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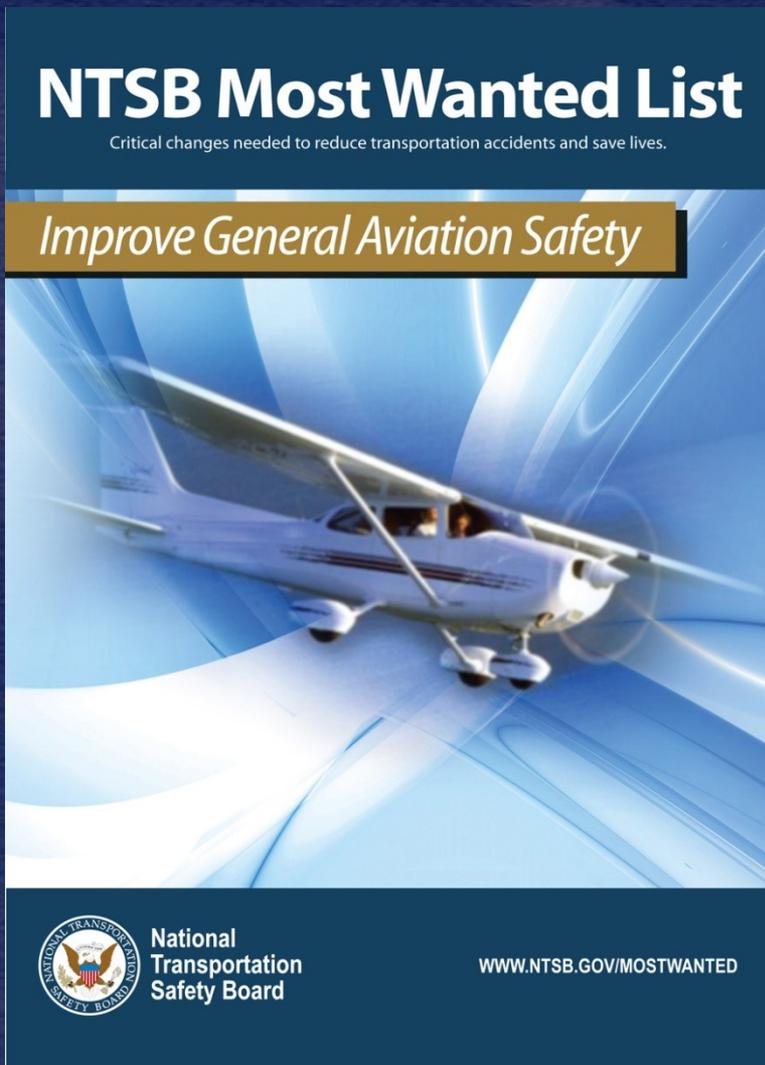


# Personal Flying: How Safe Do You Want to Be?

Earl F. Weener, Ph.D.  
NTSB Board Member

Sun & Fun  
Lakeland Florida  
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# Most Wanted List



