NTSB National Transportation Safety Board

# NTSB - Improving General Aviation Safety

Great Alaska Aviation Gathering
Alaska Airmen's Association
May 3rd, 2014

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

# N6529R - B36TC Bonanza

NTSB

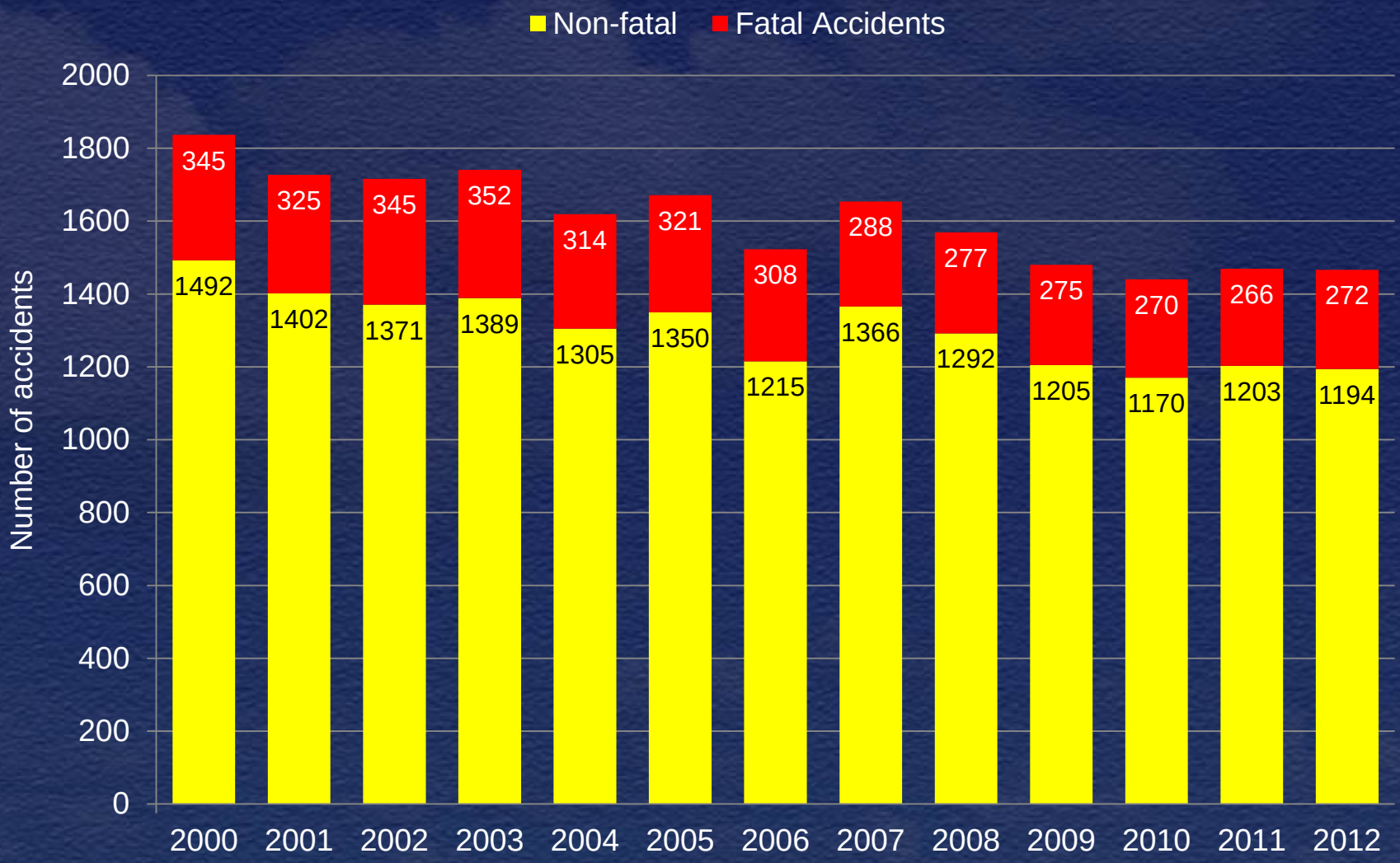
# NTSB Mission

The NTSB is an independent US federal agency charged with determining the probable cause(s) of transportation accidents, making recommendations to prevent their recurrence, conducting special studies and investigations, and coordinating resources to assist victims and their families after an accident.

# Topics

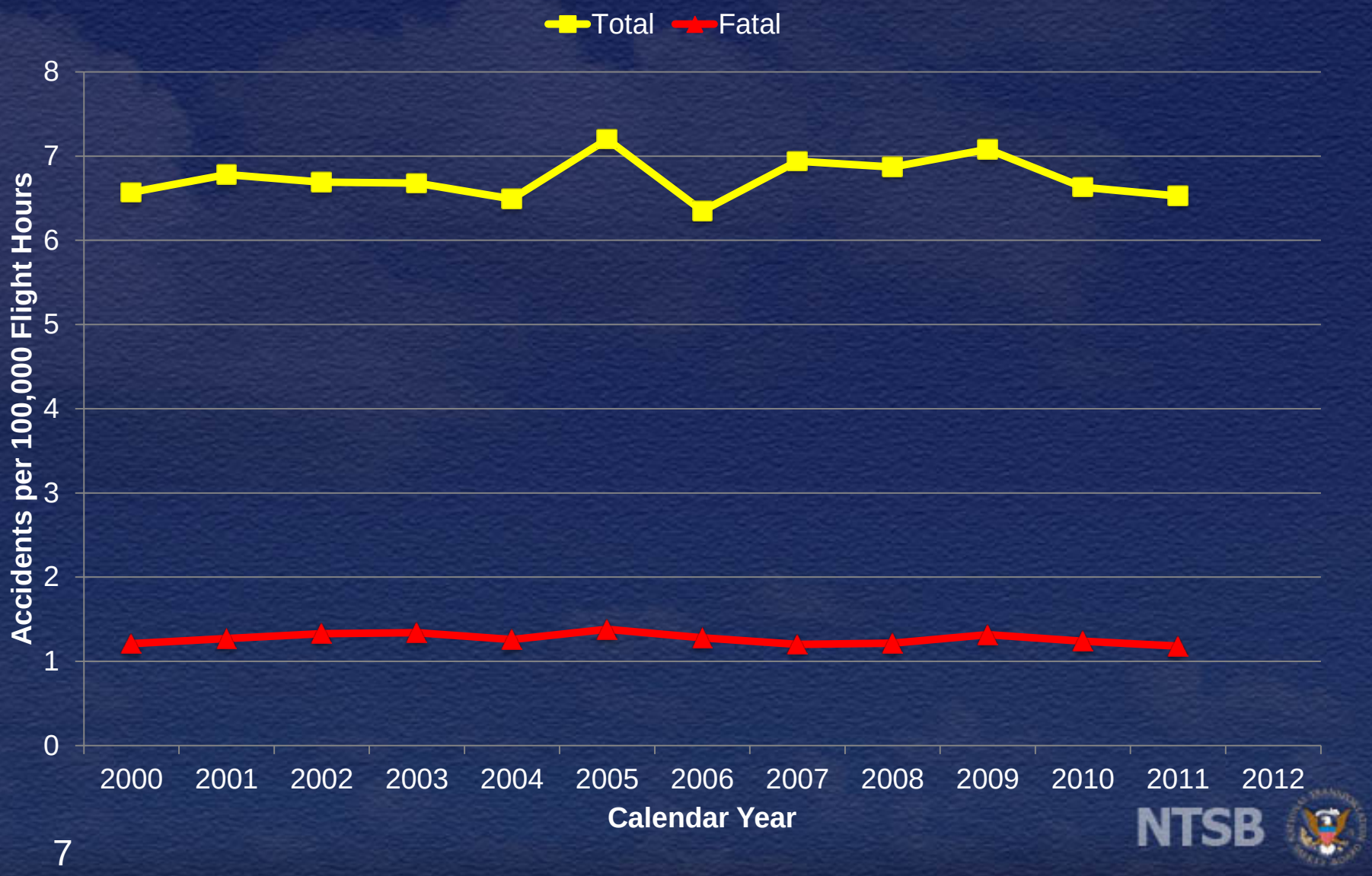
- General Aviation Accident Trends
- Most Wanted List
- GA Community Activities - JSC
- NTSB Safety Alerts

# All GA Accidents



# GA Accident-involved Fatalities

# GA Accident Rates

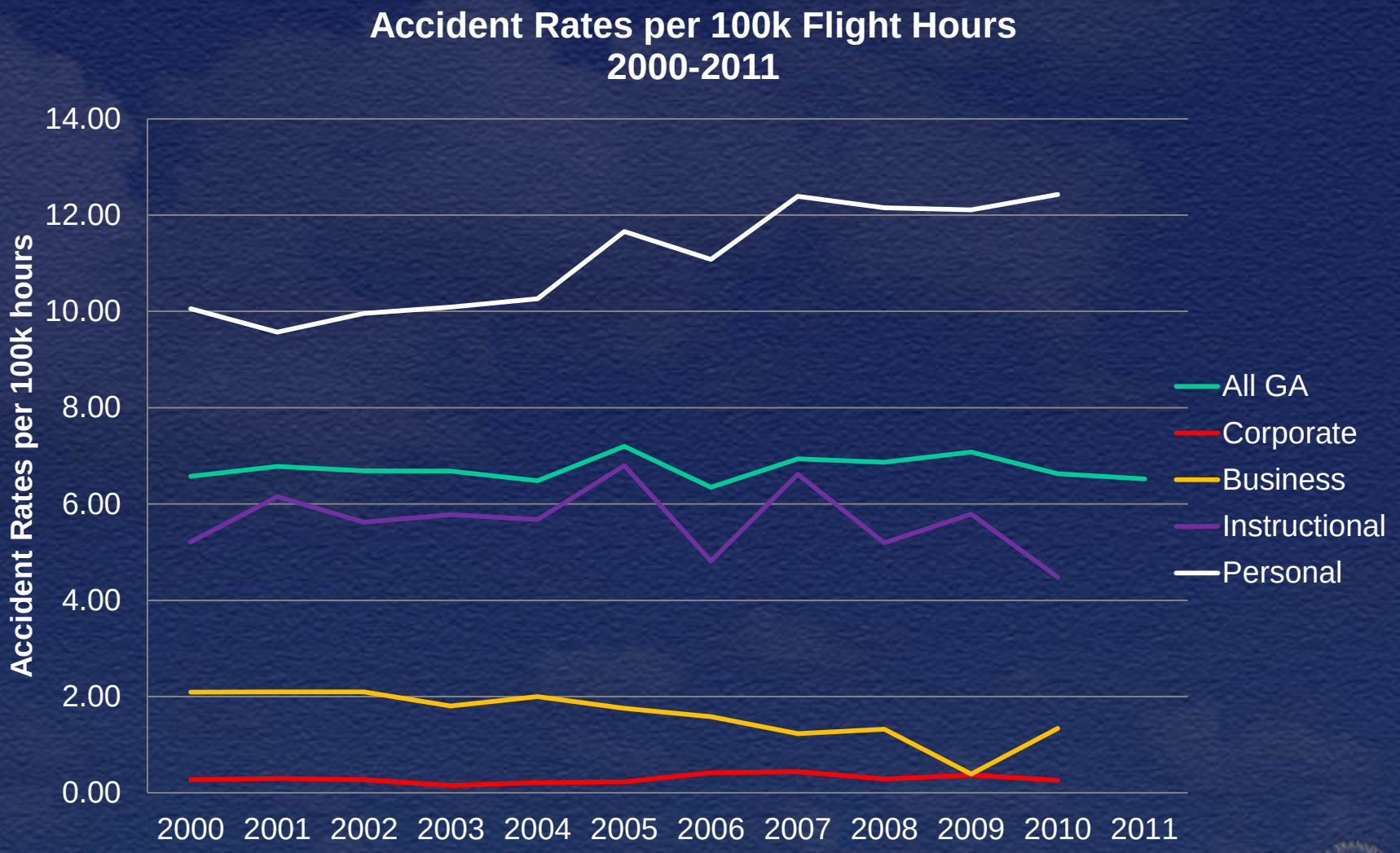



NTSB

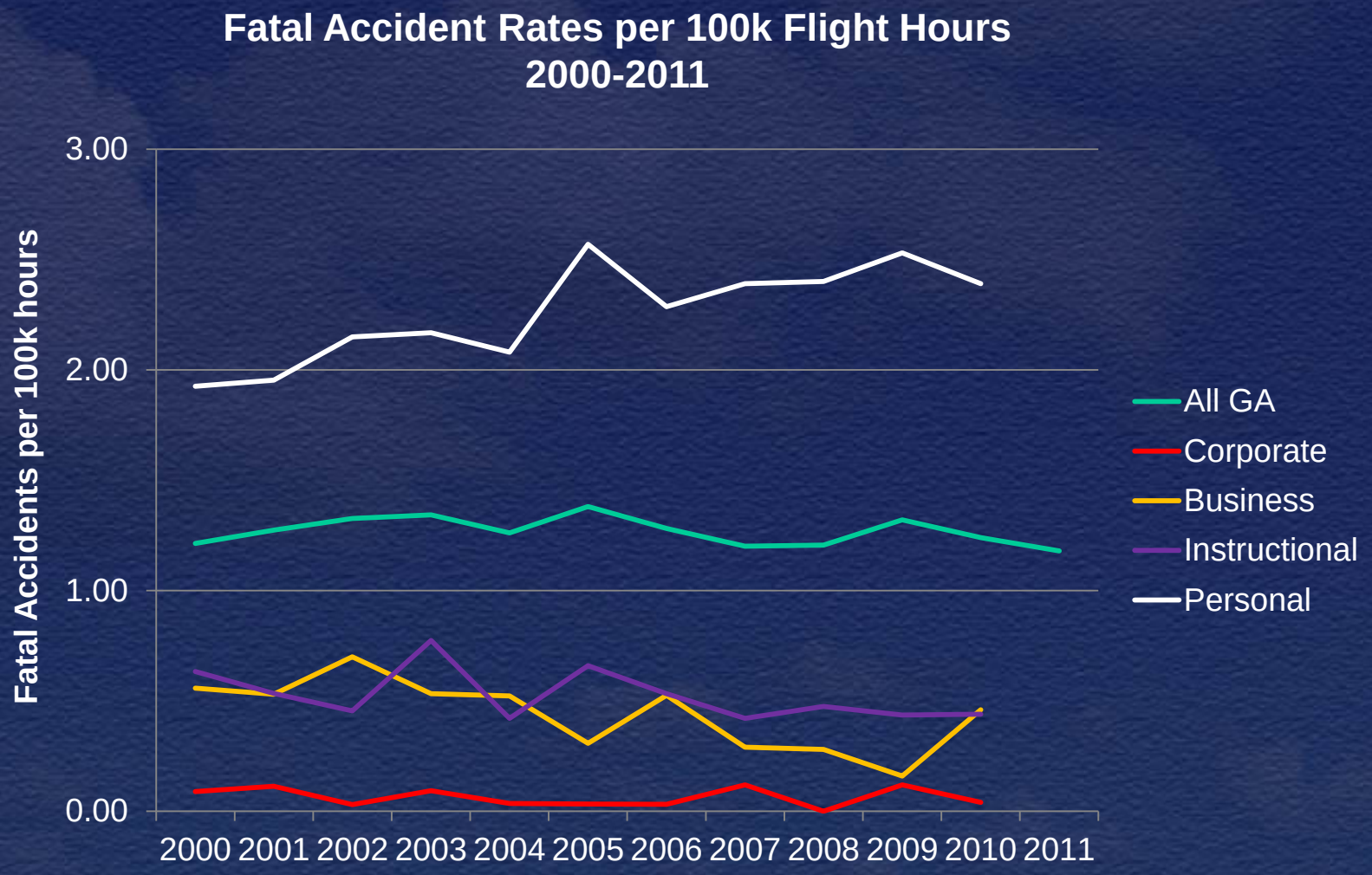
# Defining Fatal Accident Events All GA 2008-2012

- Loss of Control in Flight
- System/Component Failure – Powerplant
- Controlled Flight into Terrain
- Collision with Terrain/Object (non-CFIT)
- VFR Encounter with IMC
- System/Component Failure – Non-Powerplant

