NTSB National Transportation Safety Board

Business & Corporate Aviation Safety NTSB Perspective

NBAA Safety Committee Risk Assessment Meeting
San Diego, January 21 & 22, 2015

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

NTSB Structure

- The Board
  - Chairman
  - Vice Chairman
  - 3 Members
- Multi Mode
  - Aviation
  - Railroad
  - Highway
  - Marine
  - Pipeline and Hazardous Materials

NTSB Office of Aviation Safety

All Civil Aviation Accidents

- Fatal
- Non-Fatal
- Midair
- Public-Use

Foreign Accidents of US Carriers

Foreign Accidents of US Manufacture or Design

Injury or Death of US Citizens

Nationwide NTSB Staffing

Just over 400 Employees (All modes)

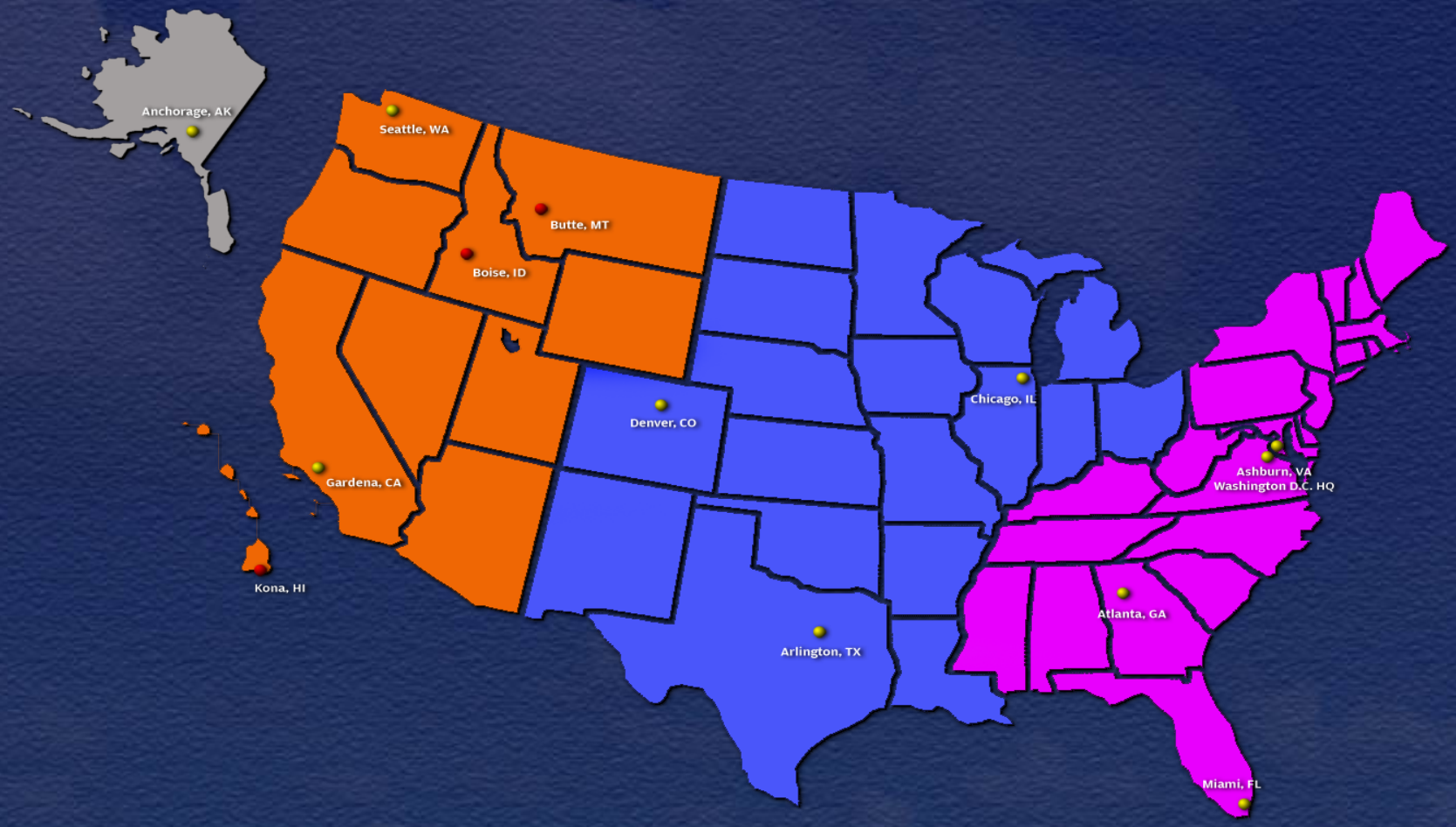
140 Employees (Aviation)