10 issue areas

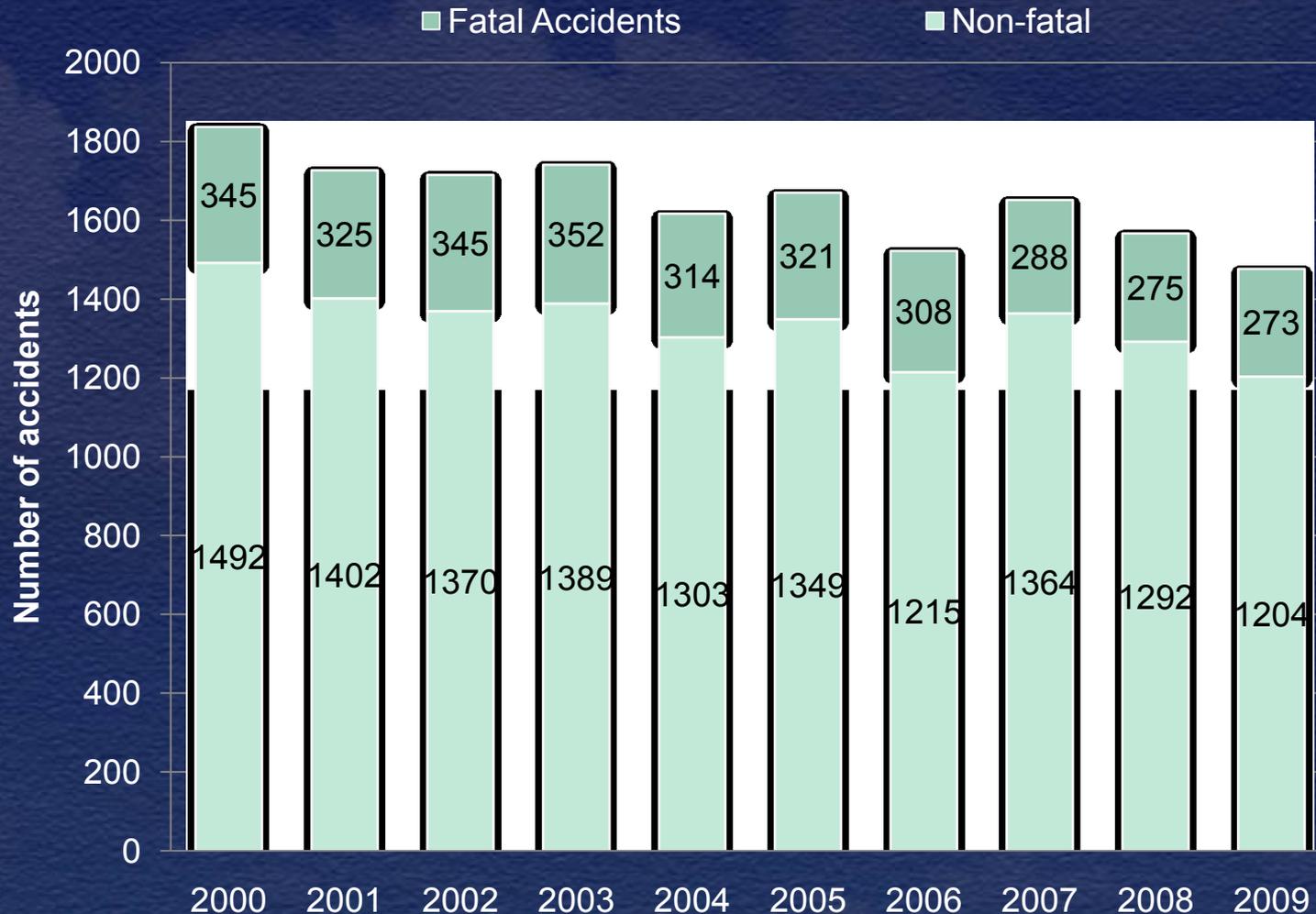
Reviewed annually

Objective – bring focus on need for improvements

# Why GA on the Most Wanted List?

- NTSB investigates approximately 1500 GA accidents per year
- Overall GA accident rate flat
  - Has not improved over the last ten years
  - Air carrier accident rate decreased almost 80%
- Personal flying accident rate