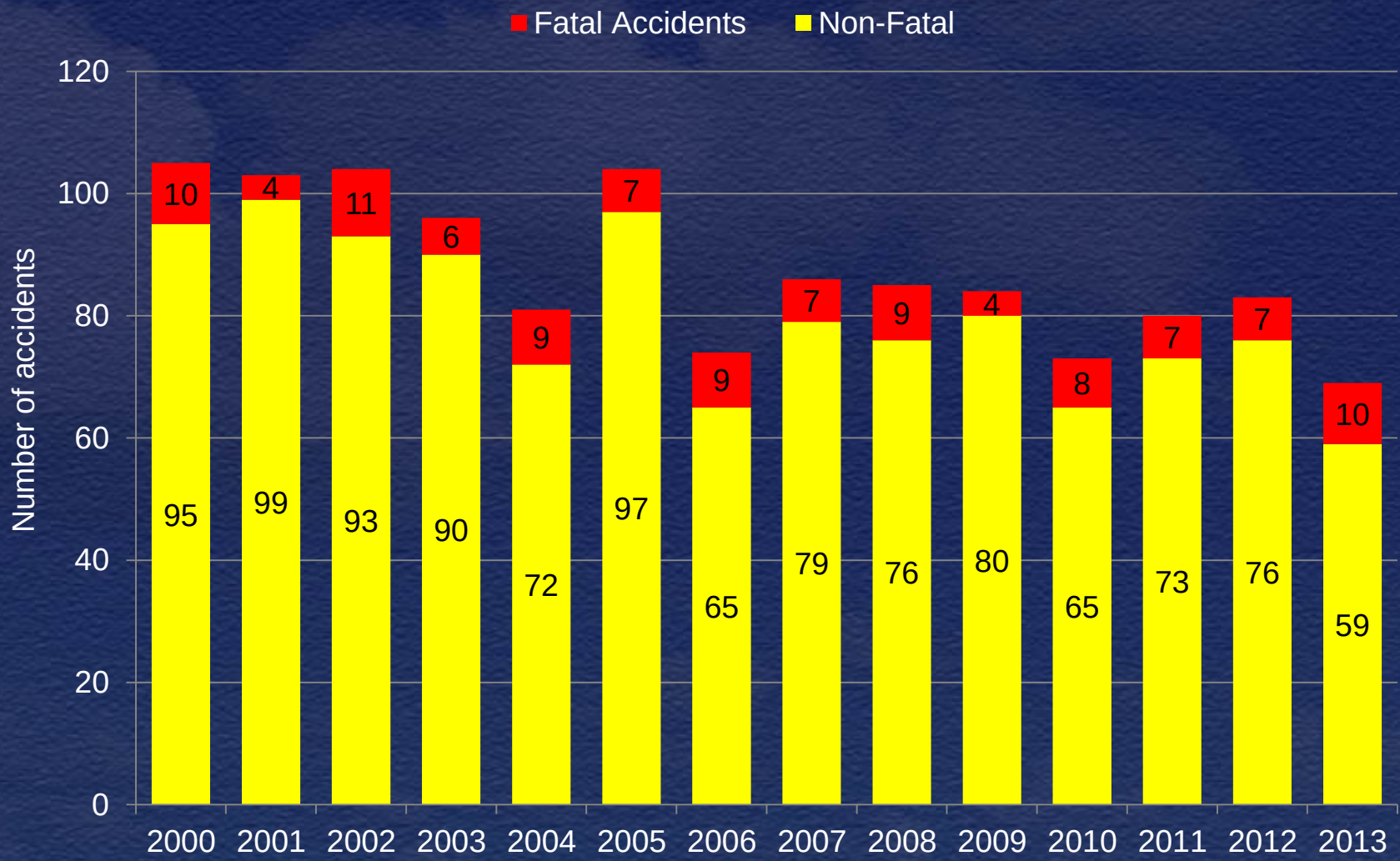
# Accident Rates per 100k Flight Hours



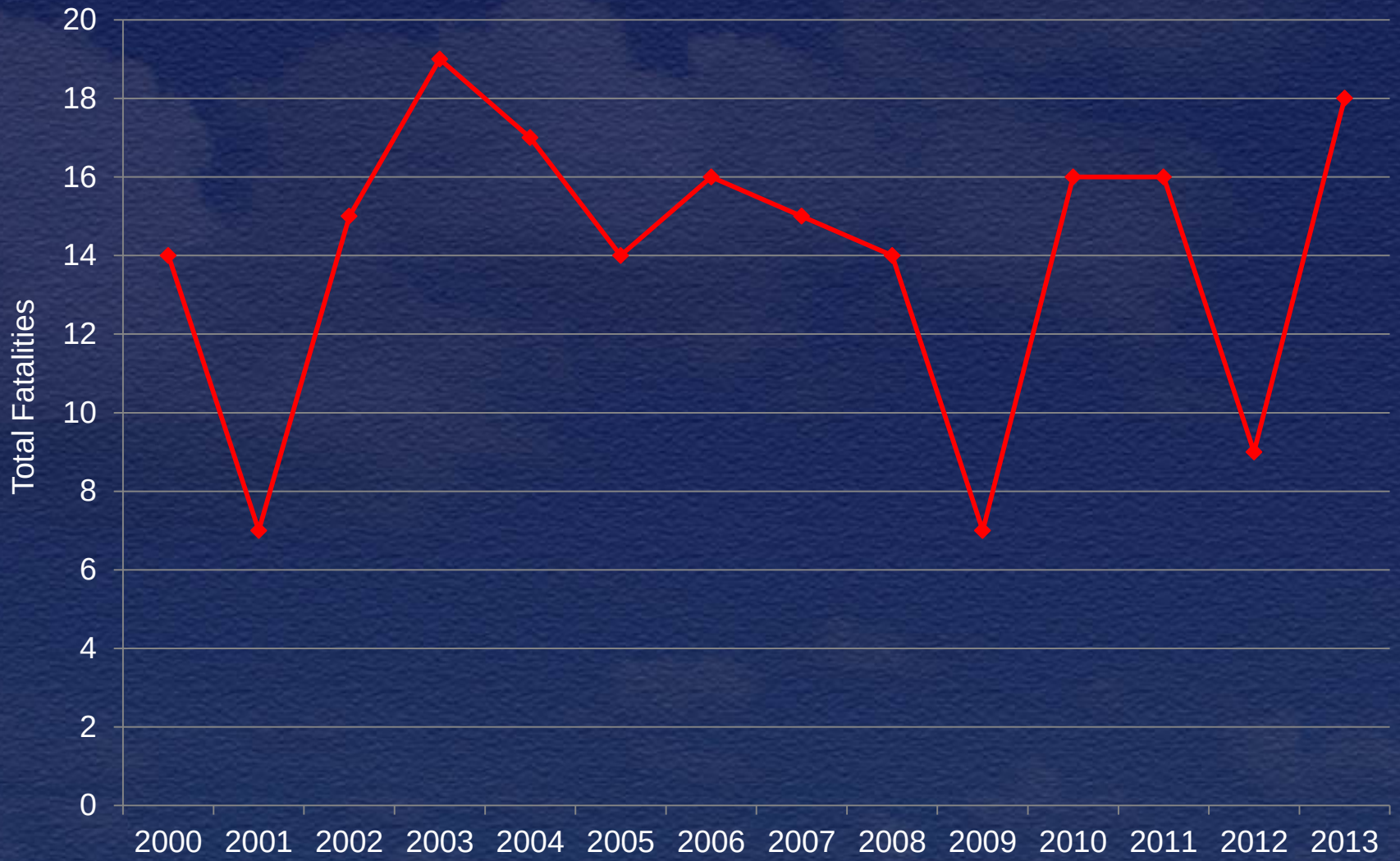
# Fatal Accident Rates per 100k Flight Hours



# Alaska – All GA Accidents



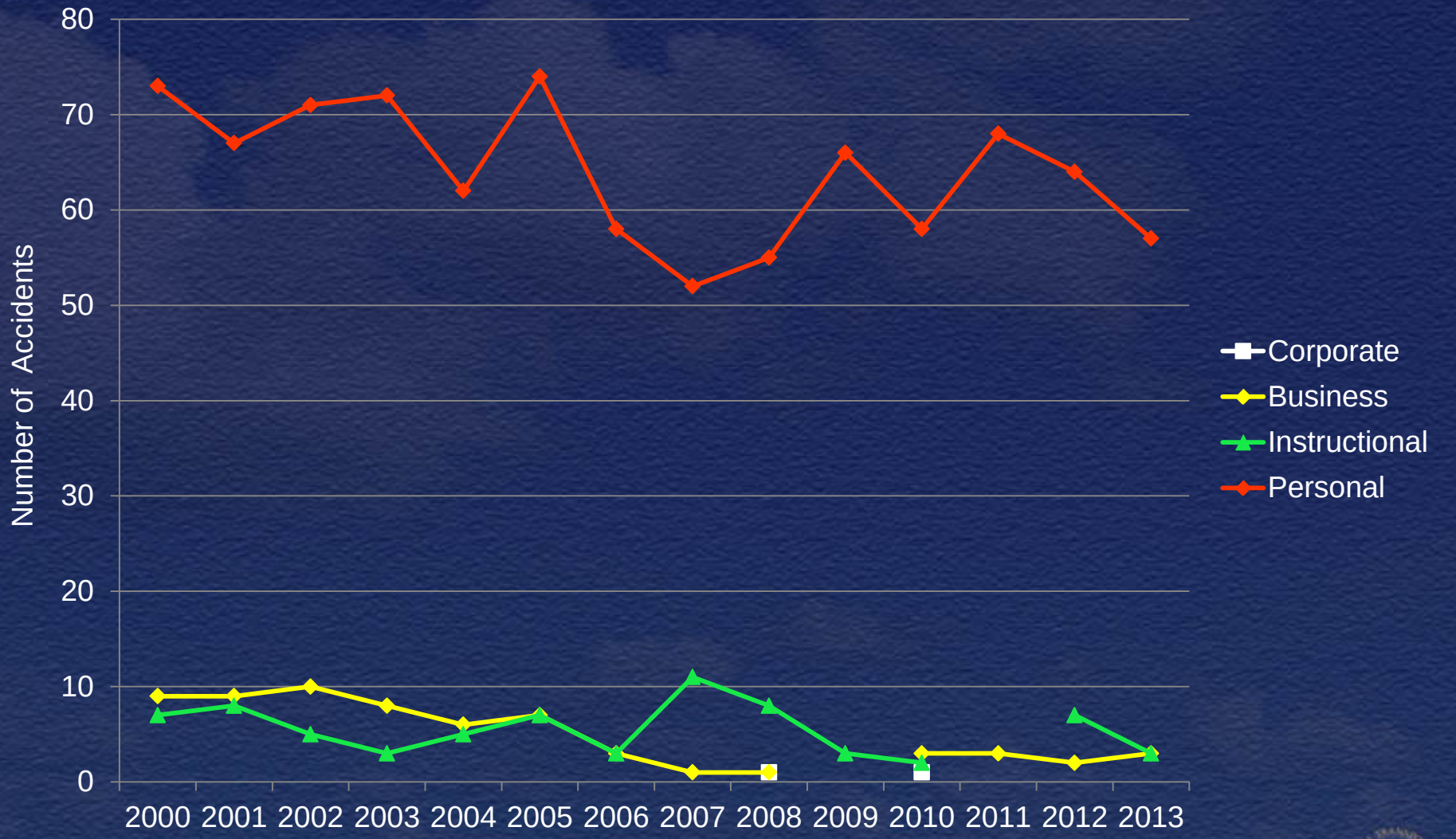
# Alaska – GA Accident-involved Fatalities