4 Regional Aviation Offices

50 Regional Aviation Investigators

6 (AS-10) Majors Investigators

NTSB Aviation Regions



Topics

- General Aviation Accident Trends
- Most Wanted List – 2015
  - Distractions
  - Substance Impairment
  - Fitness for Duty
  - Loss of Control
  - Procedural Compliance

Accident Statistics - 2013

- 1,297 Total Accidents (Down from 1,539 in 2012)
  - 236 Fatal Accidents
    - 429 Fatalities
- 1,222 General Aviation Accidents
  - 221 Fatal Accident
    - 387 Fatalities
- 52 Part 135 Accidents
  - 13 Fatal Accidents
    - 33 Fatalities

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Preliminary Accident Statistics - 2014

- 1,297 Total accidents
  - 257 Fatal accidents
- 1,112 General Aviation Accidents
  - 234 Fatal Accidents
    - 365 Fatalities
- 38 Part 135 Accidents
  - 7 Fatal Accidents
    - 18 Fatalities
- 36 Accidents Business/Corporate

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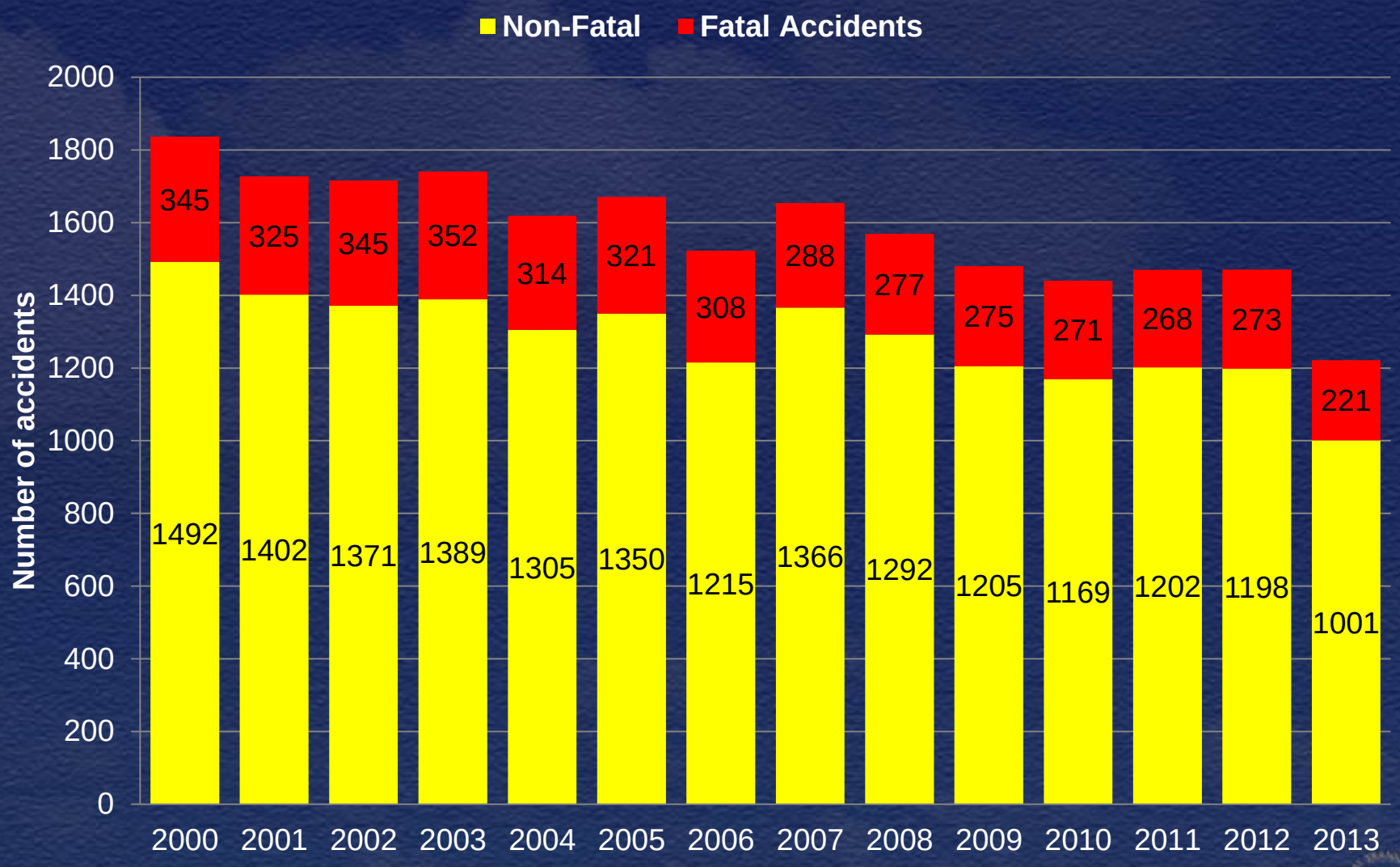
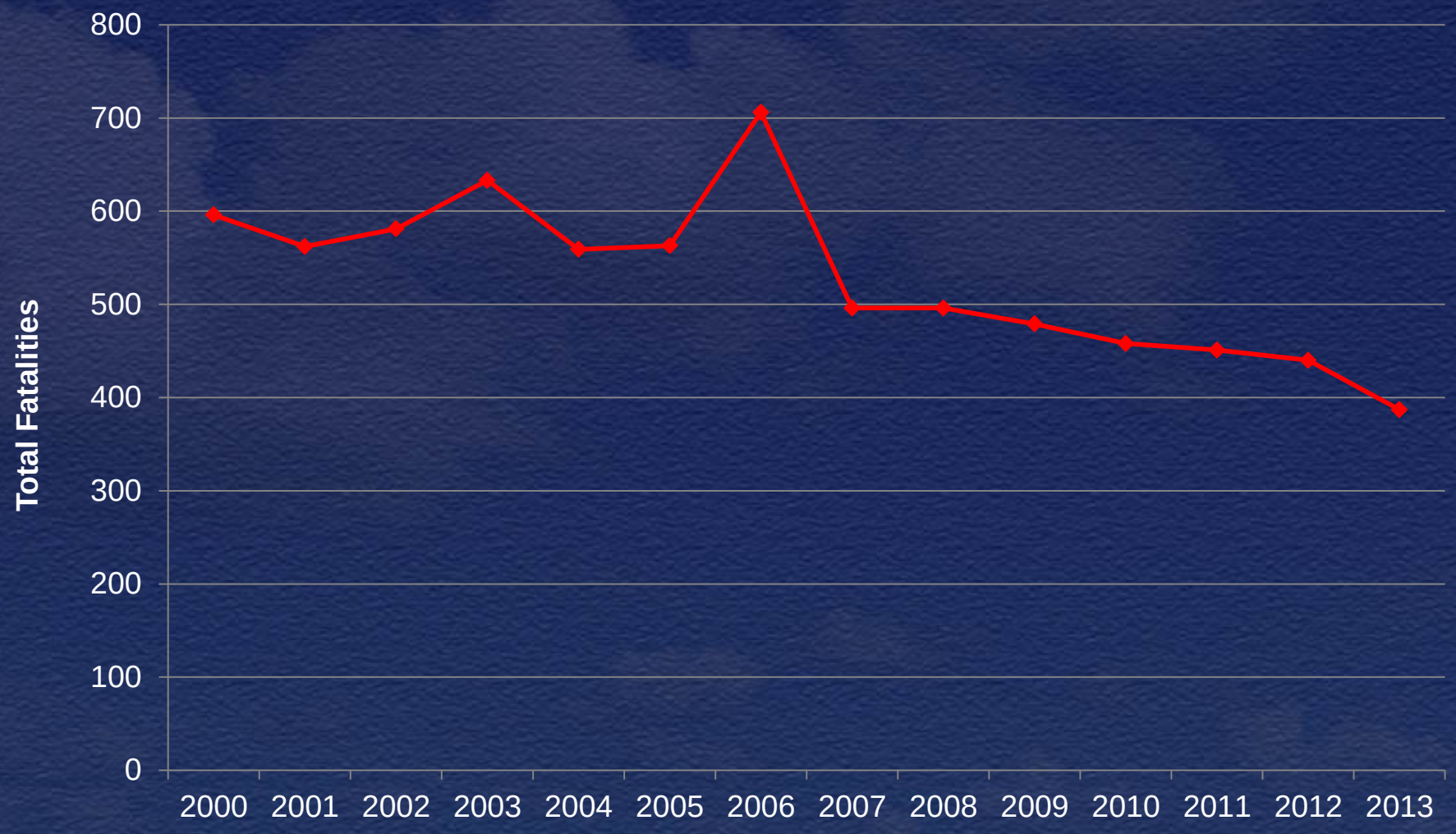
All GA Accidents