  - Increased 20% over last 10 years
  - Fatal rate increased 25% over that period
- **GA Personal flying safety needs attention**

# All GA Accidents



# GA Accident-involved Fatalities



# GA Accident Rates



Estimated from the GA and Part 135 Activity Survey, 2000-2009

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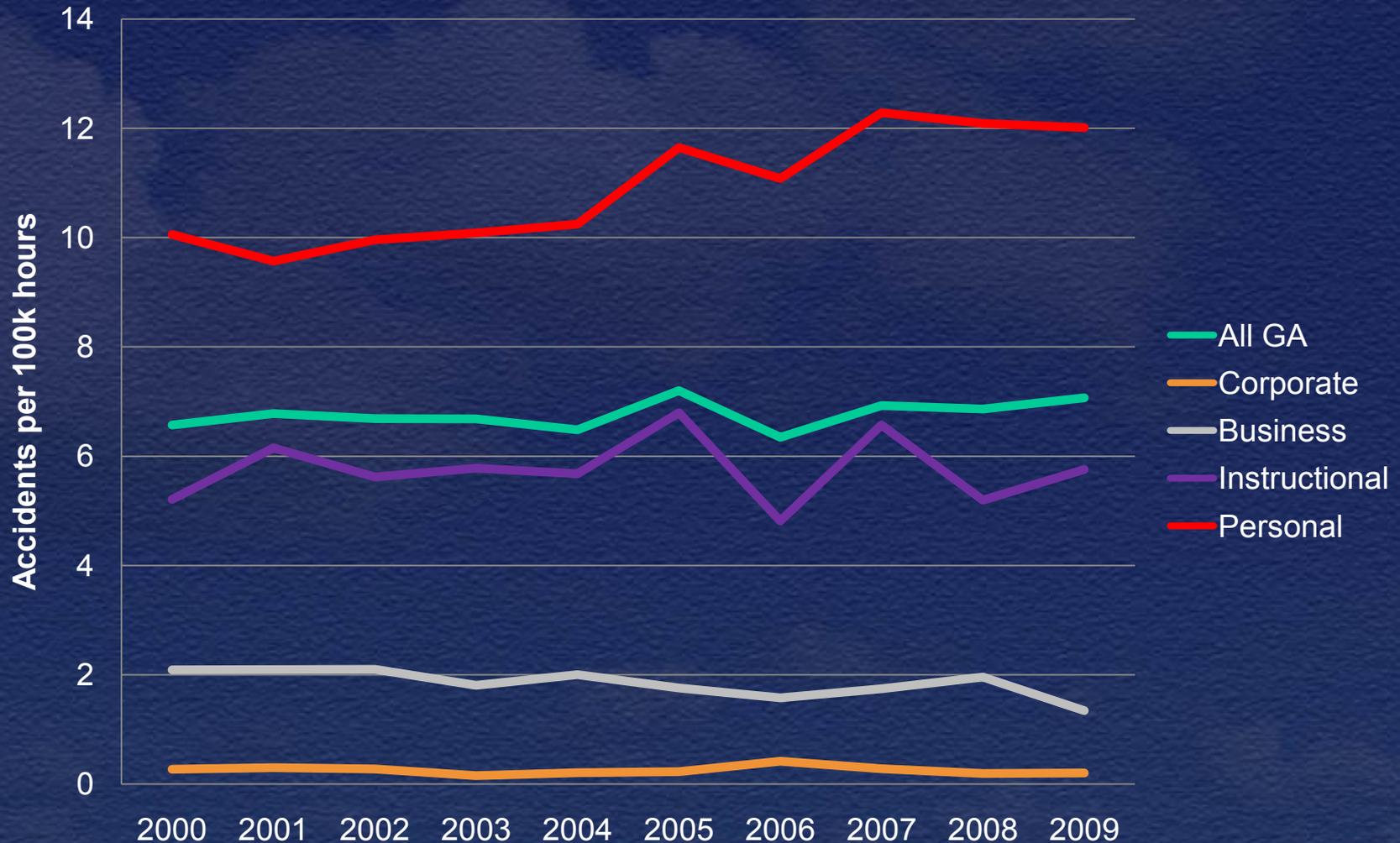
# Defining Fatal Accident Events