NTSB

12

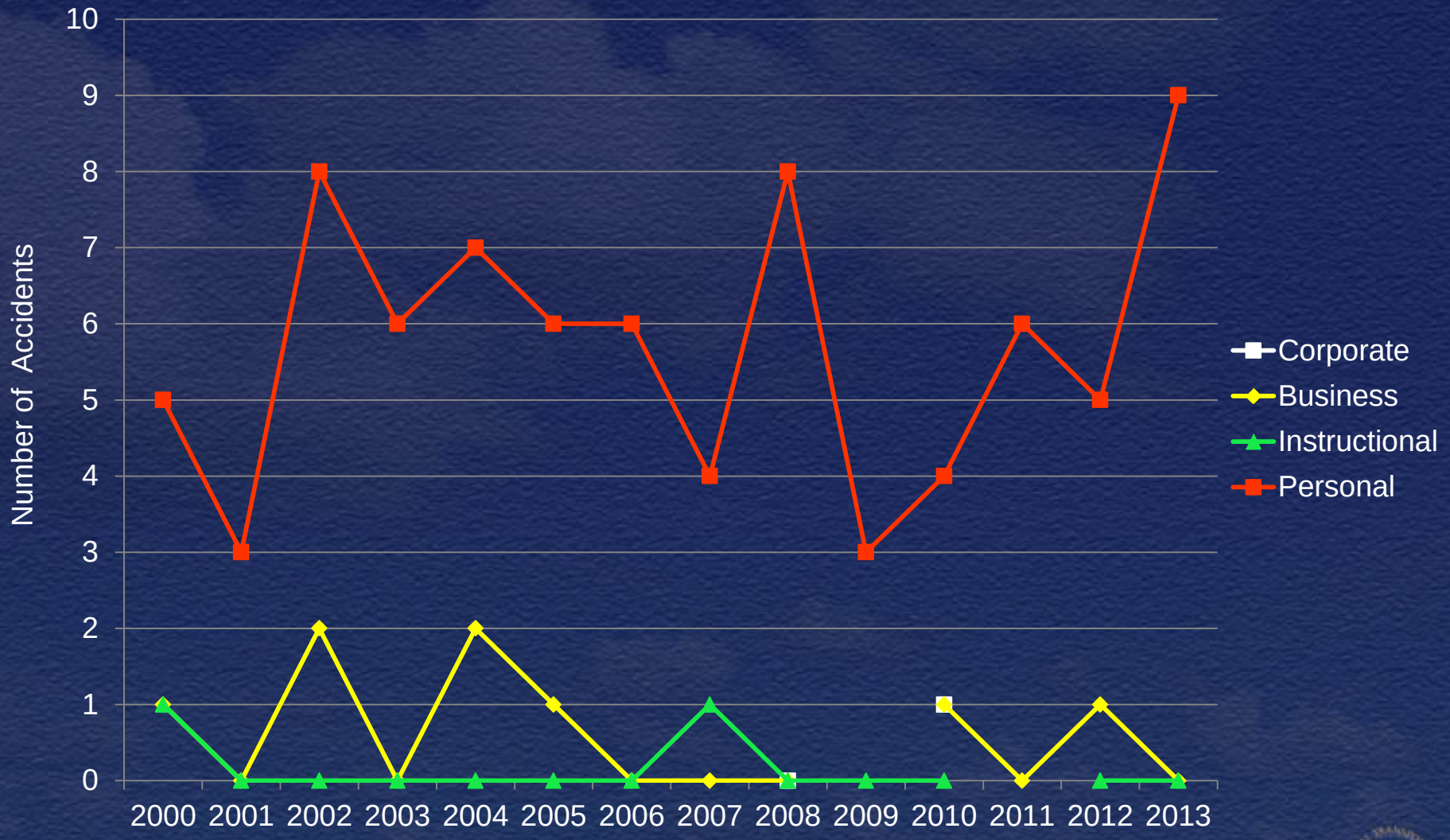
# Alaska – GA Accidents



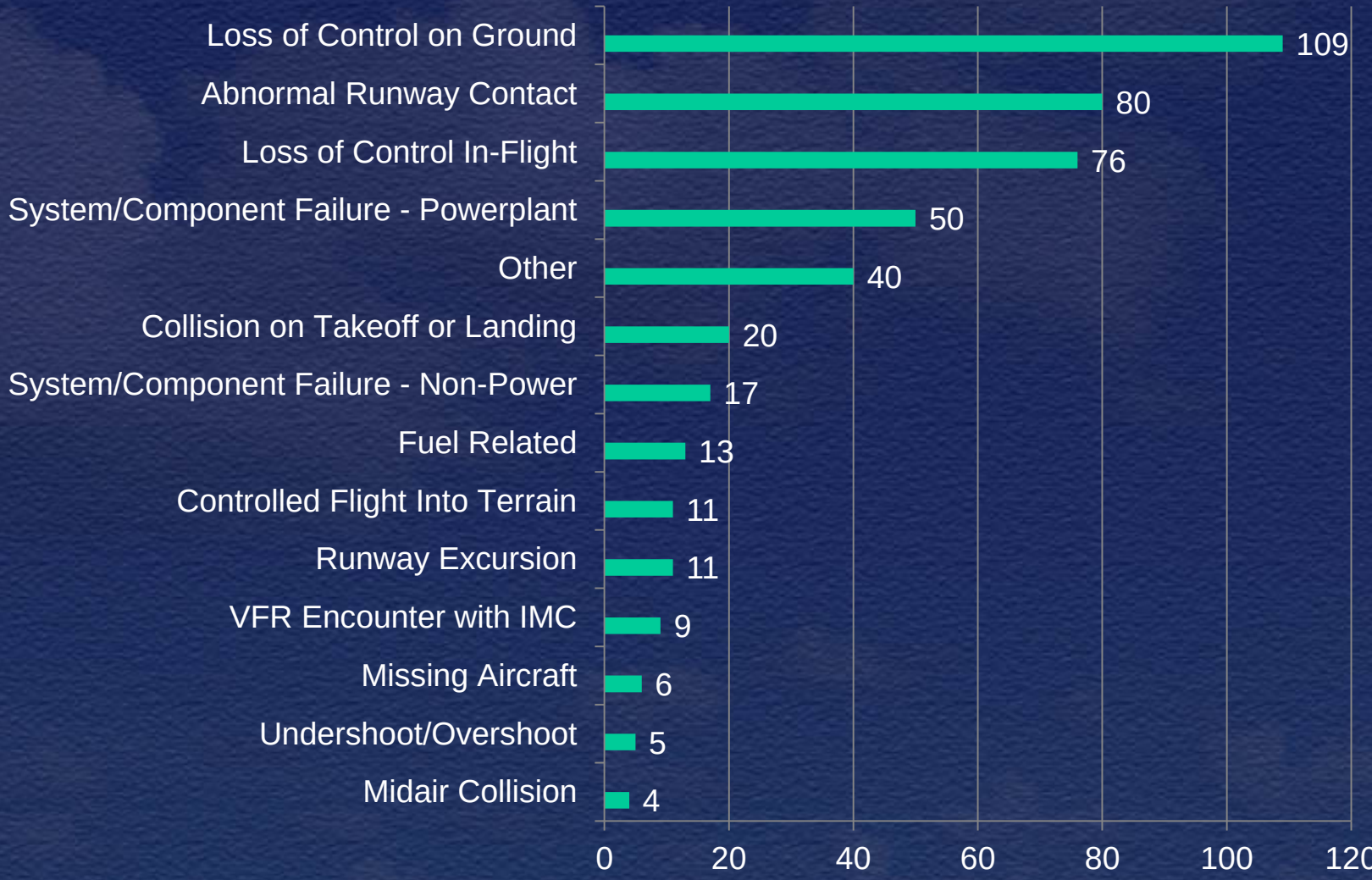



NTSB

# Alaska – Fatal Accidents

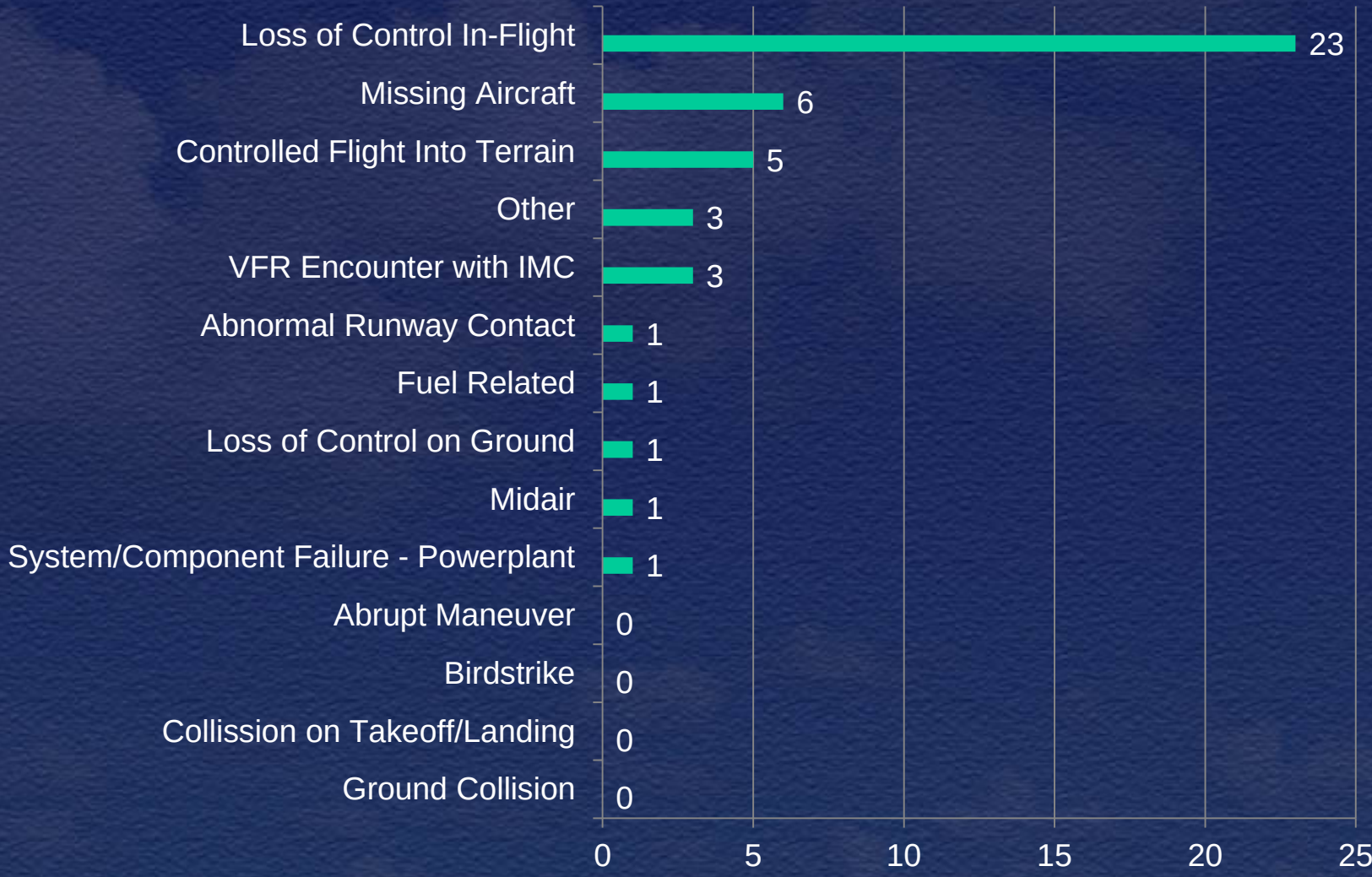


# Alaska GA Accidents by Category, 2008-2013



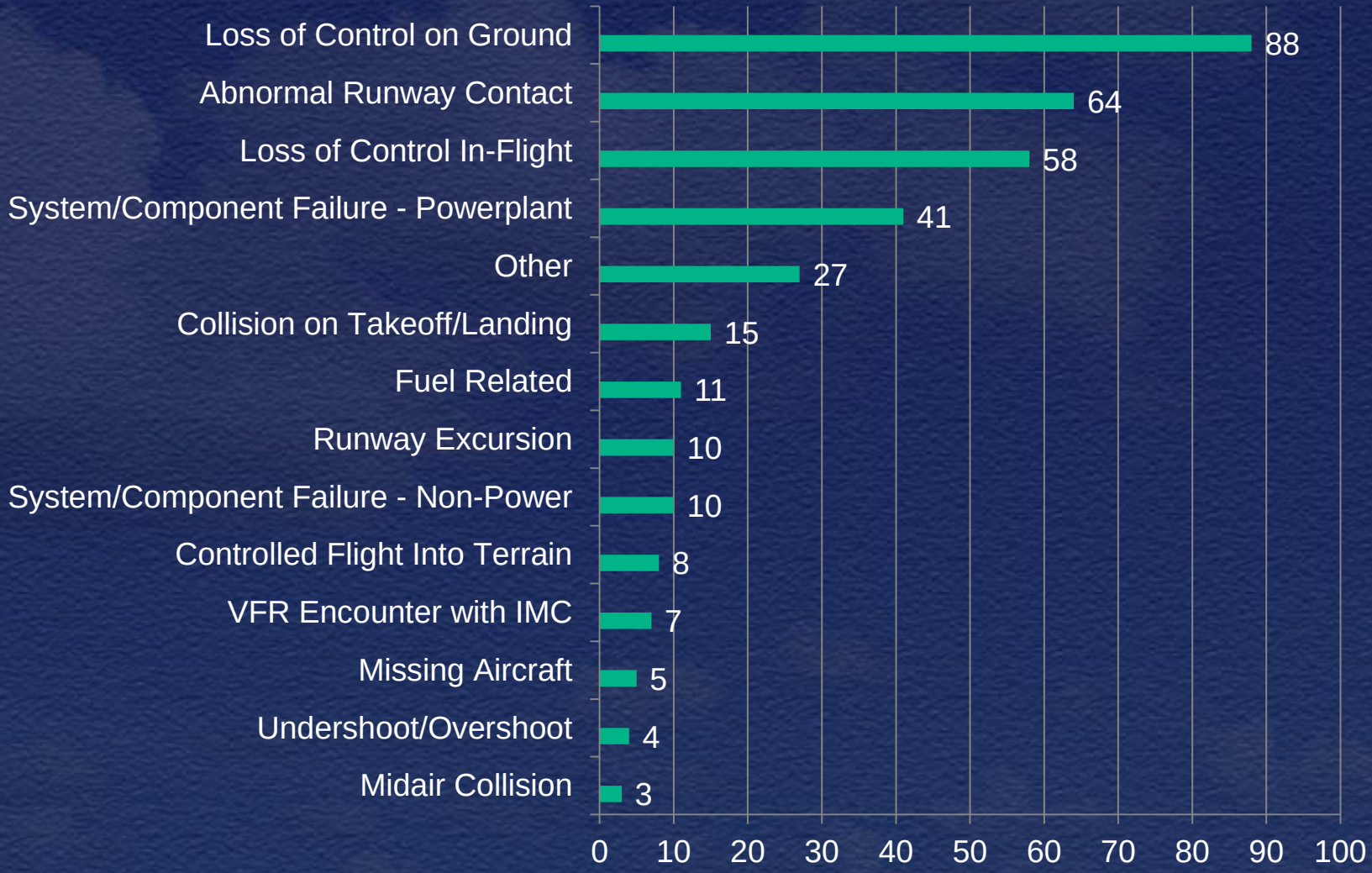

NTSB

# AK GA Fatal Accidents by Category, 2008-2013

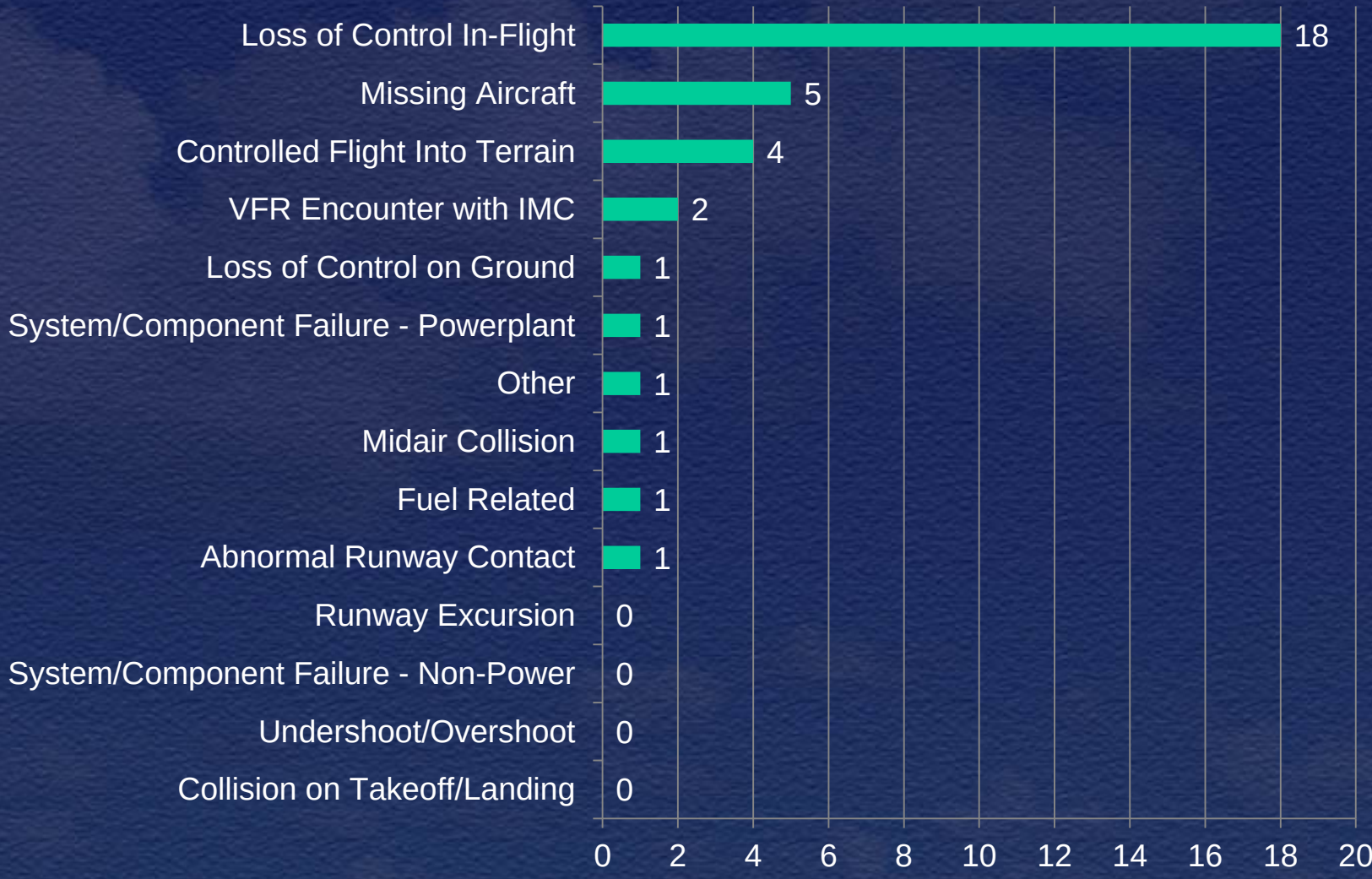



NTSB

# Alaska – GA Personal Flying, 2008-2013



# Alaska – Fatal GA-Personal Flying , 2008-2013



# Alaska – All GA Defining Fatal Accident Events,2008-2013

- Loss of Control In-Flight
- Missing Aircraft
- Controlled Flight into Terrain (CFIT)
- Other
- VFR Encounter with IMC

# Topics

- General Aviation Accident Trends
- Most Wanted List
- GA Community Activities - JSC
- NTSB Safety Alerts

# NTSB Most Wanted List

- General Aviation: Identify and Communicate Hazardous Weather
- Address Unique Characteristics of Helicopter Operations
- Advance Passenger Vessel Safety
- Eliminate Distraction in Transportation
- Eliminate Substance-Impaired Driving
- Enhance Pipeline Safety
- Improve Fire Safety in Transportation
- Implement Positive Train Control Systems
- Promote Operational Safety in Rail Mass Transit
- Strengthen Occupant Protection in Transportation

# 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 decade
  - Airline accident rate decreased more than 80%
- Personal flying accident rate
  - Increased 20% over last 10 years
  - Fatal rate increased 25% over that period

- ***GA safety needs attention***

# GA – 2014 Most Wanted List Item

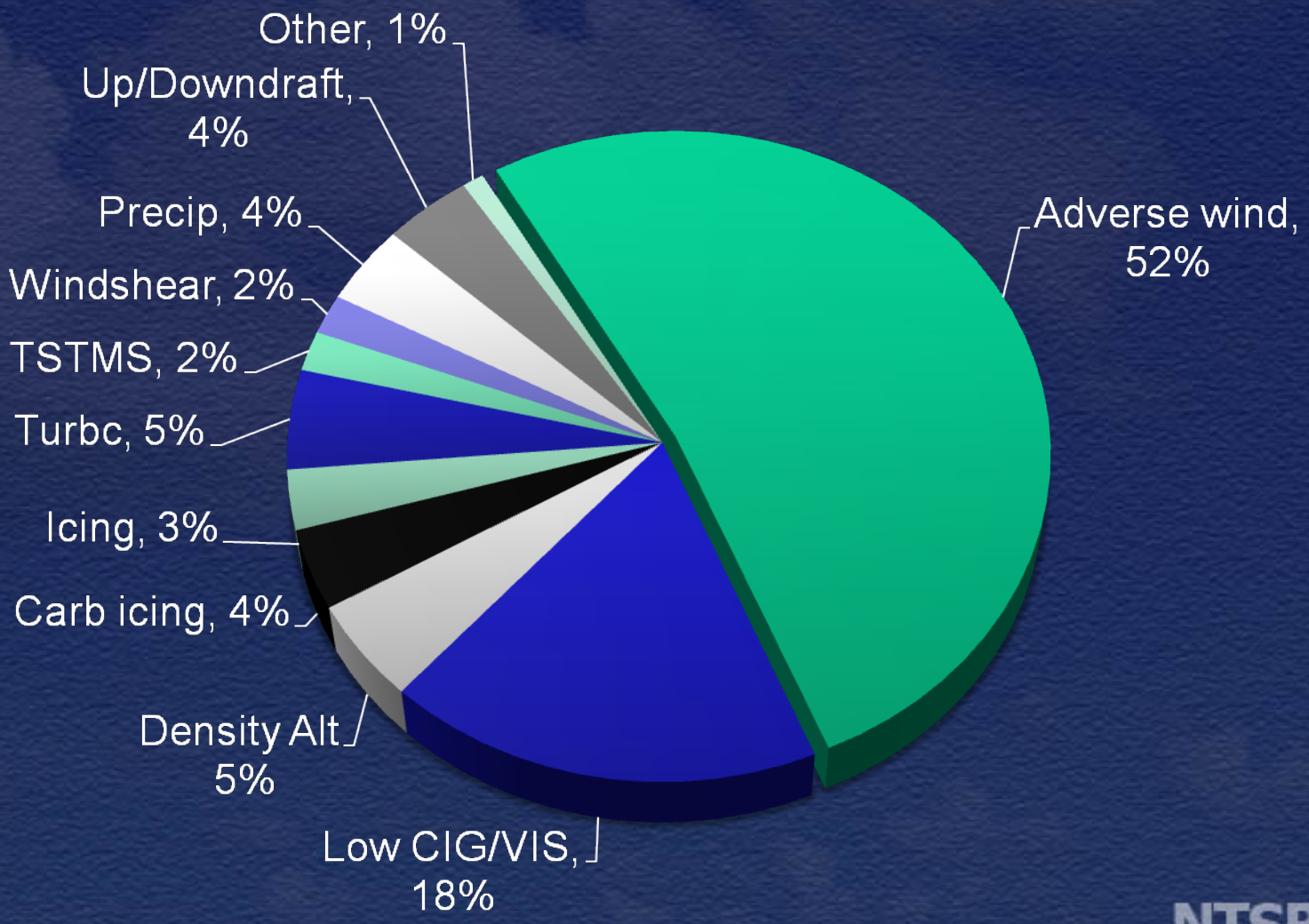
## Identify and communicate hazardous weather

