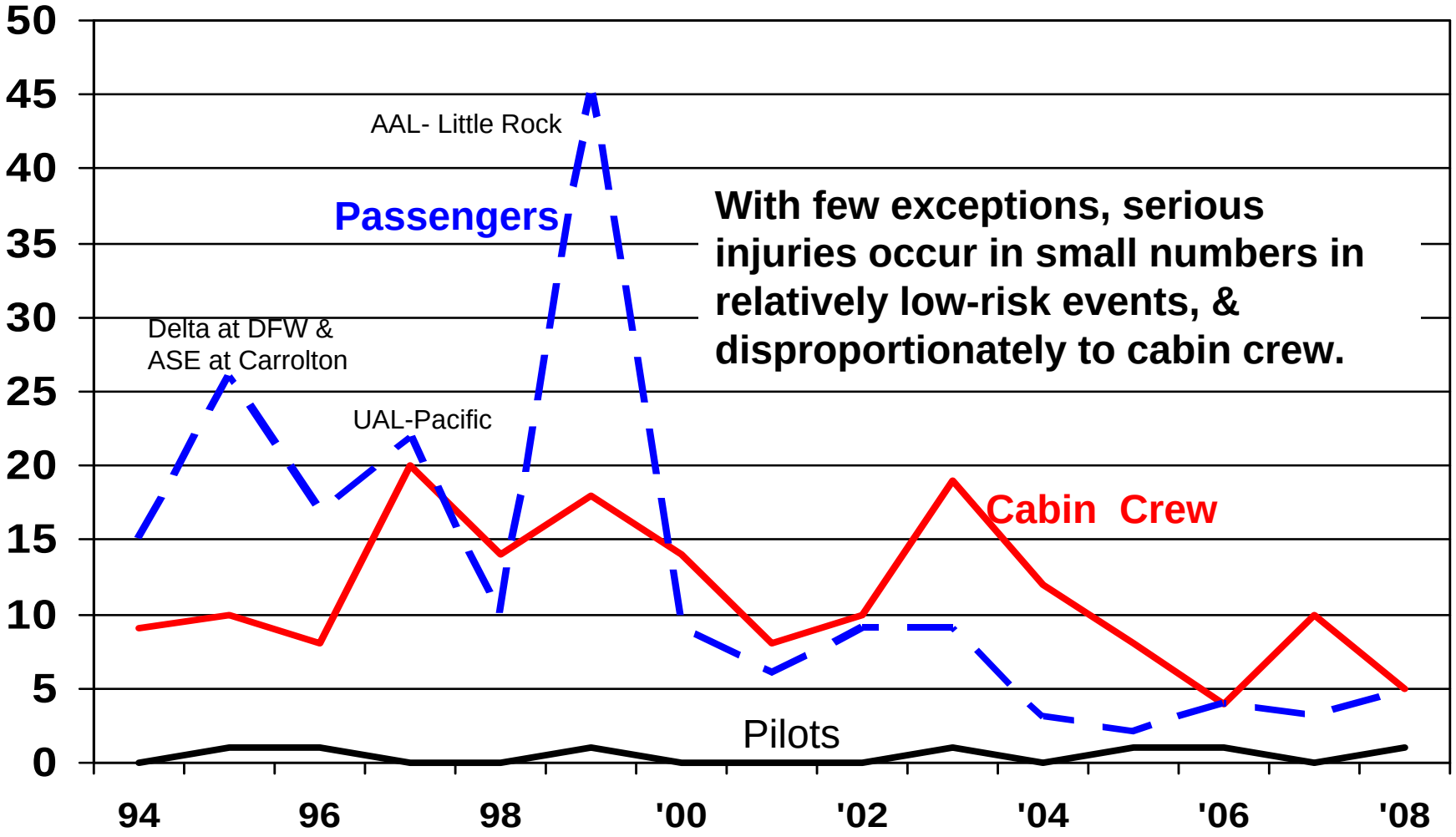


Multiple opportunities to identify existing risks and to do something about them before an accident **if carriers collect, analyze & share data.**