- Loss of Control in Flight
- Loss of Control on Ground
- Abnormal Runway Contact
- System/Component Failure – Powerplant
- Controlled Flight into Terrain
- Unintended Flight into IMC
- System/Component Failure – Non-Powerplant
- Fuel Management
- Collision on Takeoff or Landing

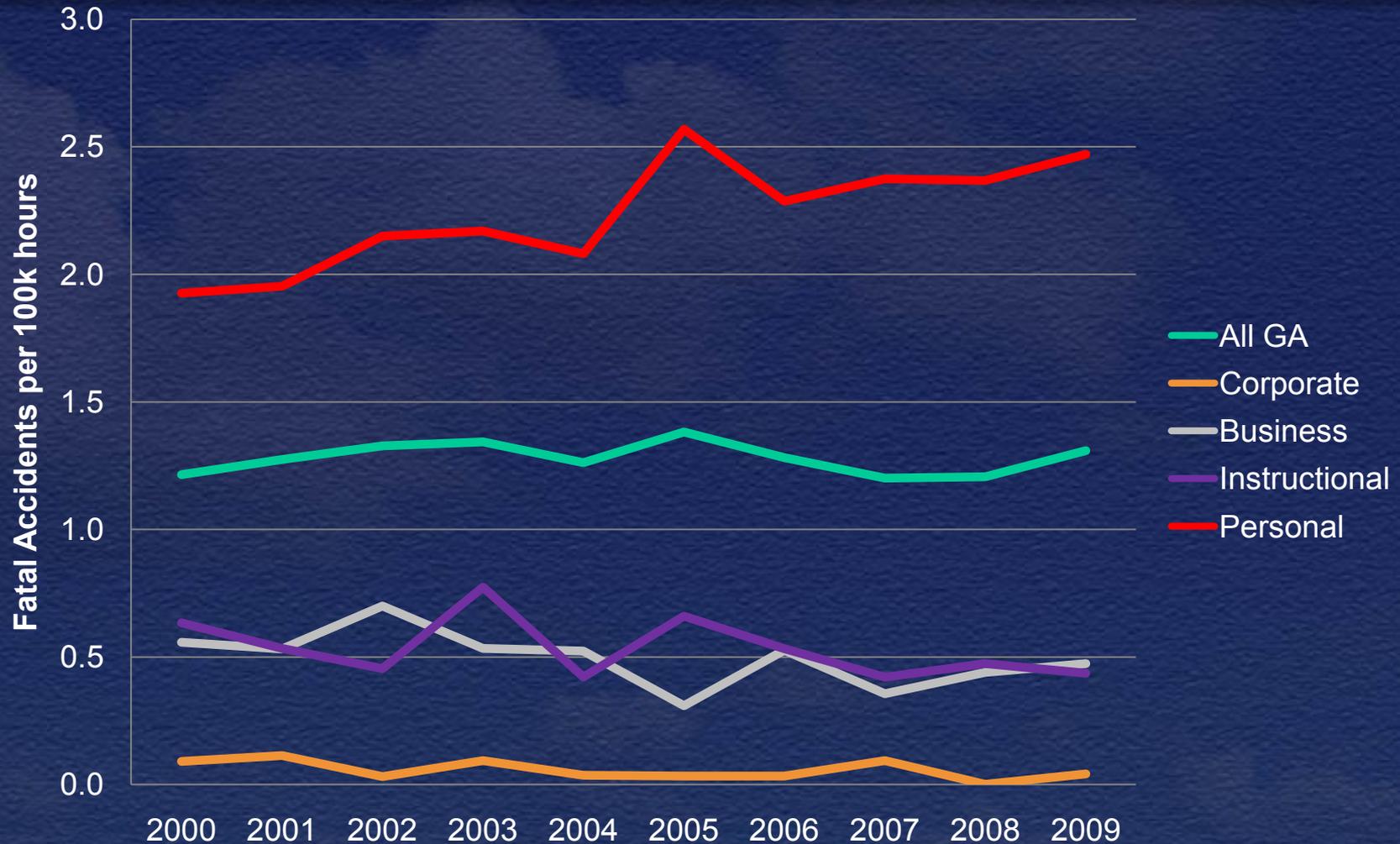
# Accident Rate Difference

- Corporate
  - Accident rates approaching that of the airlines.
- Business
  - Total and fatal accidents show a modest decline, substantially below the overall GA accident rates.
- Instructional
  - Total accident rate is slightly below the average for all of GA, the fatal rate is substantially lower.
- Personal
  - Total and fatal accident rates have risen, both rates are substantially above the average of all GA flying.

# Accident Rates per 100k Flight Hours



# Fatal Accident Rates per 100k Flight Hours



# Business Flying, 2007-2009

All accidents – Loss of control (in-flight or on the ground) accounted for the largest portion, followed by system/component failures.

Fatal accidents - Loss of control in flight accounted for the greatest proportion, followed by controlled flight into terrain and collisions on takeoff or landing.

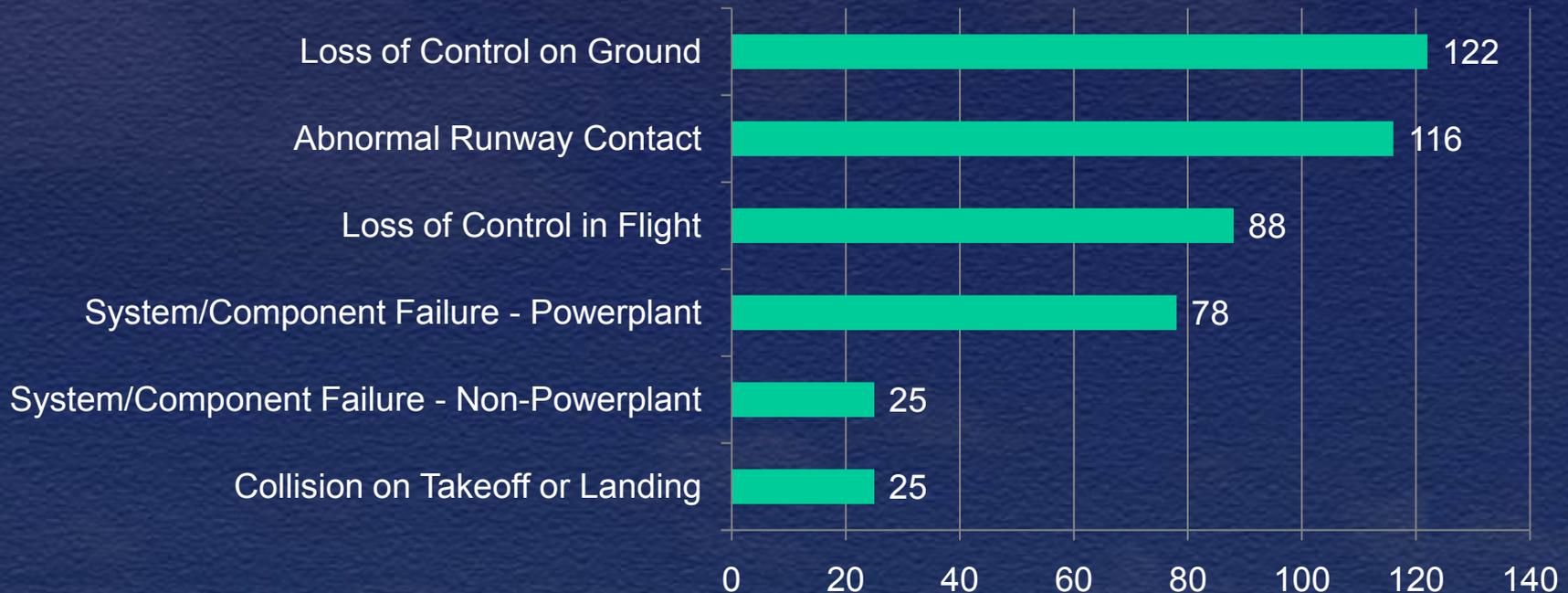
**Number of Fatal Accidents**



# Instructional Flying, 2007-2009

Loss of control on the ground or in flight and abnormal runway contact (e.g., hard landings) accounted for the great majority of defining accident events for instructional flying accidents in both fixed-wing airplanes and helicopters.