- Focus areas
  - Creation of weather information and advisories
  - Collection and dissemination of weather information
  - Pilot training and operations

# Why focus on weather?

- Weather continues to play a major role in accidents and incidents
- Most accidents and incidents in weather are preventable

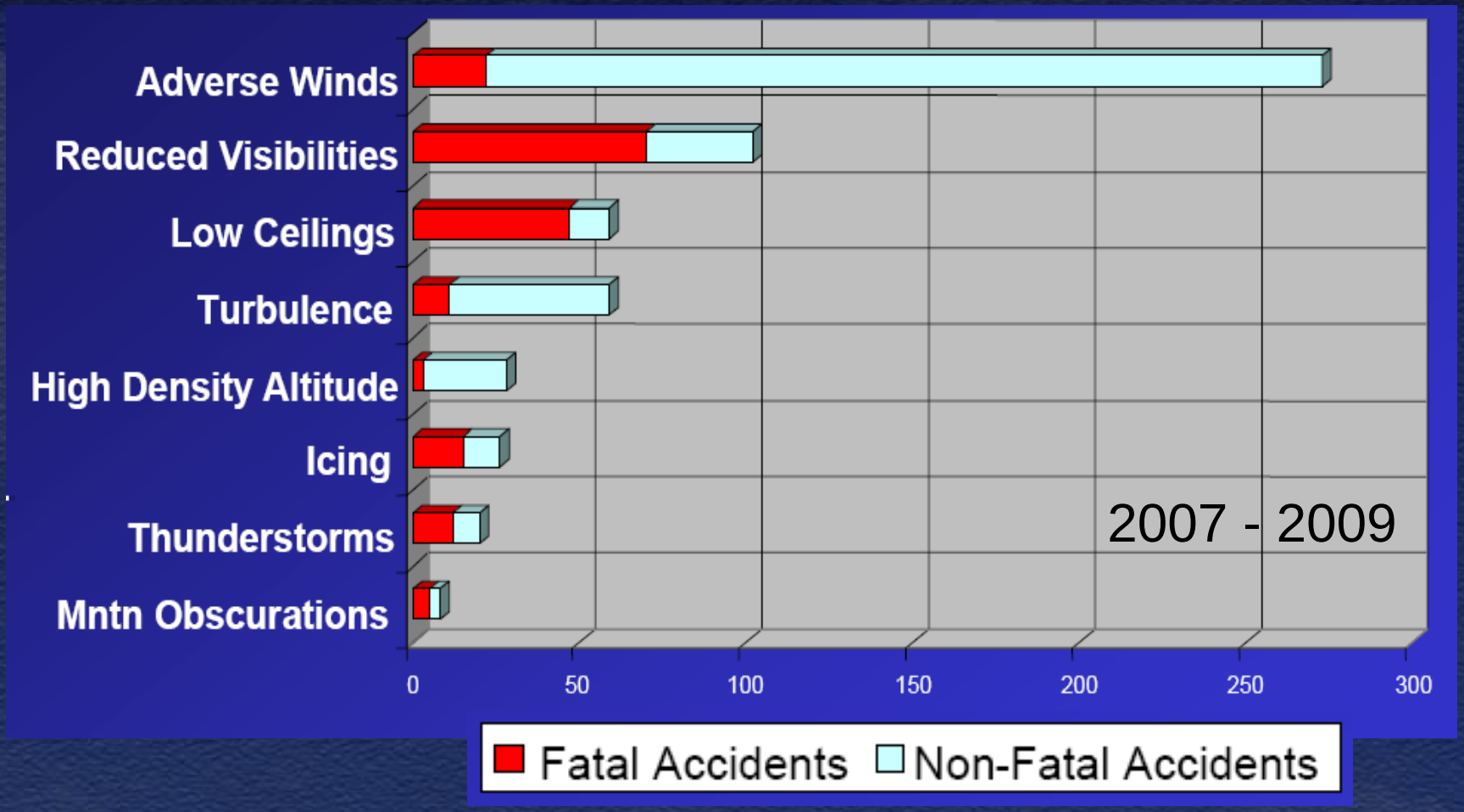
# Part 91 Weather Related Accidents 2007-2009






NTSB

# Weather Related Accidents




*Weather related accident categories can have high fatality rates!*



NTSB

# Areas of Concern

- The overall ATC/pilot/met culture
- Wx training for ATC and pilots
- NWS consistency in aviation information/products
- PIREPs

# ERA12LA500

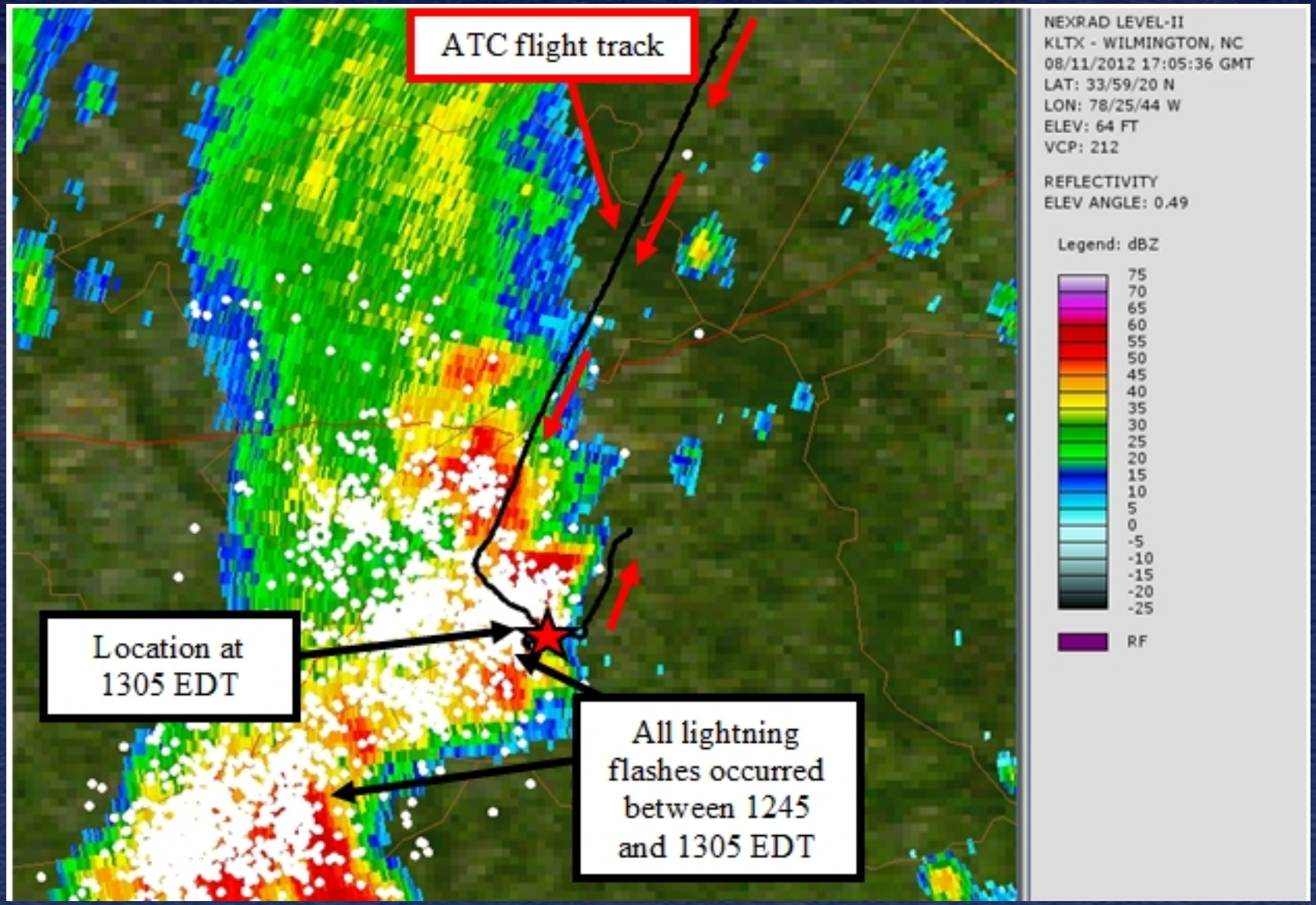
## Beech V35B, N11JK
## Effingham, SC
## August 11, 2012

- IFR flight
- Weather briefing obtained/ flight plan filed
- Non-fatal

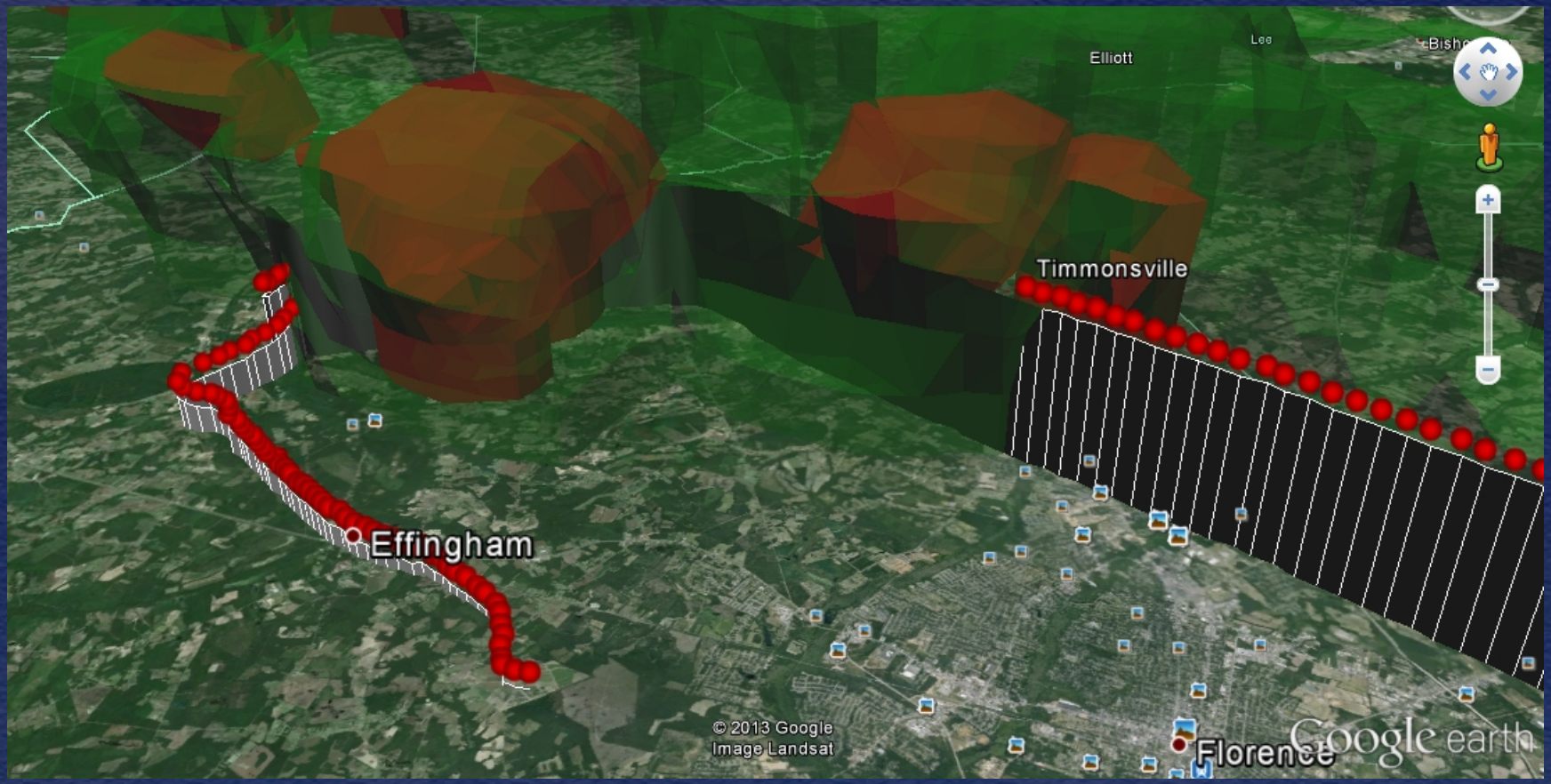
***KFLO 111730Z 22008G25KT 1 3/4SM +RA BR FEW033 BKN049 22/20 A2997 RMK AO2 PK WND 26033/1714 RAB14 P0008=***



NTSB

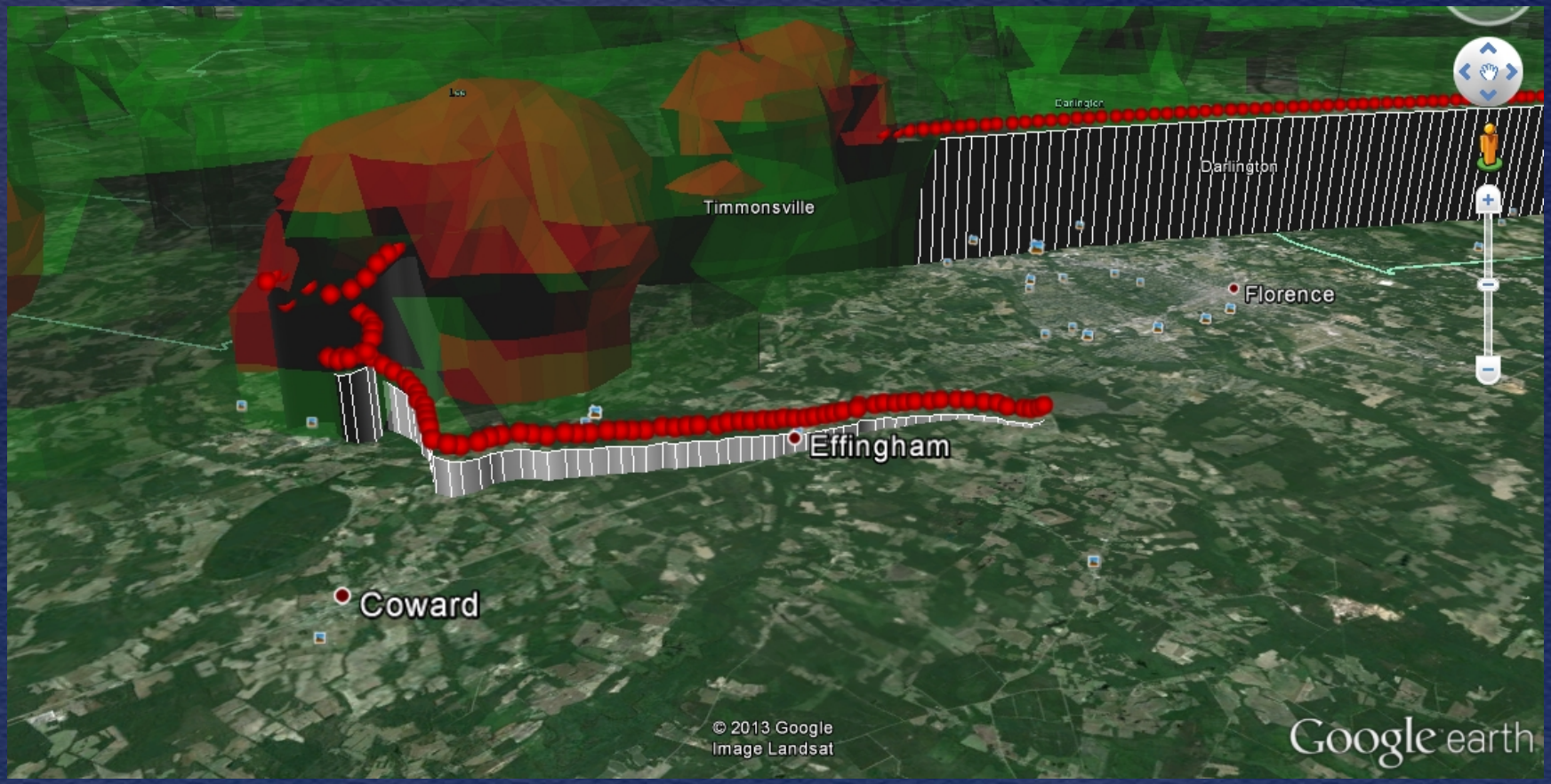

ATC flight track
Location at 1305 EDT
All lightning flashes occurred between 1245 and 1305 EDT
NEXRAD LEVEL-II
KLTX - WILMINGTON, NC
08/11/2012 17:05:36 GMT
LAT: 33/59/20 N
LON: 78/25/44 W
ELEV: 64 FT
VCP: 212
REFLECTIVITY
ELEV ANGLE: 0.49
Legend: dBZ
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
RF

Effingham
Florence
Timmonsville
Darlington
Witherspoon Island
Byrds Island
© 2013 Google
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth


Elliott
Timmonsville
Effingham
Florence
© 2013 Google
Image Landsat
Google earth



NTSB


Timmonsville
Darlington
Florence
Effingham
Coward
© 2013 Google
Image Landsat
Google earth



NTSB

# Pilot Reports - PIREPS

- PIREPs are a critical source of aviation weather information
- PIREPs allow ATC and meteorologists to keep all pilots aware of weather hazards
- **ALL** PIREPs (including *"null"* and *"light"* reports) are operationally significant to an aviation meteorologist !
- PIREPs can communicate better flying conditions, help reduce AIRMET size, and prevent weather advisories from "crying wolf"
- PIREPs can help warn pilots of conditions that may be worse than forecasted