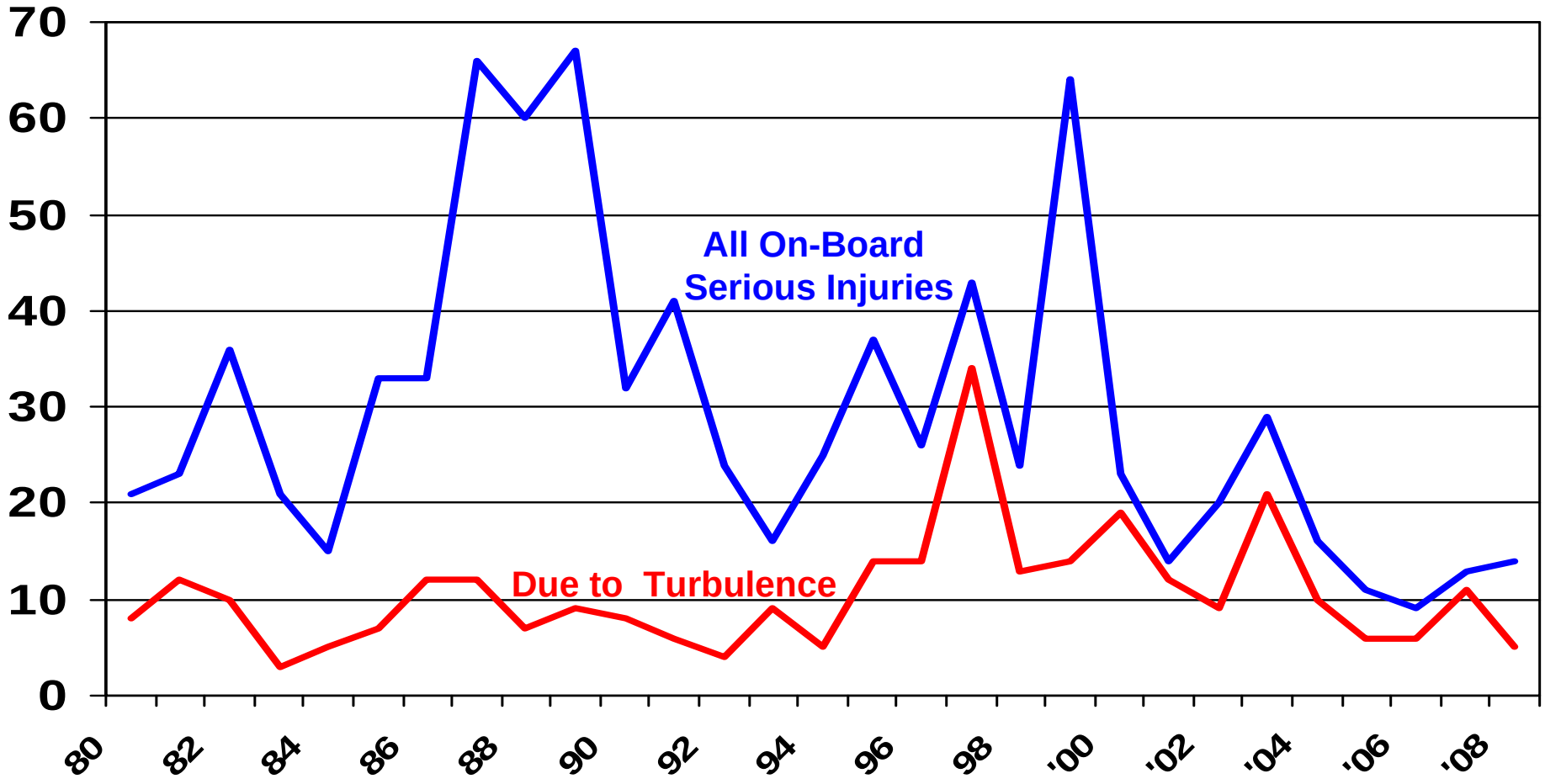
# Other Targets for Continued Improvement in Occupant Safety:

# Serious Injuries

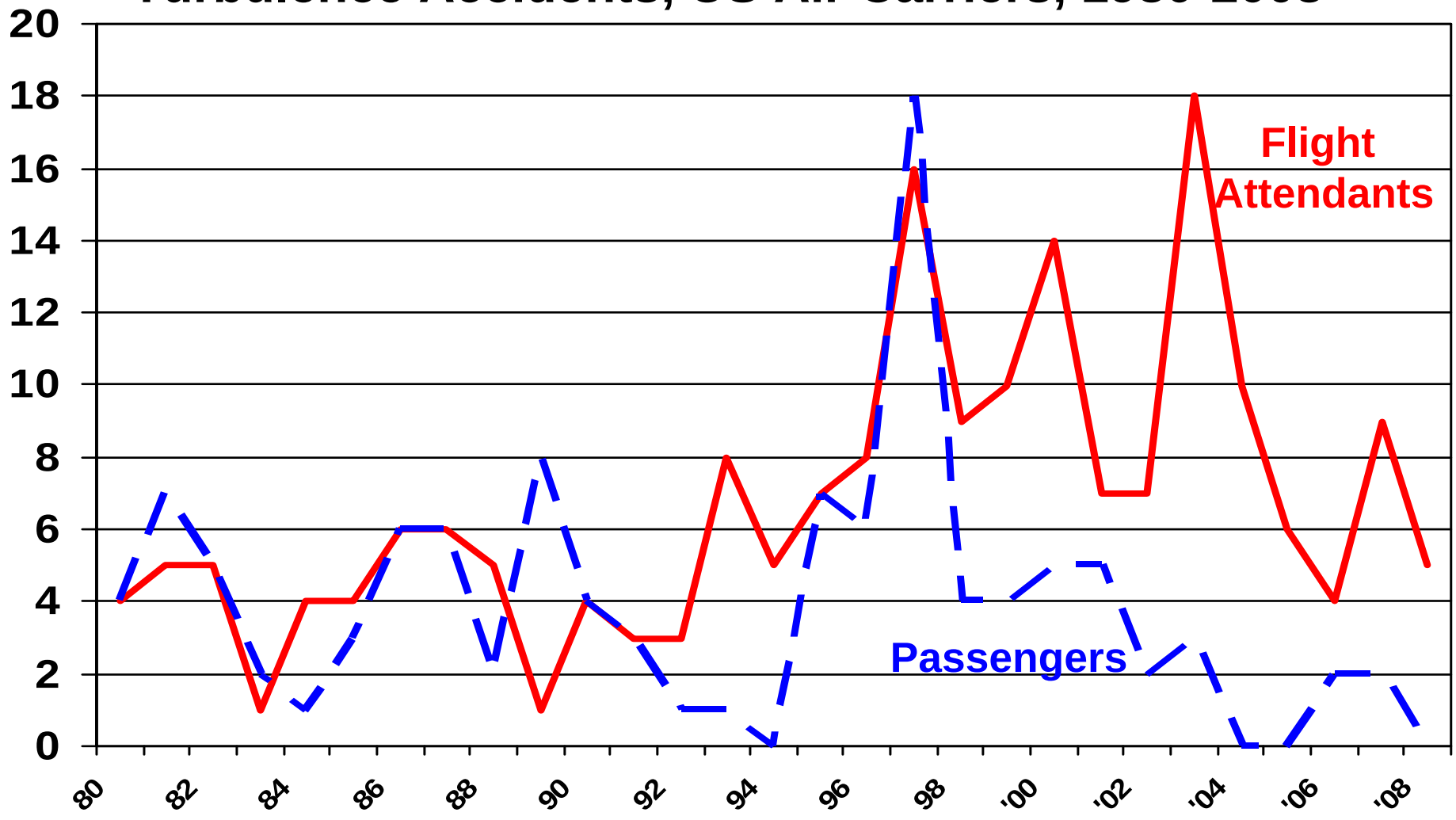
# Who Is Seriously Injured Onboard Passenger Flights, U.S. Air Carriers, 1980-2008