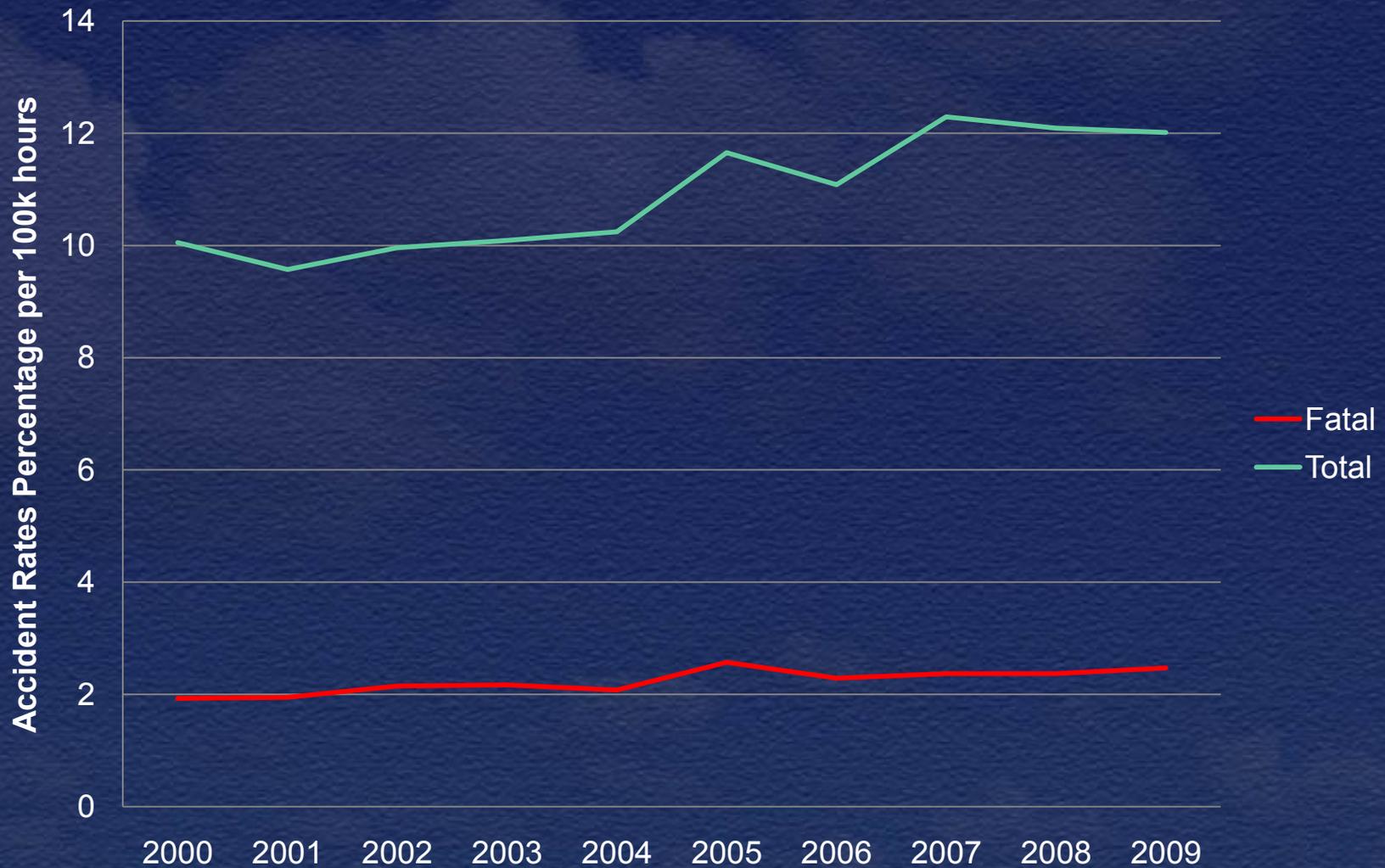
## Number of Fatal Accidents



# Personal Flying Accidents



# Personal Flying Accident Rates

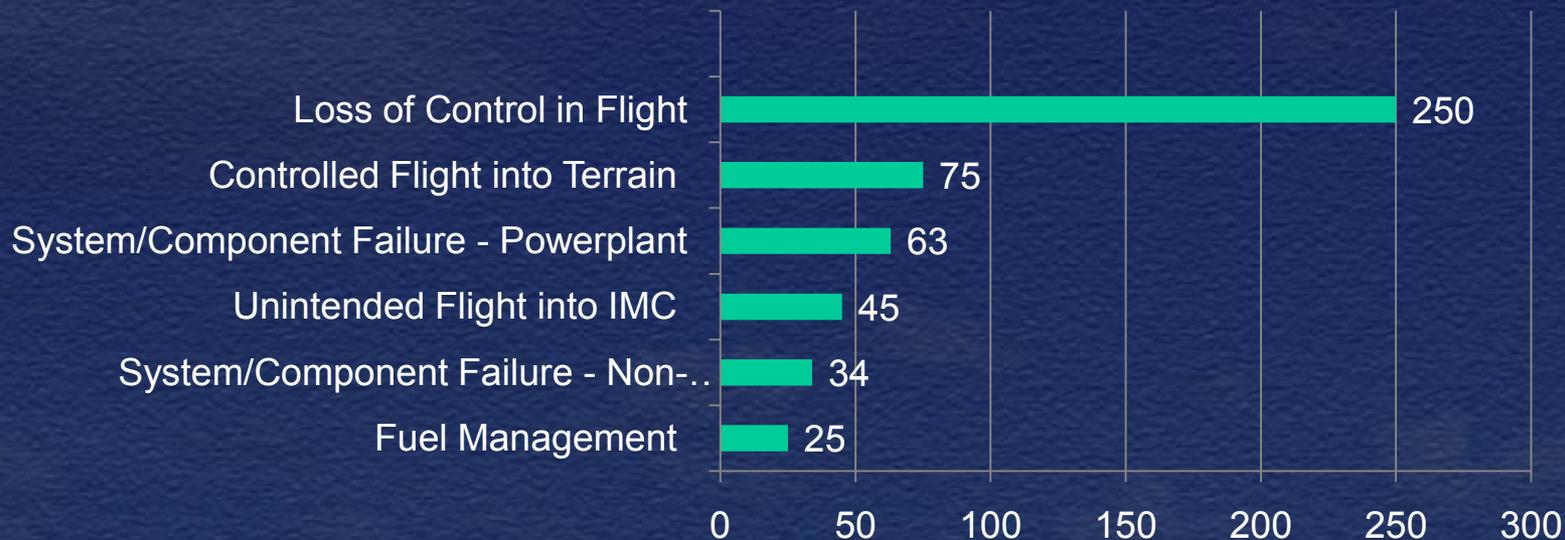


# Personal Flying, 2007-2009

Total accidents - loss of control in flight and on the ground and power plant failure were the most common defining events.

Loss of control in flight accounted for the greatest proportion of the fatal personal flying accidents.

## Number of Fatal Accidents



# Alfred Sheinwold

“Learn all you can from the mistakes of others. You won’t have time to make them all yourself”

# Accident Chain-of-Events



- An accident is typically the end of a sequence of events
- Interruption of this chain-of-events could eliminate the accident
- Look for opportunities to break the chain

# Loss of Control in Flight



# Loss of Control In-flight

- Accident #LAX08FA300
- Beechcraft A36
- Approach to KCRQ, Carlsbad CA airport, 331 ft msl
- One person onboard, fatal
- Weather – 100 ft ceiling,  $\frac{1}{4}$  mi visibility, wind 280 degrees at 5 kt
- ILS 24 minimums 200 ft ceiling,  $\frac{3}{4}$  mi visibility

# Loss of Control In-flight

- Pilot
  - Private certificate
  - Instrument rating 2 months prior
  - Nine hundred hours total time
  - No instrument training in accident aircraft
- Aircraft
  - No apparent malfunctions
  - Adequate fuel

# Loss of Control In-flight

- Accident sequence
  - ATC cleared for ILS approach RW 24
  - Tower issued “low altitude alert” and advised pilot he was south of localizer
  - Two minutes later pilot stated he was “aborting” the approach
  - One minute later pilot stated “I’m in trouble”

# Loss of Control In-flight

- Radar tracks
  - Two miles from approach end RW24 airplane crossed LOC at 800 ft heading south
  - Track started tight left-hand turns
  - Altitude fluctuated between 600 and 1100 ft msl
  - Last radar return showed airplane at 900 ft msl and 56 kt ground speed