# PIREPs assist with…

- AIRMETs
- SIGMETs
- CWAs
- TAFs
- Area Forecasts
- Computer models (turbulence forecasts, icing forecasts, etc…)
- Products developed by meteorologists and provided to ATC
- EVERYONE's situation awareness of weather

# NTSB interests

- *Hazardous Weather Identification and Communication in General Aviation* – NTSB Most Wanted List item
- NTSB recognizes importance of improving the PIREP "system" in NAS

  Pilots – increase volume of PIREPs and ensure reporting is accurate and detailed

  FAA – major changes to the way PIREPs are handled, ensuring more timely and accurate weather related information is received by the pilot

  NWS – consistent weighting of reports by meteorologists, so the best products are delivered to the flying community

- NTSB formally working with AOPA, FAA and NWS

# What should pilots do?

- Understand that YOUR reports provide the BEST situational information on aviation weather for other pilots, ATC, and meteorologists
- Give detailed PIREP's, especially when reporting hazardous weather conditions, to ATC or Flight Watch
- Report weather that does vary greatly from what is forecast
- Report weather that does not vary greatly from what is forecast
- Provide routine reports even if it's severe clear and no turbulence

# What should pilots do?

- To ensure your report gets to those who need it, begin communication with “I want to make a PIREP”
- Report icing and turbulence encounters in accordance with FAA criteria:
  - Icing (sections 7-1-21 and 7-1-22 in AIM)
  - Turbulence (section 7-1-23 in AIM)

AOPA PIREP resource:

http://flash.aopa.org/asf/skyspotter/swf/flash.cfm



NTSB

# Summary

- Identifying and Communicating Hazardous Weather - Most Wanted List
- Multi-year/on going effort
- Most weather related accidents and incidents are preventable

# Topics

- General Aviation Accident Trends
- Most Wanted List
- GA Community Activities - JSC
- NTSB Safety Alerts

# GA Joint Steering Committee

Adapt the successful CAST model

- Cooperative Government and Industry
- Data driven risk management
- Consensus decision-making
- Voluntary commitment
- Implementation focused

The GAJSC is a means to…

- *Focus limited Government/Industry resources to data-driven risks and solutions*

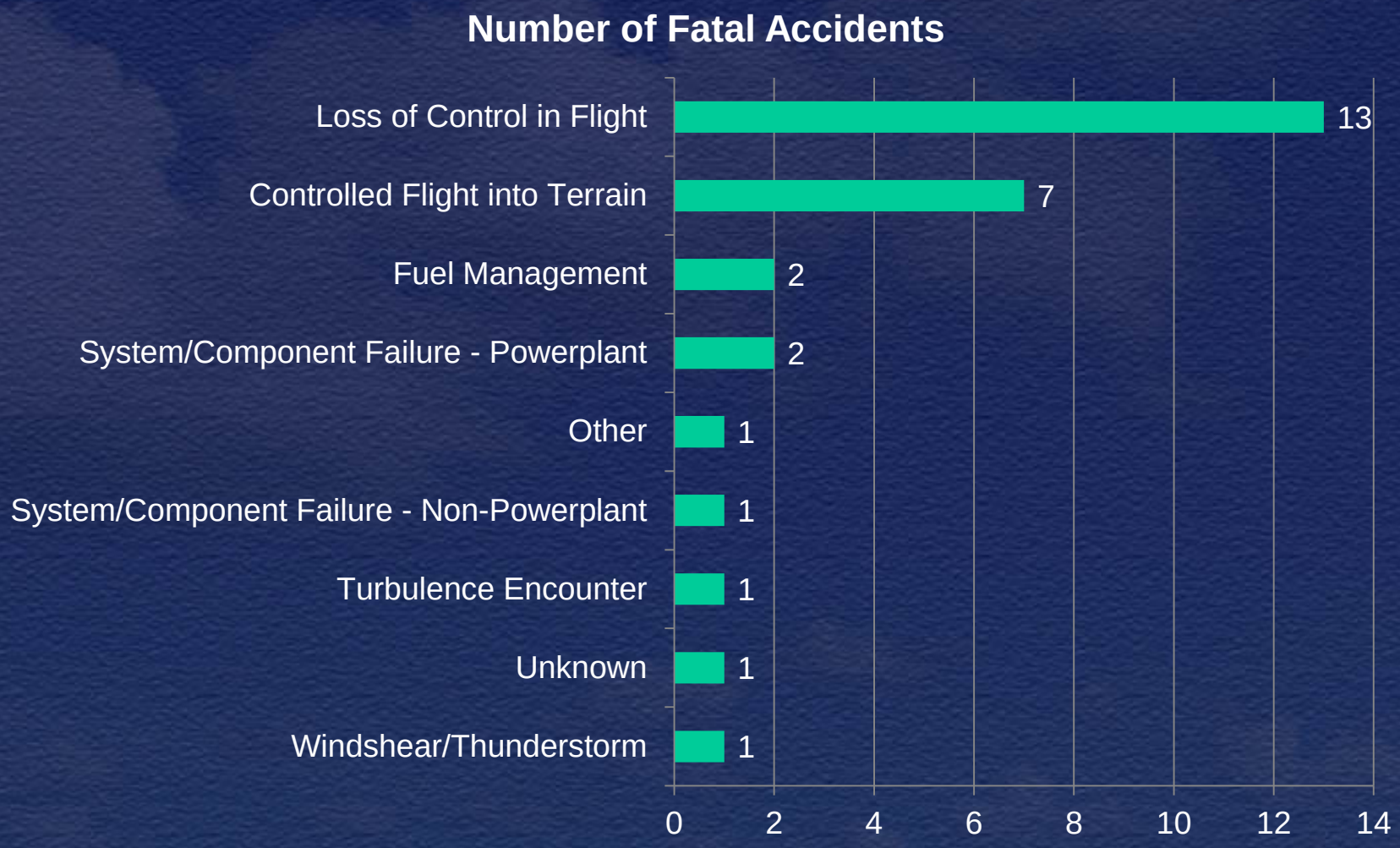
# GA JSC Organization

- Steering Committee
  - Co-chaired by FAA and AOPA
- Safety Analysis Team
  - Co-chaired by FAA and GAMA
- Working Group(s)
  - Composed of subject matter experts as appropriate and relevant to topic

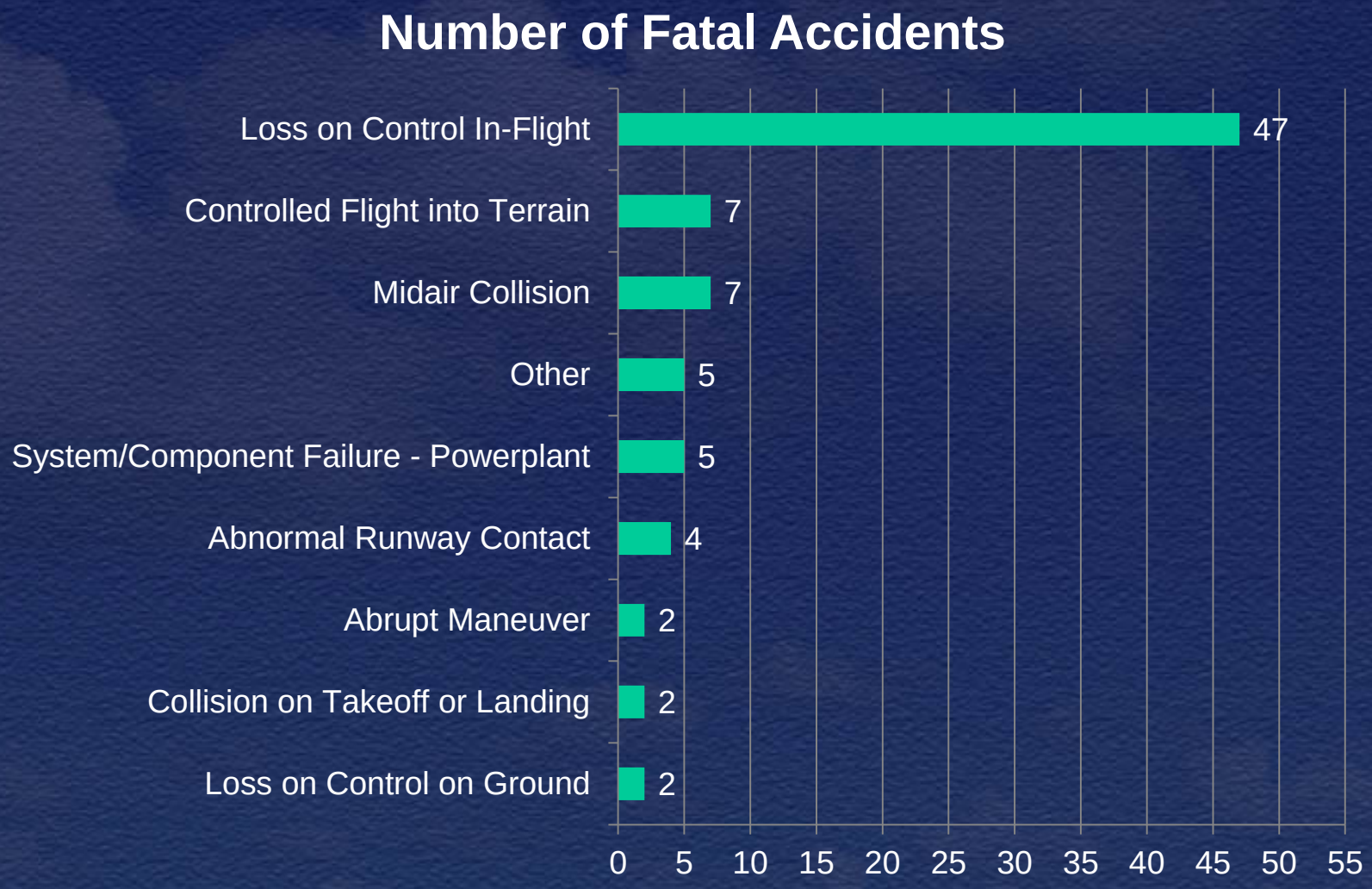
# GA JSC Participants

- Government
  - FAA, NASA, NTSB, NWS
- Industry/Operational Community
  - GAMA, EAA, NBAA, NATA, AOPA, SAFE, NAFI, FSF, UAA, Pegasus, SAMA, Insurance, Academia…

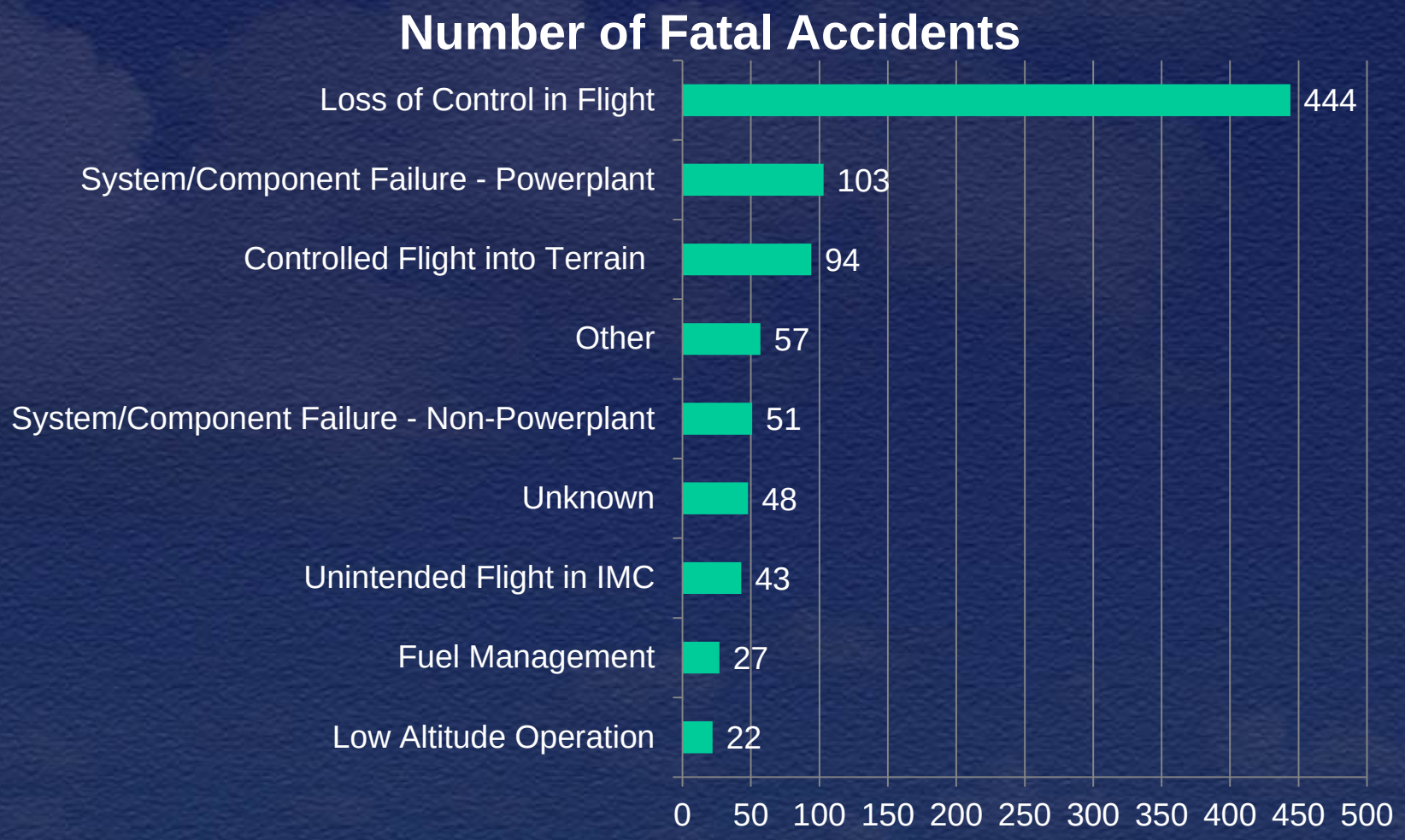
# Business Flying, 2008-2012



# Instructional Flying, 2008-2012



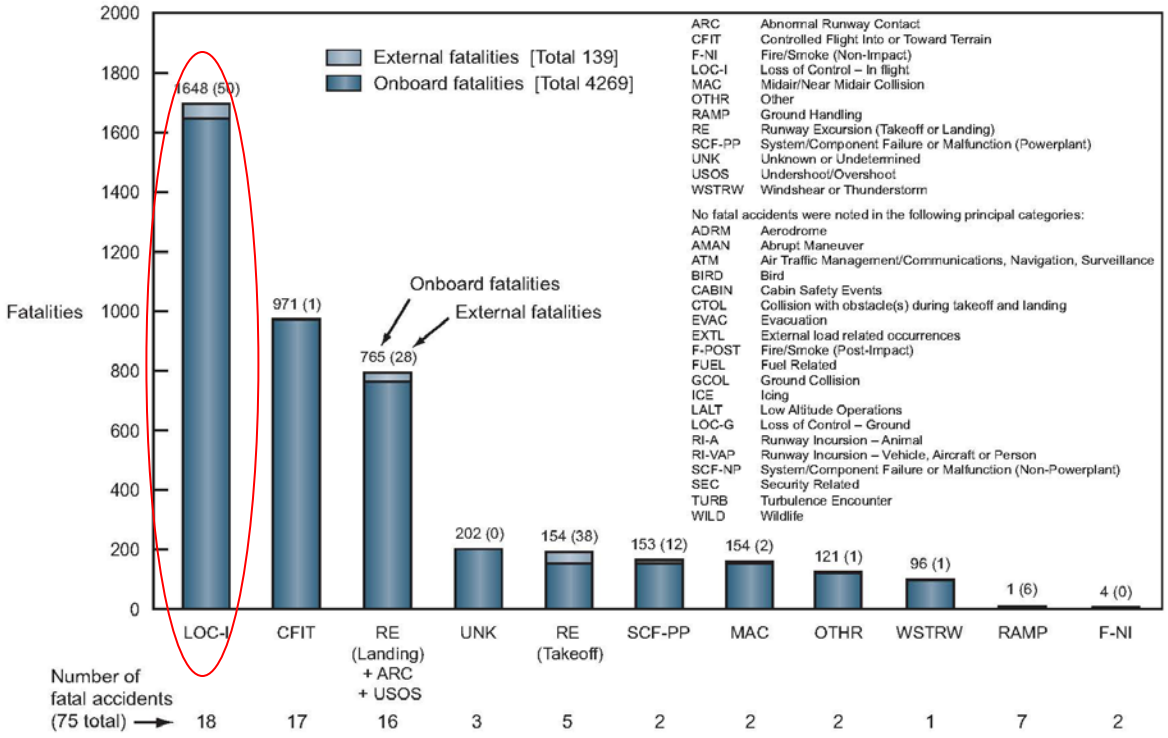
# Personal Flying, 2008-2012



# Boeing Annual Statistical Summery

## Fatalities by CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories

### Fatal Accidents – Worldwide Commercial Jet Fleet – 2003 Through 2012




*Note: Principal categories as assigned by CAST.*

*For a complete description of CICTT Aviation Occurrence Categories, go to: http://www.intlaviationstandards.org/*