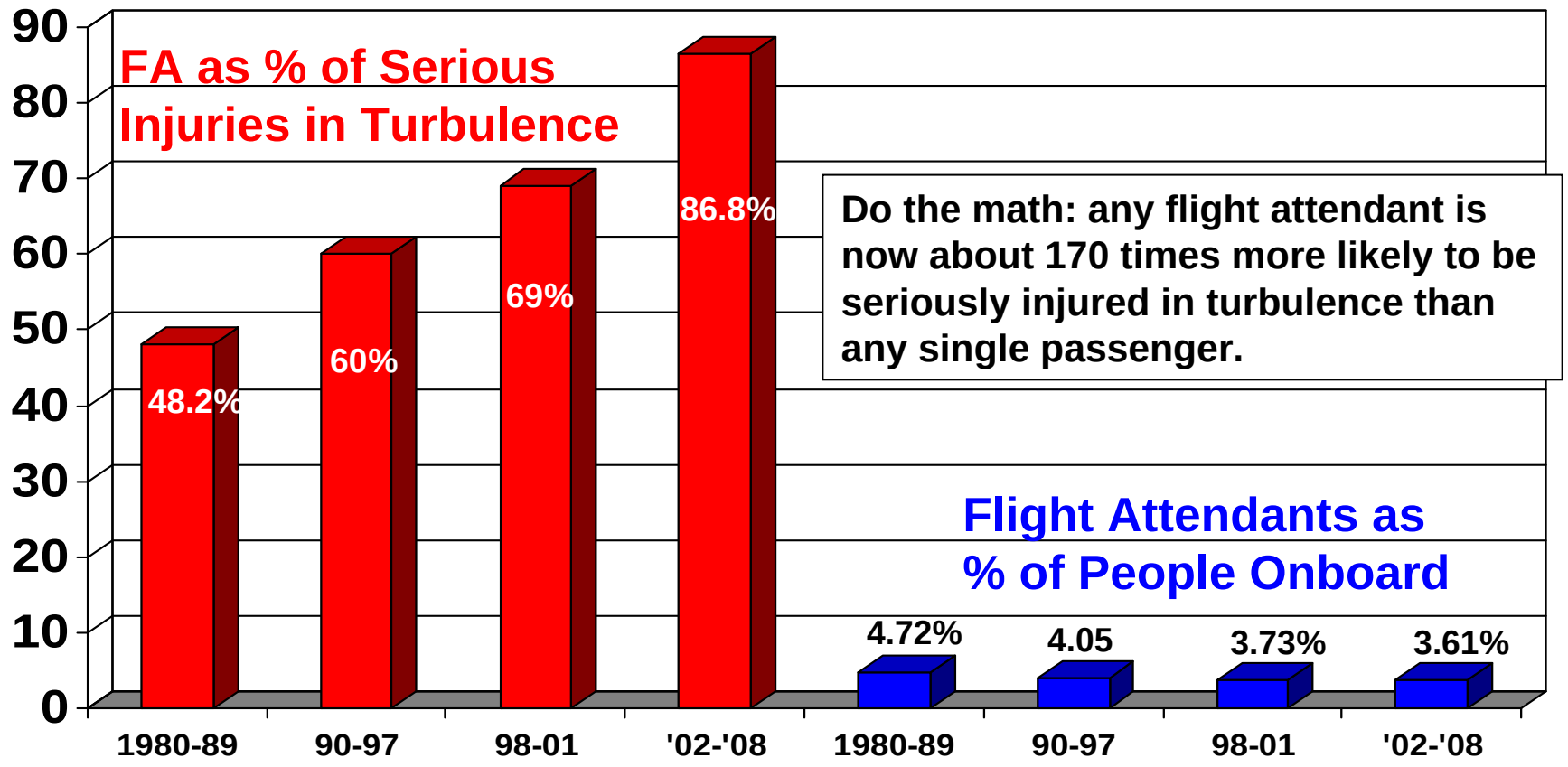
# And They Occur Most Commonly in Turbulence: Turbulence Versus All On-Board Serious Injuries U.S. Air Carriers