- Wreckage confined to initial impact area

# Loss of Control In-flight

## Probable Cause

The pilot's failure to maintain control during the instrument approach and attempted go-around

# Controlled Flight into Terrain



# Controlled Flight into Terrain

- Accident NYC08FA138
- Cirrus SR22
- Night IFR Departure Front Royal Virginia, KFRR, 709 ft msl
- Two fatalities – pilot & son
- Weather – Winchester, KOKV, 15 mi S
  - Wind 340 deg at 4 kt
  - 3 mi visibility in rain
  - Broken 2,400 ft, overcast 3,000 ft

# Controlled Flight into Terrain

- Pilot
  - Private Certificate, Instrument rating
  - Estimated total time – 193 hours
- Aircraft
  - Airplane total time less than 300 hrs
  - No apparent malfunctions
  - Flight data extracted from PFD system

# Controlled Flight into Terrain

- Accident sequence
  - IFR clearance – direct COGAN intersection, climb and maintain 4,000, expect 5,000 10 minutes after departure
  - Prior to takeoff, Desired Course set to 050 deg, approximate direct course to COGAN
  - Airplane departed RW27
  - GPS waypoint COGAN selected during takeoff roll
  - Aircraft path continued west, consistent with GPSS not selected



# Controlled Flight into Terrain

- Flight path
  - Total time of flight 80 seconds
  - First 40 sec, runway heading, climbing 900 to 1,000 fpm
  - 25 sec, vertical speed decreased to 0 fpm,
  - then up 2200 fpm,
  - then decreased to 700 – 750 fpm up
  - Airplane reached 2,200 ft msl and 140 kt ias
  - Last 6 sec, steep descending turn to left, roll to 95 deg and pitch to 27 deg down

# Controlled Flight into Terrain

## Probable Cause

The pilot's failure to maintain clearance from rising mountainous terrain, and his failure to turn toward his assigned course during initial climb. Contributing to the accident were the low ceiling, reduced visibility, dark night conditions and rising mountainous terrain