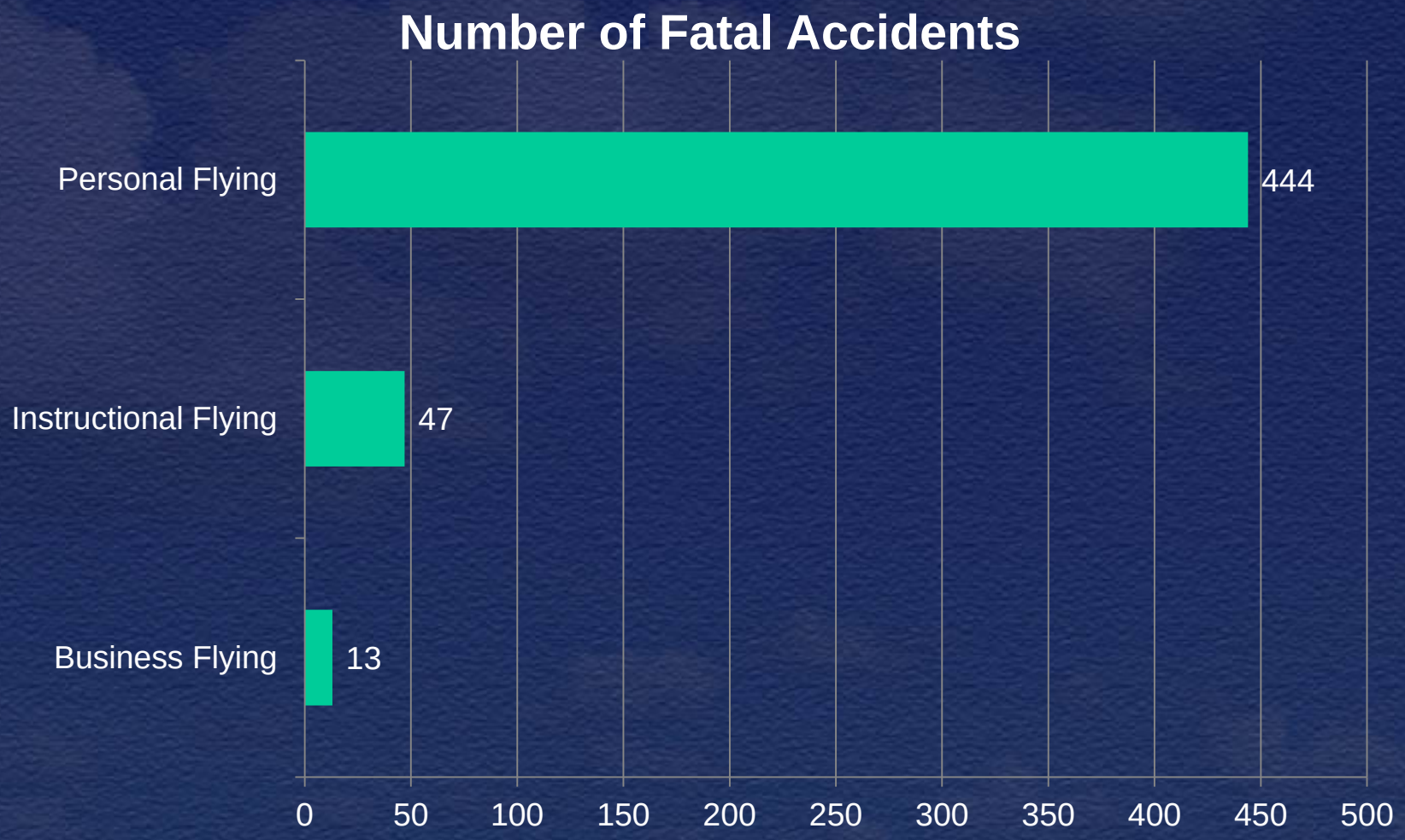


Copyright © 2013 Boeing. All rights reserved

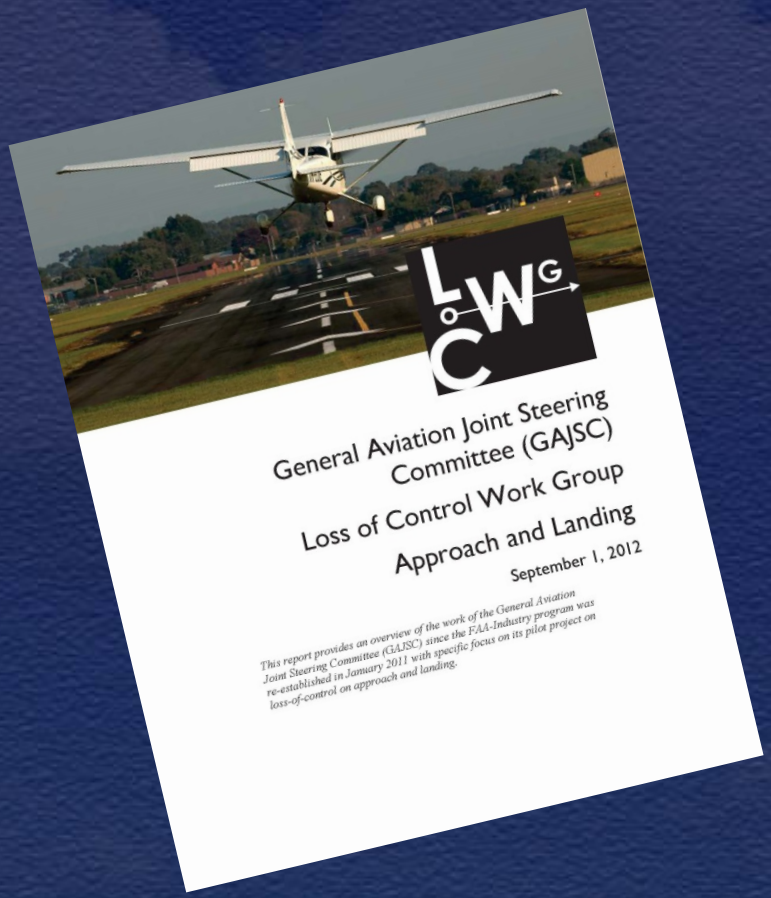
# Primary category of accidents

- Personal flying – LOC
- Instructional flying – LOC
- Business flying – LOC
- Airline flying – LOC

# Loss-of-Control 2008-2012



# Loss-of-control Working Group




## Safety Enhancements Identified

- AOA – New, Current, Retrofit
- Aeronautical Decision Making
- Stabilized Approach
- Single Pilot CRM
- Medication effects
- Weather Technologies
- Etc…

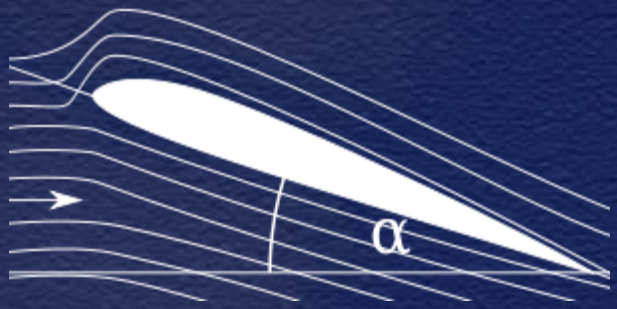
28 Safety Enhancements



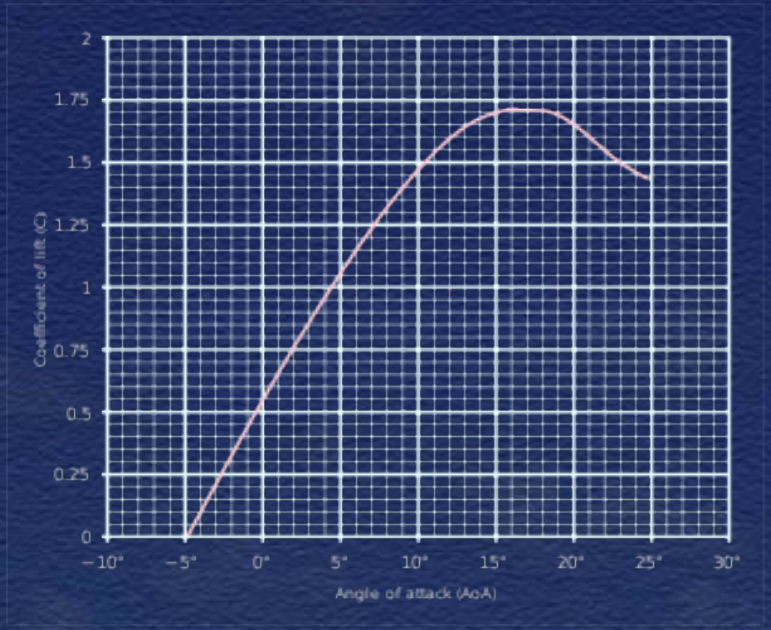
NTSB

# Lower Cost AOA Displays

- Stall occurs at a specific Angle-of-Attack
  - But not always at the same airspeed



First of AOA indicators built to ASTM stds and installed as a minor mod




FAA installation policy changed

NTSB

# Stall Recovery

- Reduce the angle-of-attack below maximum lift coefficient
  - Push over to eliminate stall warning
- Adjust throttle
  - Avoid overspeed and high G levels
- Level wings
- Pitch back to level
- Don’t try to “Power out of a stall”

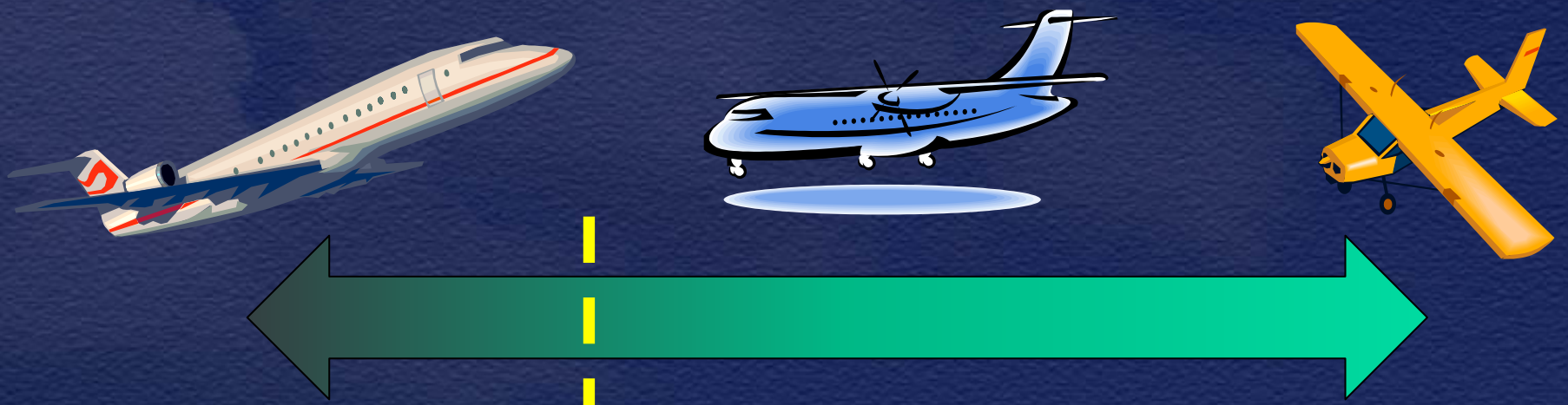
# Flight Recording Devices

- **Glass Panel (G1000, etc.)**
  - Able to record to SD card or USB
  - Can upload data directly to NGAFID

- **Traditional Instruments**
  - Apps – iOS & Android
    - Can Include AHRS & ADS-B
  - Portable Devices (GPS units)
  - Installed Recorders (Appareo)

53:21.03
MANEUVERING SPEED
110 KIAS
WARNING
N12345
ANN TEST
ALT BAT
AVIONICS
NAV
HDG
ALT
COM
CRS BARO
RANGE
PAN
FMS
TAS 104 KTS
GS 000 KTS
NAV
NAV-2
BEARING
NAV-1
AUX
NAV-1
RANGE
VIEW
CENTER
HDG BUG
ALT BUG
VSI BUG
BARO SET
29.82
001/000
010 NM
NAV 109
RPM
EGT
FUEL GAL
FULL
FUEL PUMP
BEACON
NAV LIGHT
PITOT HEAT
LAND LIGHT
TAXI LIGHT
STROBE LIGHT
OPEN
CLOSE
DOORS
BRAKES
INSTR BRT
CABIN FLOOD
VACUUM
ALTIMETER

# Two Paths for GA Flight Data…



**FOQA**

**NGAFID**

- Avionics (G1000, etc.)
- Installed Recorders (Appareo)
- Apps – iOS & Android (AHRS & ADS-B)
- Portable Devices (GPS units)

# Corporate FOQA

- Corporate programs are very similar to air carrier programs - *Just fewer operations and reports per operator – more operators*
- Nine corporate members
- Mixture of FOQA and ASAP(-like) data
- Community has an established structure for sharing lessons learned – *mini InfoShare*
- Looking at new uses for the data – *Risk based training*
- Opportunities for growth over this year

# FDM Benefits to the GA Community

- **Flight replay capability** of flights brought into the program
- **Comparison of self with the greater GA community**
- **Identification of potential risks** discovered in their own flight data
- ***Systemic Improvements in GA safety***

# Topics

- General Aviation Accident Trends
- Most Wanted List
- GA Community Activities - JSC
- NTSB Safety Alerts

# NTSB Safety Alerts

- Preventing Aerodynamic Stalls
- Reduced Visual References
- Is Your Aircraft Talking to You
- Risk Management for Pilots
- Risk Management for Mechanics

NTSB
SAFETY ALERT
National Transportation Safety Board

**Preventing Rote Callouts**

**Confirm Cockpit Indications Before Making Callouts**

*The problem*

- Recent National Transportation Safety Board investigations have identified several instances in which pilots made callouts without first verifying the cockpit indication that corresponded with the callout.
- In these cases, the pilots acted out of habit and made callouts based on what they expected to see regarding the cockpit indication but did not take the time to verify it.
- Examples of accident investigations include the following:
  - A Boeing 757 overran the end of the runway while landing in Jackson Hole, Wyoming. The captain called out "deployed" even though the speedbrakes were not deployed and "two in reverse" even though neither reverser was fully deployed. Both the speedbrakes and the thrust reversers had mechanical defects, and the captain did not manually deploy the speedbrakes when they failed to deploy automatically because, based on his rote callout, he did not recognize that they did not deploy.[1]
  - A Hawker 800 crashed after a late go-around attempt in Owatonna, Minnesota. After touchdown, the copilot called out "we're dumped," but the flaps were not all the way in the lift dump position and the airplane did not slow down as expected, leading the pilot to attempt to go around.[2]

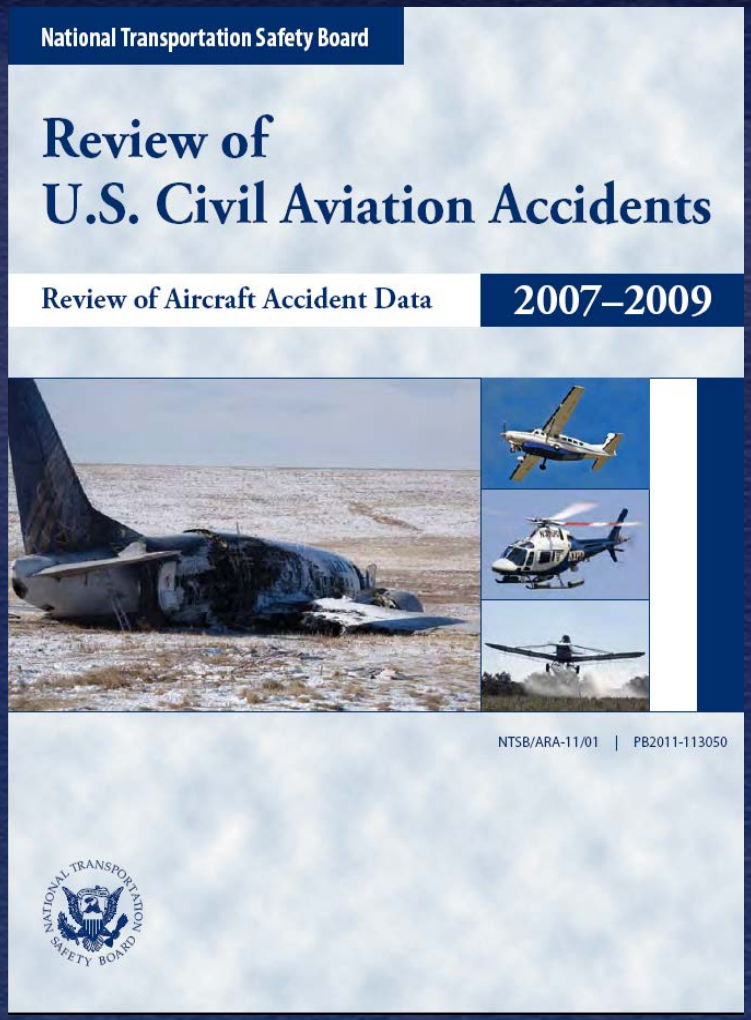
[1] Runway Overrun, American Airlines Flight 2253, Boeing 757-200, N668AA, Jackson Hole, Wyoming, December 29, 2010, Aircraft Accident Report NTSB/AAB-12/01 (Washington, DC: National Transportation Safety Board, 2012).
[2] Crash During Attempted Go-Around After Landing, East Coast Jets Flight 81, Hawker Beechcraft Corporation 125-800A, N818MV, Owatonna, Minnesota, July 31, 2008, Aircraft Accident Report NTSB/AAR-11/01 (Washington, DC: National Transportation Safety Board, 2011).