# Passengers & Flight Attendants Seriously Injured in Turbulence Accidents, US Air Carriers, 1980-2008



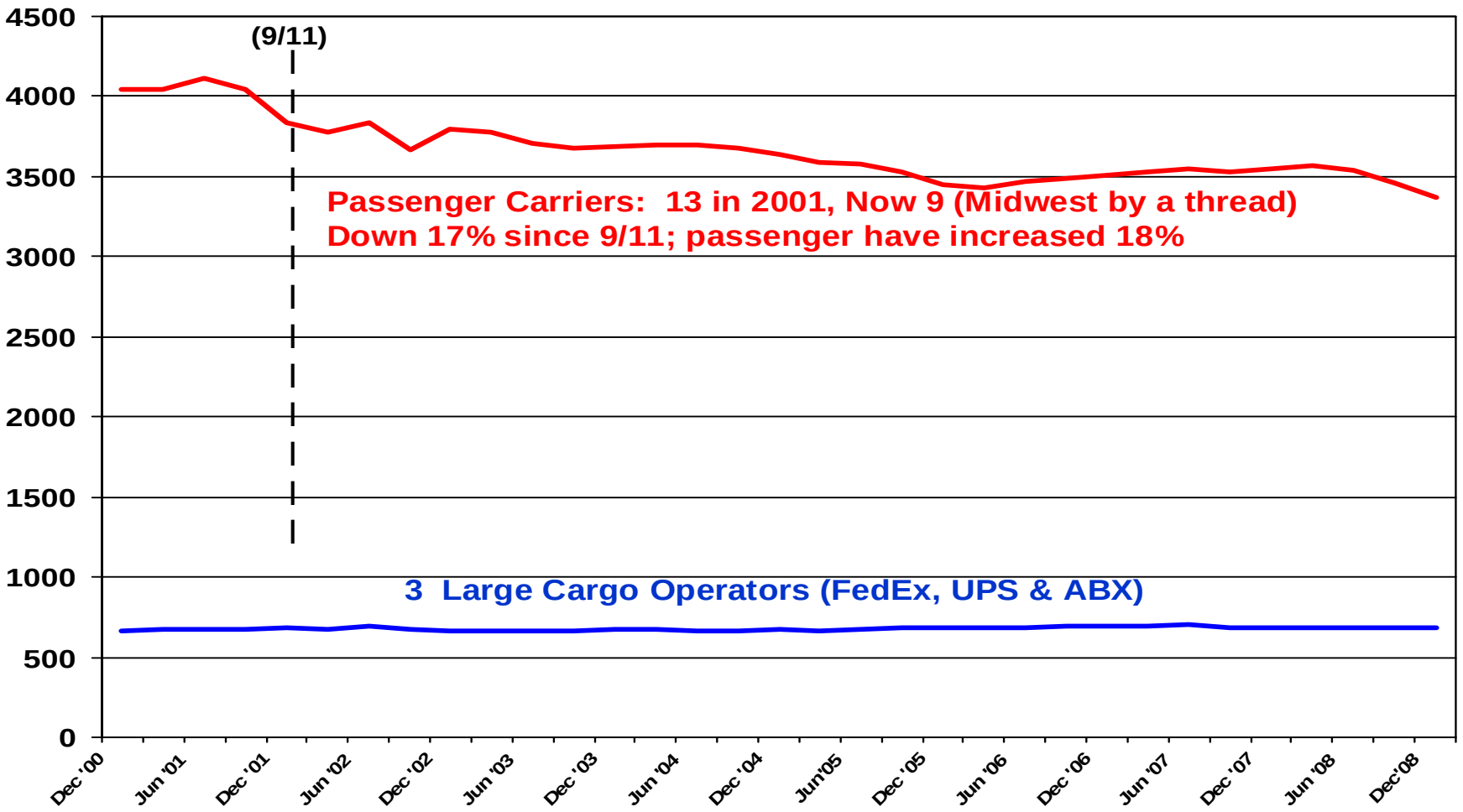
# Flight Attendants' Share of Serious Injuries in Turbulence Versus Share of People Onboard



# Flight Attendants Versus Passengers

- **Passenger use of seatbelts is no longer the primary issue. Behavioral changes since 9/11 have further reduced passenger risk in turbulence.**
- **Job tasks require flight attendants to be up & moving much of the time**
- **(increased by load factors), but job tasks are not the sole factor.**
- **Primary strategies are conceptually simple: avoid turbulence if you can; and get people seated and secured. *Turbulence accidents virtually disappear when people are seated & secured.***
- **Corporate policy, communication & training are the least expensive targets.**
- **Policies or practices (including decisions by cabin crew) can place too much priority on cabin service & incur extra risk - - get seated when evidence suggests increased risk. (SOP)**
- **Flight path decisions can expose flight attendants to added risk. & (SOP)**
- **On-board communications procedures can be tedious; they may take too long or break down before everyone gets the word. Keep it simple!**
- **Procedures for simple, "all-clear" communications often are weak.**