# System Failure – Powerplant



# System Failure - Powerplant

- Accident ERA09FA093
- Beechcraft 36
- Night IFR approach, Bowman Field, KLOU, Louisville, KY
- One fatality – pilot
- Weather
  - Winds 330 degrees at 3 kts
  - Ceiling overcast at 800 ft
  - Visibility 6 miles in mist

# System Failure - Powerplant

- Pilot
  - Commercial Certificate, SEL/MEL
  - Flight Instructor rating, SEL
  - Instrument rating
  - Approximately 2300 hrs total flight time
- Airplane
  - Total airframe time – 6274 hours
  - Engine IO 520, 58 hours since overhaul
  - Pilot observed oil pressure problem
  - Mechanic advised to have problem checked



# System Failure - Powerplant

- Accident sequence
  - Prior to night departure from MDW, pilot noted problem with airplane
  - Maintenance not available until morning
  - After several attempts, pilot managed to get engine started and departed for KLOU at about 0220
  - Nine miles out on RNAV approach to KLOU pilot declared “Emergency” due to engine failure

# System Failure - Powerplant

- Aircraft right wing struck tree at height of about 30 ft along side a golf course
- Aircraft came to rest inverted approximately 175 ft from tree
- Front section of cabin roof crushed in
- Fuel recovered from left tank, right tank separated from aircraft
- Initial examination revealed engine would not rotate

# System Failure - Powerplant

- Engine teardown
  - Crankshaft and counterweight assembly fractured through at forward fillet radius of #2 main bearing journal
  - #2 main bearing journal showed scoring consistent with bearing rotation
  - #3 main bearing journal fractured at rear fillet area

# System Failure - Powerplant

- NTSB Materials Lab found presence of silk thread patterns and gasket making material on sealing surfaces of the main bearing bosses
- Material not part of engine manufacturer maintenance documentation, TCM SIL 99-2B
- #2 main bearing boss severely damaged on both halves, including rotation mechanical gouging and deformation of the boss area behind the bearing, including mushrooming deformation of the boss

# System Failure - Powerplant

## Probable Cause

The pilot's continued operation of the aircraft with known deficiencies. Contributing to the accident was the improper sealing of the engine case during overhaul

# Unintended Flight into IMC



# Unintended Flight into IMC

- Accident DEN08FA141
- Cessna 182T
- Four fatalities – pilot and 3 passengers
- VFR flight from Steamboat Springs Colorado to Brenham Texas
- No record of weather briefing or flight plan
- Impacted terrain on Mt Guyot, near Georgia Pass, Park County, Colorado
- Weather – IMC in general area



# Unintended Flight into IMC

- Pilot
  - Private Certificate, SEL & MEL
  - Instrument rating
  - Total flight time – 1576 hours
  - Instrument time – 154 actual, 40 simulated
- Airplane
  - Garmin 1000 with XM weather & stormscope
  - 1492 hours total time
  - No evidence of pre-impact anomalies in engine or airplane systems

# Unintended Flight into IMC

- Accident flight – NTSB meteorology analysis
  - At departure marginal VMC with overcast above and scattered clouds at and below flight level
  - Weather at accident site deteriorated rapidly after departure
  - Pilot likely encountered level 2 thunderstorm
  - Lost control and impacted terrain
    - Approximately 55 degrees nose down
    - Wings level
  - Wreckage located at 12,300 ft msl

# Unintended Flight into Terrain

## Probable Cause

The pilot's failure to maintain aircraft control after inadvertently encountering instrument meteorological conditions.

Contributing to the accident were the pilot's failure to obtain a weather brief and the severe weather conditions.

# Fuel Management



# Fuel Management

- Accident ERA09FA289
- Beechcraft A36
- Pilot & fwd passenger – fatal; two aft passengers received minor injuries
- IFR flight plan; VMC conditions
- Flight from Destin, FL to Newnan GA
- Accident location was Beauregard, AL
- Weather – scattered at 3,900 ft, 10 mile visibility, winds 120 degree at 5 kts

# Fuel Management

- Pilot
  - Private Certificate, SEL
  - Instrument rating
  - Total flight time – 1,618 hours
  - Instrument time – 110 actual, 26 simulated
- Airplane
  - Recently turbonormalized engine
  - Osborne Tip tanks (approx 10 gal per tank)
  - 752 hours total time
  - No evidence of pre-impact **anomalies**

# Fuel Management

- Accident sequence
  - Second leg of trip
  - Picked up 3 passengers at intermediate airport
  - In cruise at 7,000 ft, engine lost power
  - Restarted, but subsequently lost power again
  - Forced landing approach to pasture
  - Collided with trees and large rolled bale of hay

# Fuel Management

- Post accident investigation
  - Fuel selector to right tank – 1 qt fuel present
  - Right tip tank breached but contained 4 ½ gal
  - Left fuel tank separated from airplane
  - Left tip tank breached but contained ½ gal
  - Before trip
    - 74 gal usable in main tanks
    - 20 gal usable in combined tip tanks
    - 25.4 gal drained to make weight & CG

# Fuel Management

- At takeoff for 2<sup>nd</sup> flight leg, about 48.6 gal in mains and 20 gal in tip tanks
- Performance calculations indicated that more than 48.6 gal would have been used by point of initial loss of power
- Likely used all main fuel but not tip fuel

# Fuel Management

## Probable Cause

The pilot's improper fuel management, which resulted in a total loss of engine power due to fuel starvation.