Available on www.NTSB.gov

# Safety Alert Video Preview

NTSB

# Accident Investigations




- NTSB accident files are on-line
- Many recent accident Dockets are on-line
  - Factual reports,
  - Interviews
  - Photographs
- www.ntsb.gov

http://www.ntsb.gov/doclib/reports/2011/ARA1101.pdf



NTSB

# Alfred Sheinwold

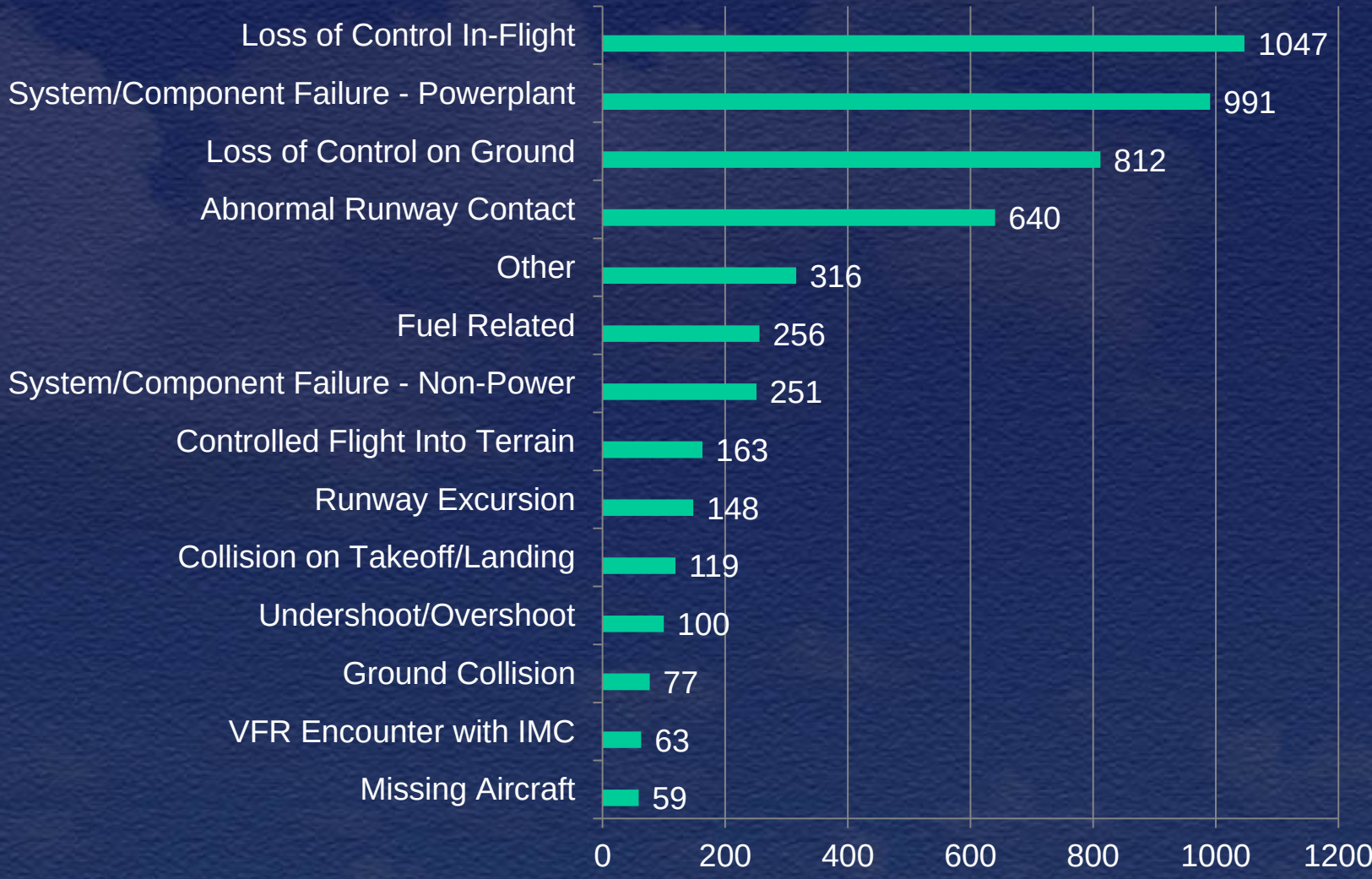
"Learn all you can from the mistakes of others.  You won't have time to make them all yourself"