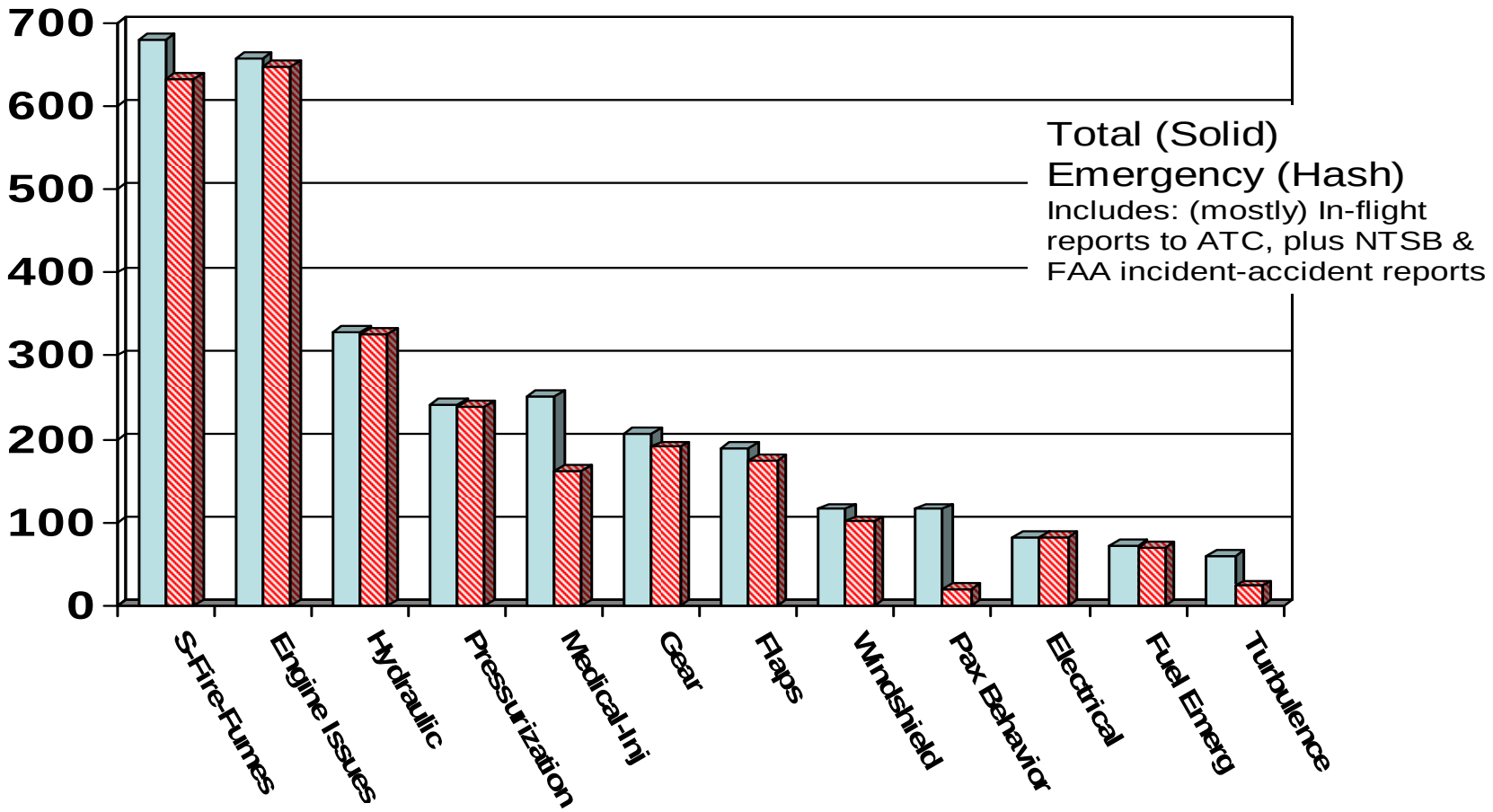
# Large Jets Operated by Major Carriers, By Quarter Since December 2000



# Other Risks to Cabin Occupants

## 12 Leading Sources of In-Flight Reports & Emergencies

**(Includes False Alarms)**



# CONCLUSIONS

- The commercial aviation system is far safer today than anyone projected just a decade ago, but risks remain.
- The cabin safety community can use its moral authority to support efforts that realistically can improve safety even more.
  - Start with efforts that will make major impacts even less common than they are today; that should be top priority.
  - Encourage participation in data sharing (case by case).
  - Yet, do not overlook traditional concerns of cabin safety (turbulence, evacuation, passenger behavior, etc.).