# Summary

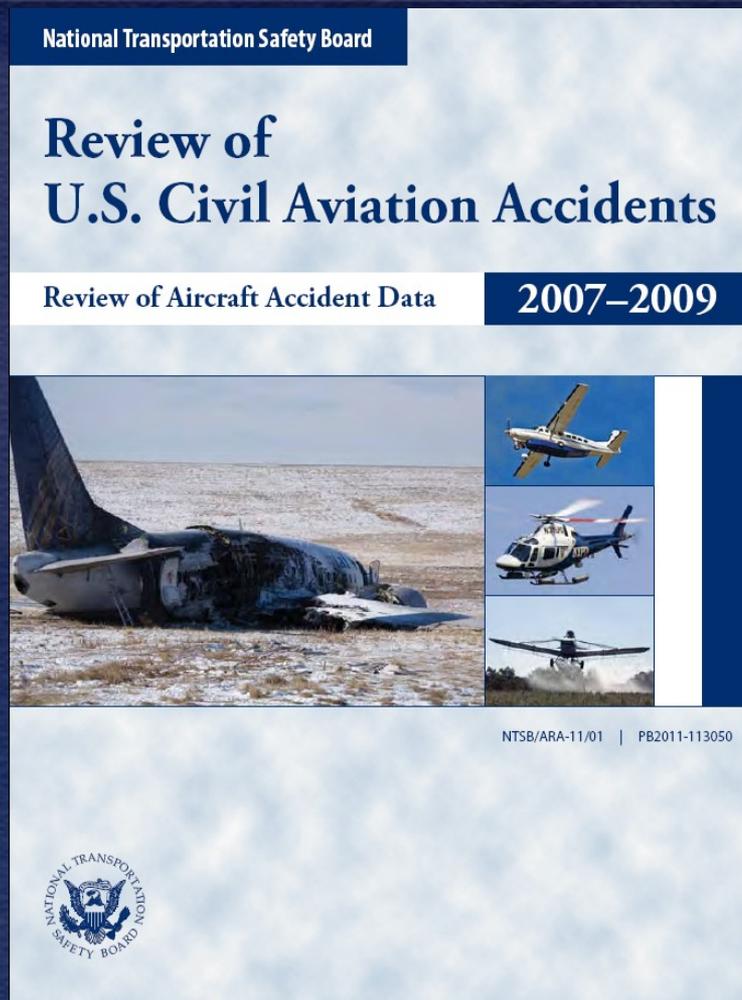
- Pilot proficiency
  - Launch into hard IMC with new instrument rating and no instrument instruction in airplane
  - System operational confusion on IFR departure
  - Fuel system mismanagement leading to forced landing
- Airworthiness
  - Takeoff night IFR with known deficiency

# Summary

- Preparation & planning
  - Launch into weather with destination forecast to be below minimums
  - Launch VFR into IMC conditions with no IFR flight plan or recorded weather briefing
- Decision making
  - Numerous points where a different decision would have lead to a different outcome



# You can try this at home



- NTSB accident files are on-line
- Many recent accident Dockets are on-line
  - Factual reports,
  - Interviews
  - Photographs
- [www.nts.gov](http://www.nts.gov)

<http://www.nts.gov/doclib/reports/2011/ARA1101.pdf>

# Douglas Adams

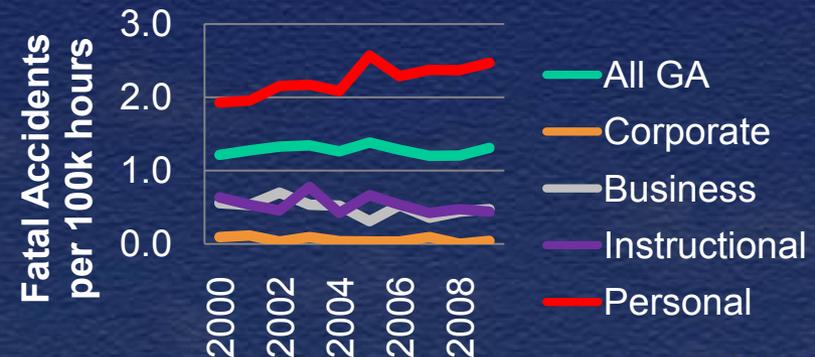
“Human beings, who are almost unique in having ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so.”

# A Personal Decision

The equipment we fly is capable of much greater safety than many pilots achieve.

At what accident rate do you want to operate by yourself or with family and friends; down with the Corporate and Business operators or at the Personal level?

**It's your choice!**





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