# 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."

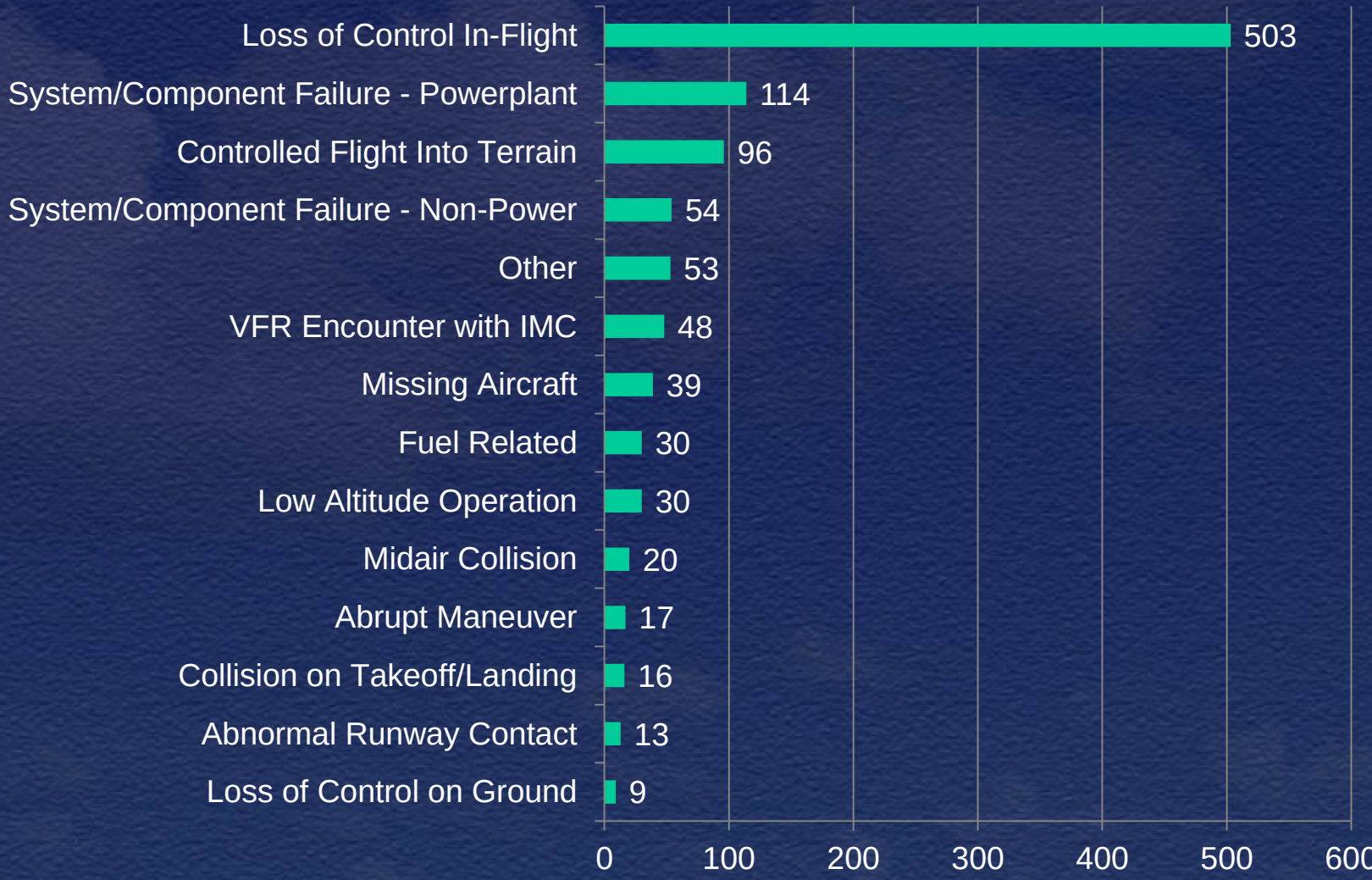
# NTSB

# GA-Personal (excludes Alaska), 2008-2013



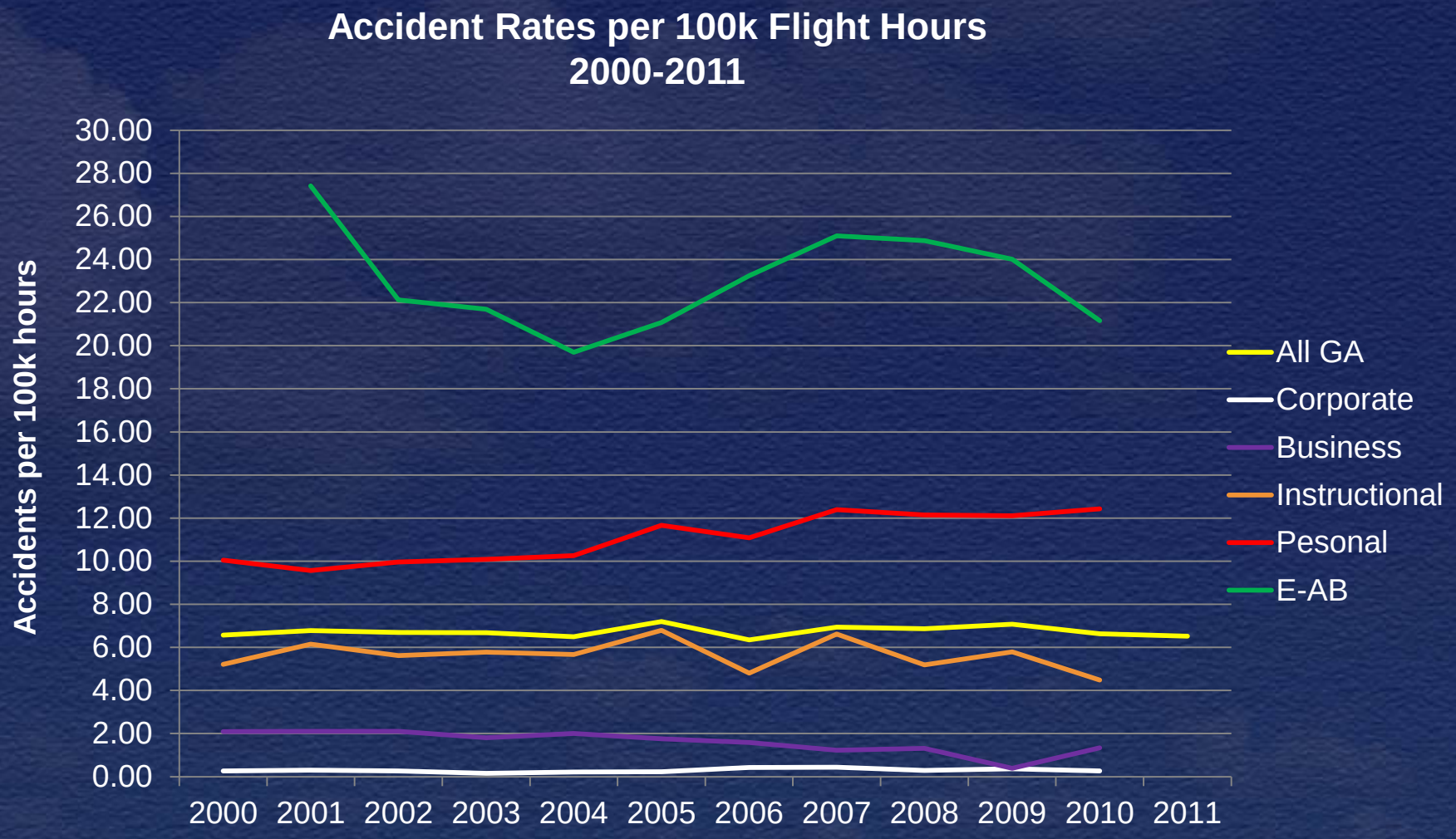

NTSB

# Fatal GA-Personal (excludes Alaska), 2008-2013

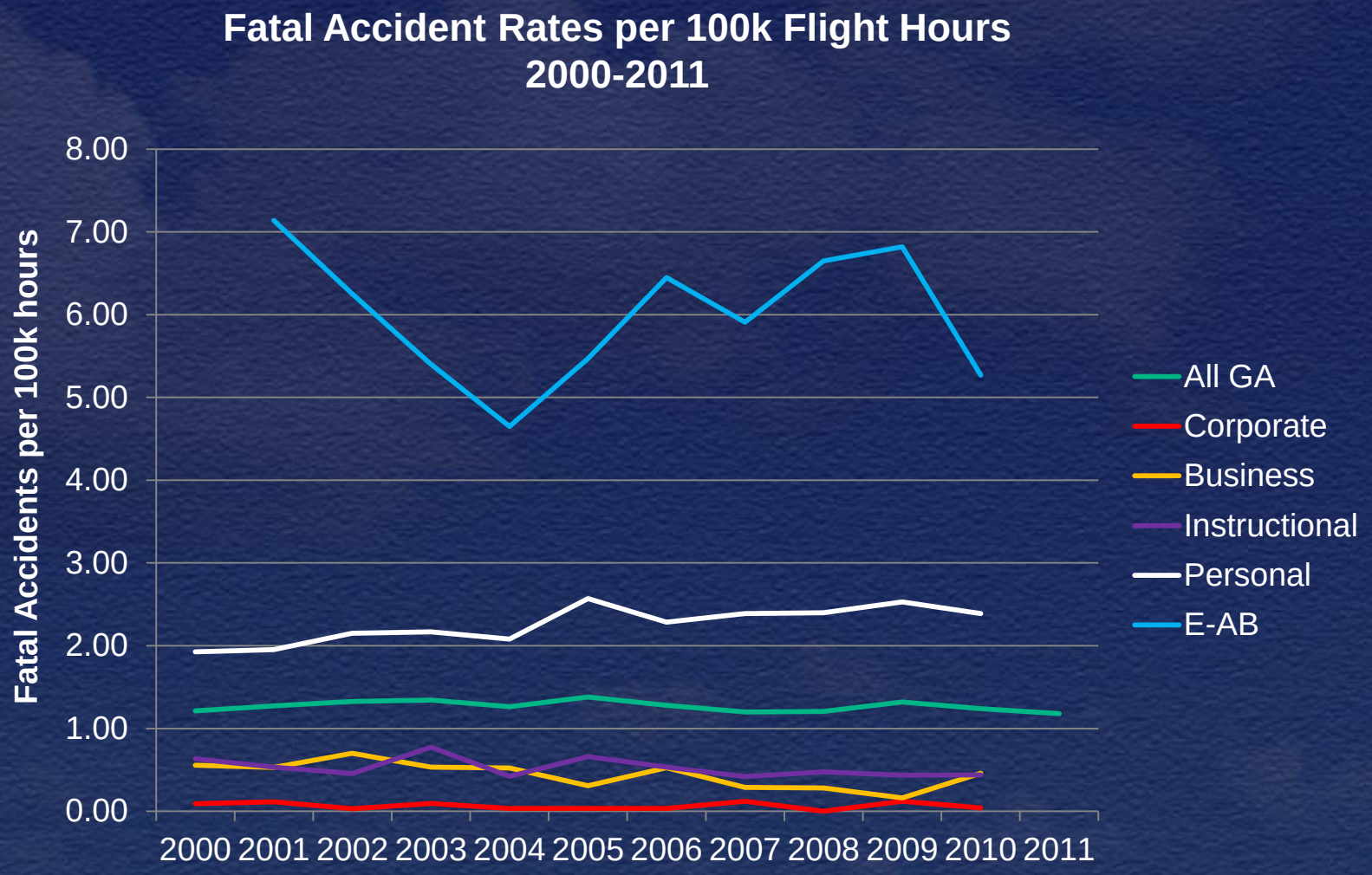



NTSB

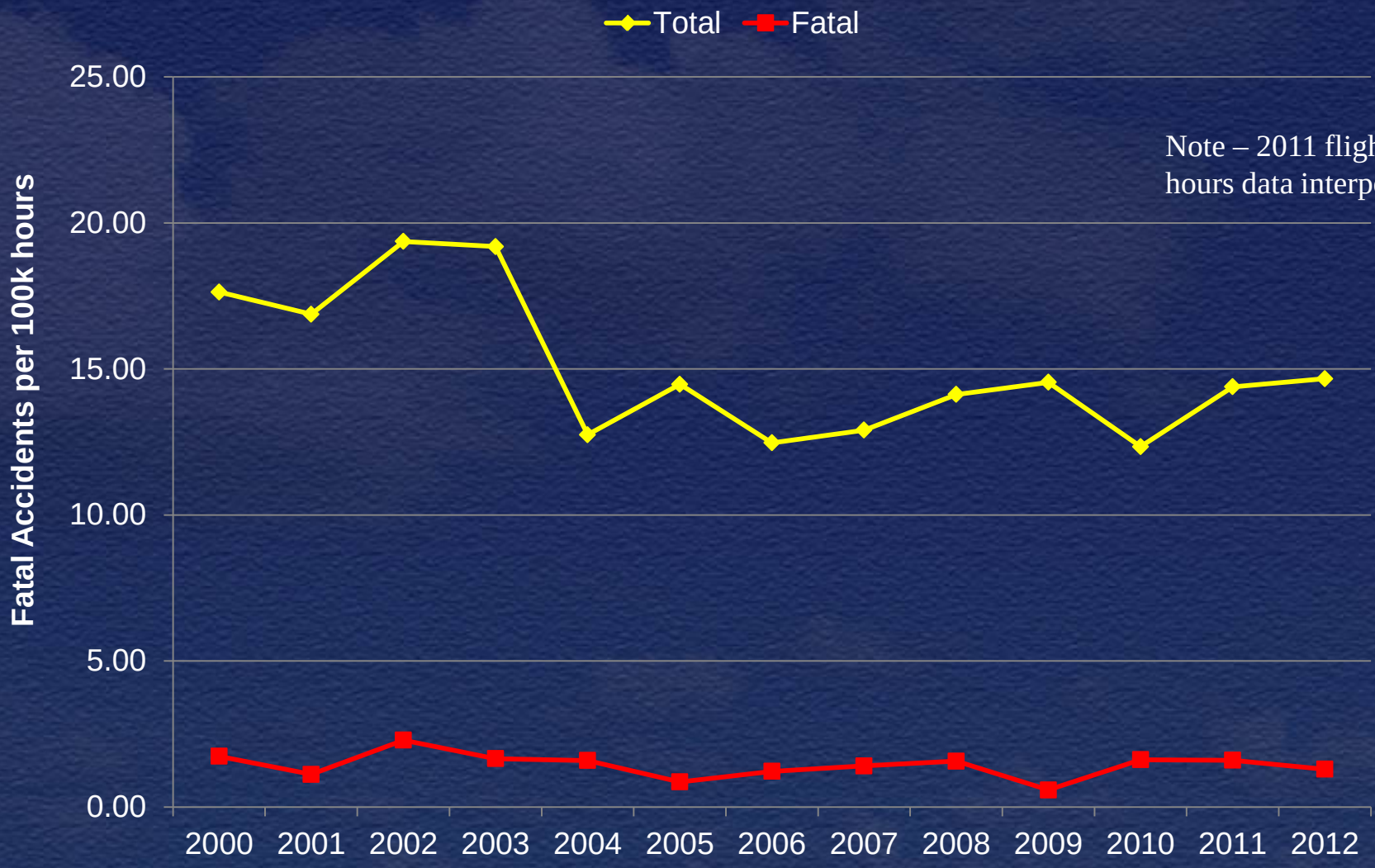
# Accident Rates per 100k Flight Hours



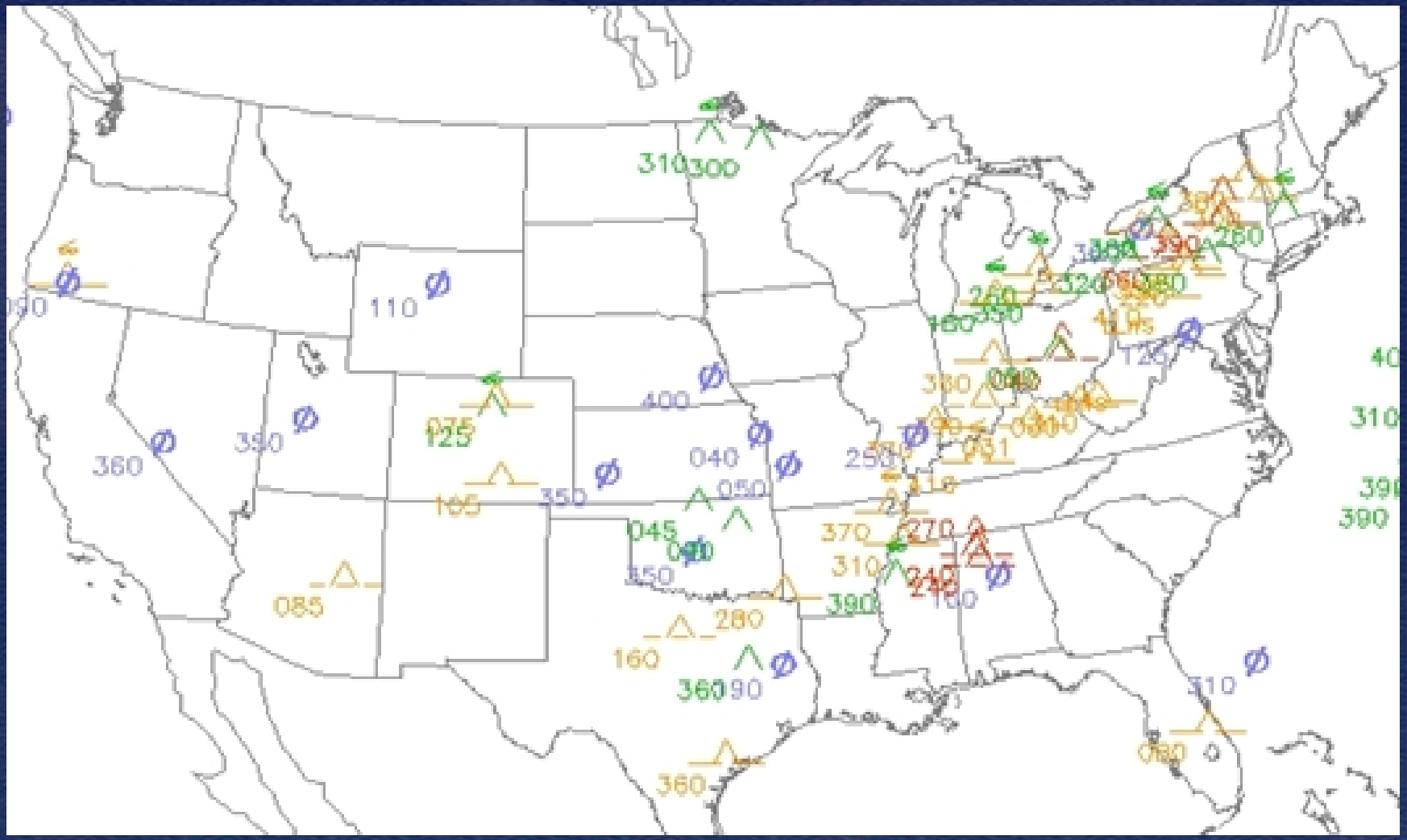
# Fatal Accident Rates per 100k Flight Hours



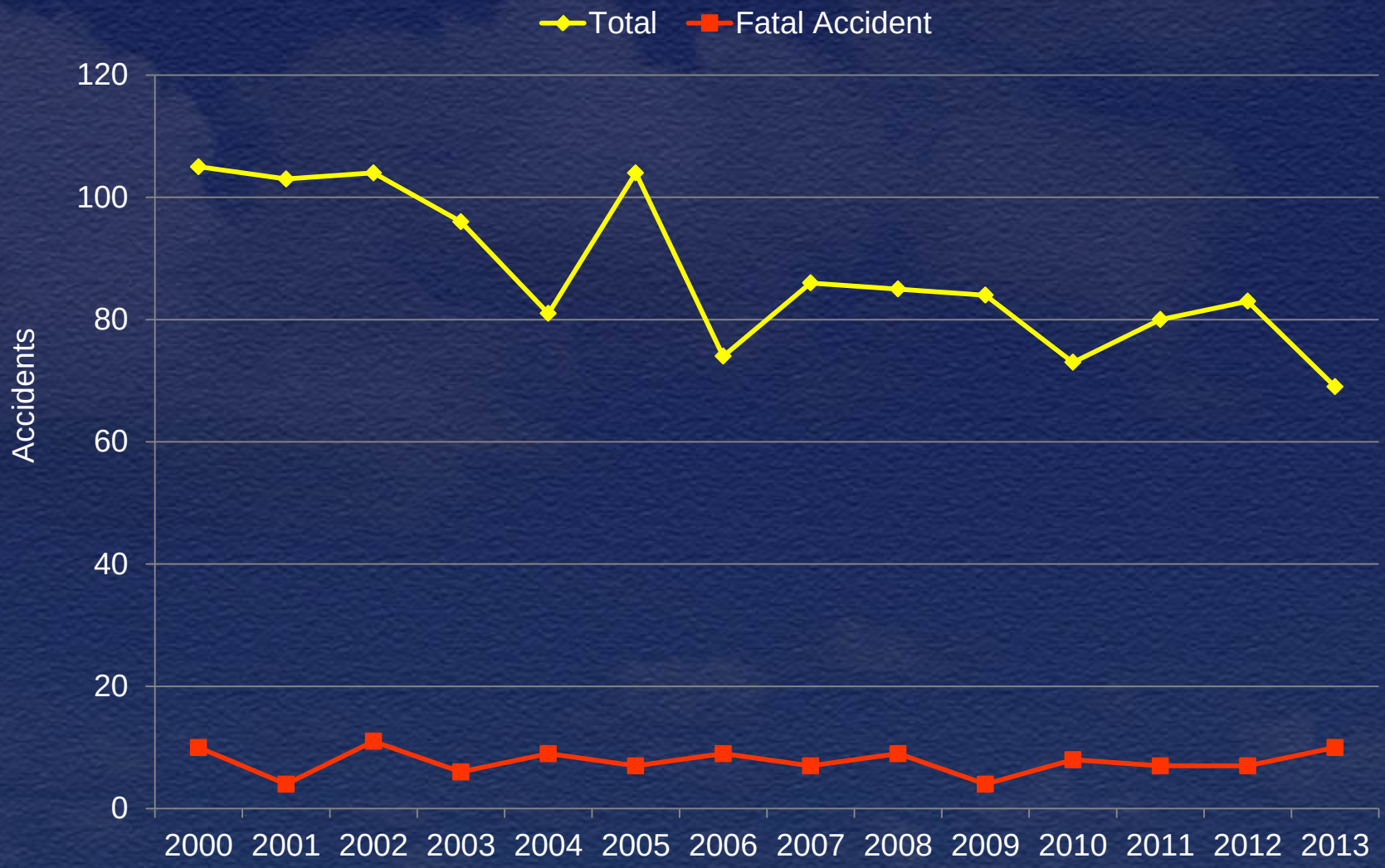
# AK P91 & 135 On-Demand Acc Rate



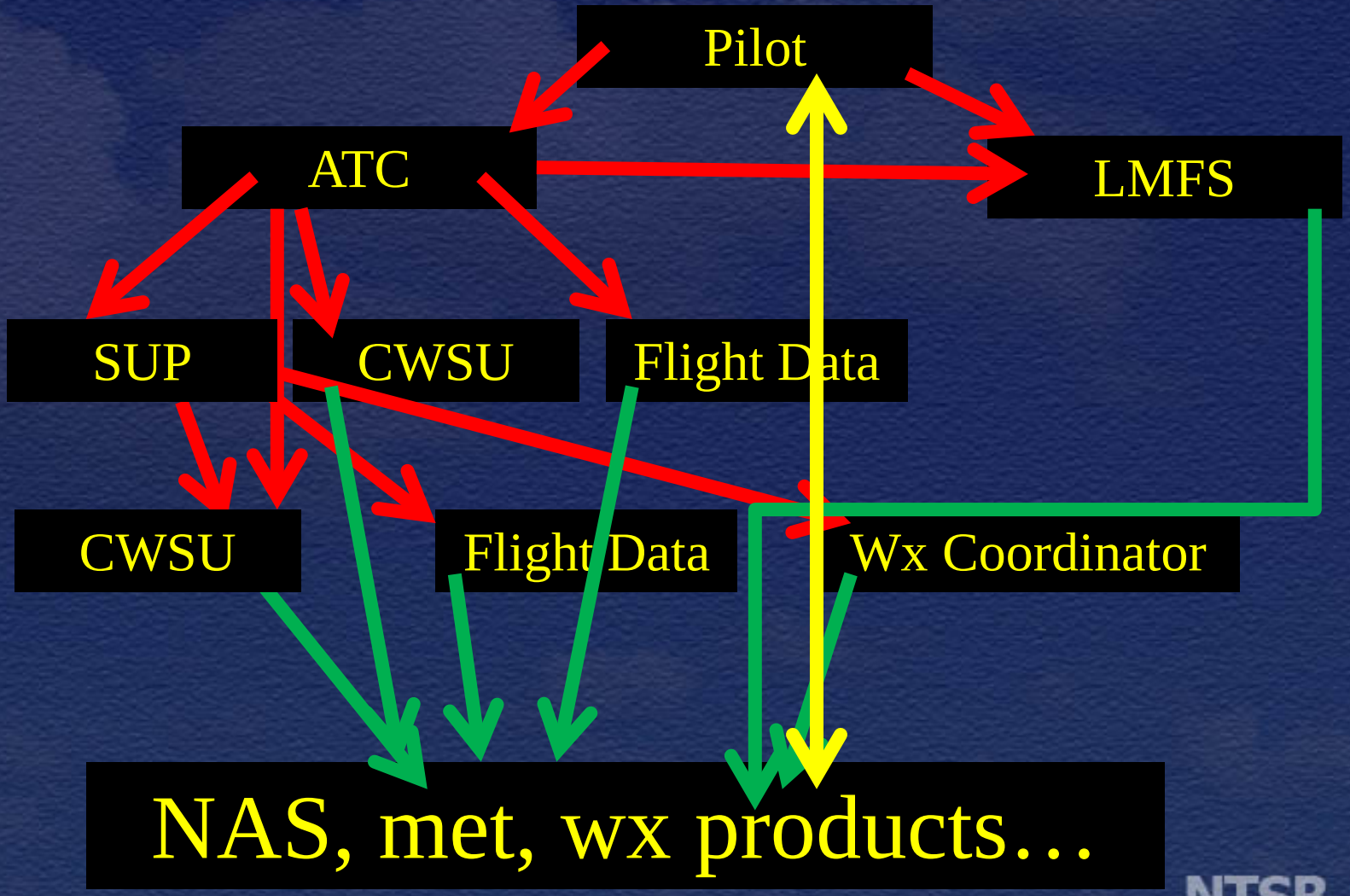
# Typical Pireps in NAS



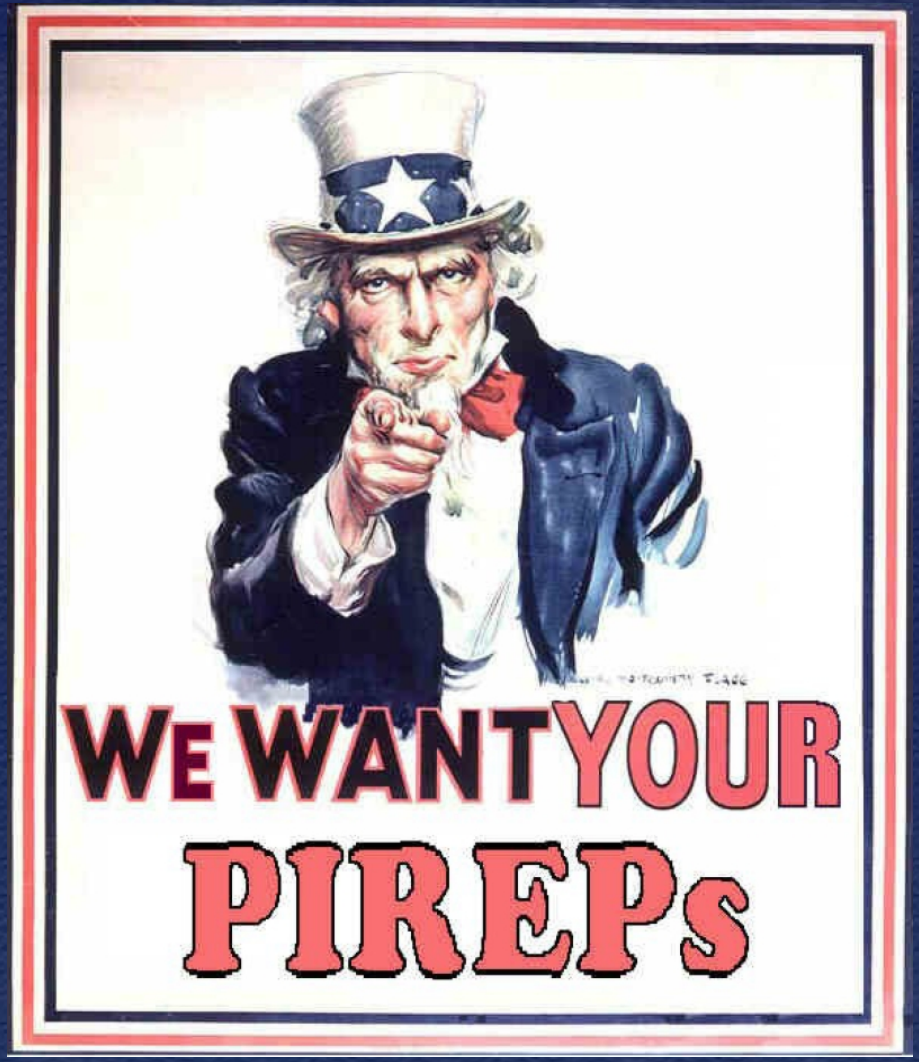
# Alaska – GA Accidents



# From the pilot to…??



# Current NTSB products

- Numerous safety recommendations and safety alerts
  - Hazardous weather encounters
  - Pilot in-cockpit Nexrad latency
- Forth coming safety recommendations in this area

Your pilot reports directly affect the quality of weather information provided back to you.