GA Accident-involved Fatalities



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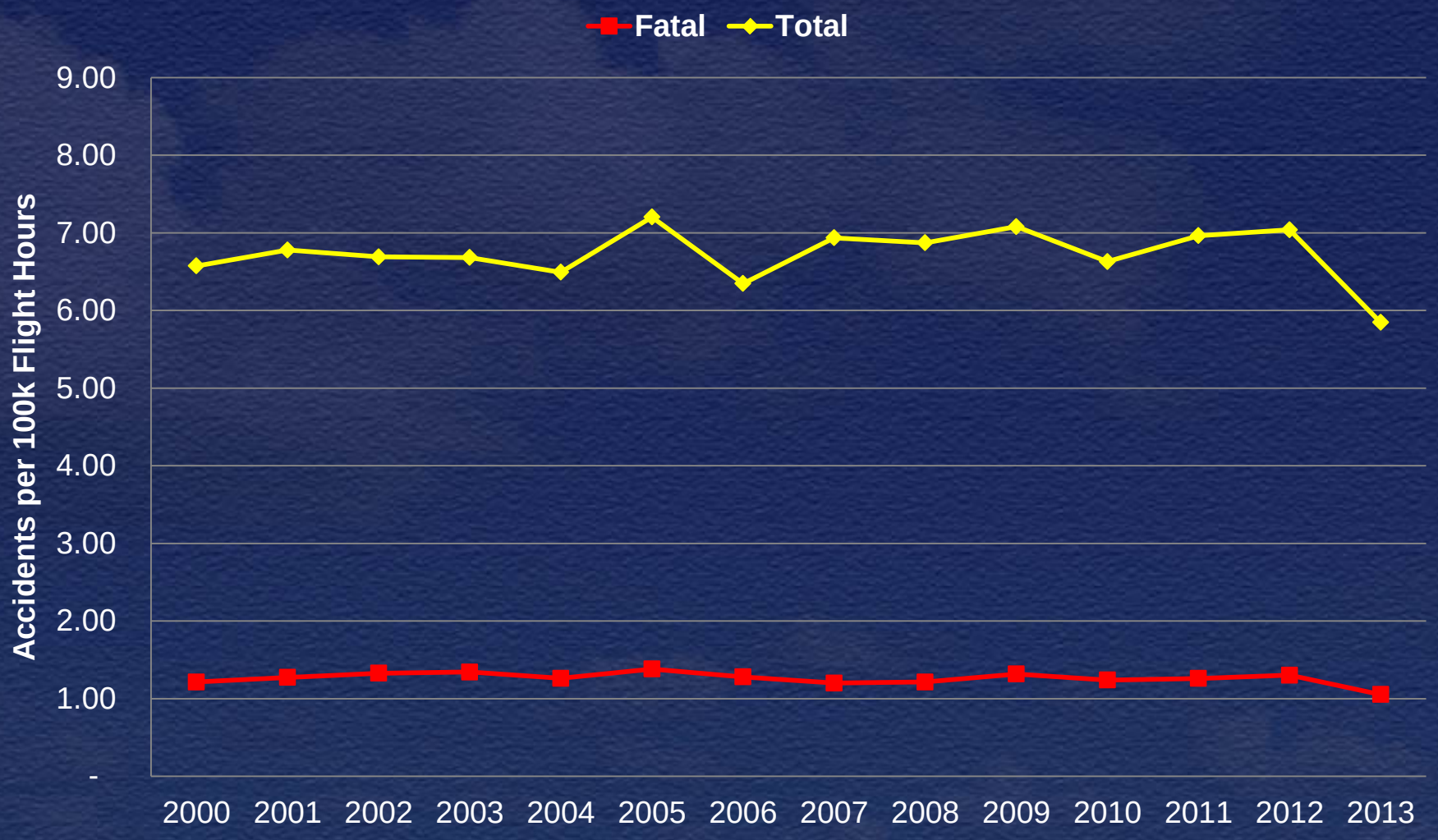
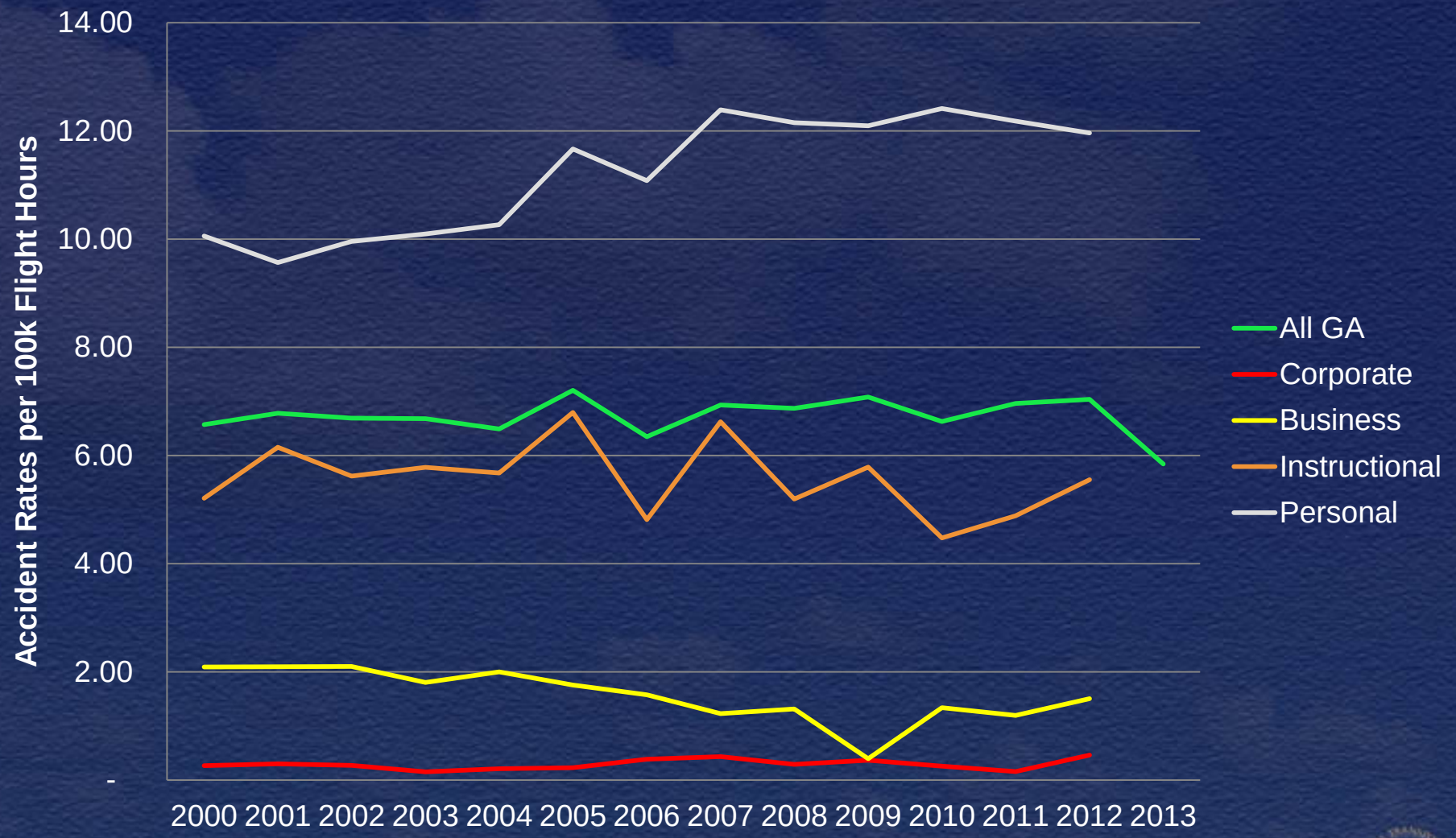
GA Accident Rates



*The 2011 GA Survey is currently not available. FAA is actively engaged in re-calibration efforts and expect to have validated 2011 data published at a later date.

Accident Rates per 100k Flight Hours



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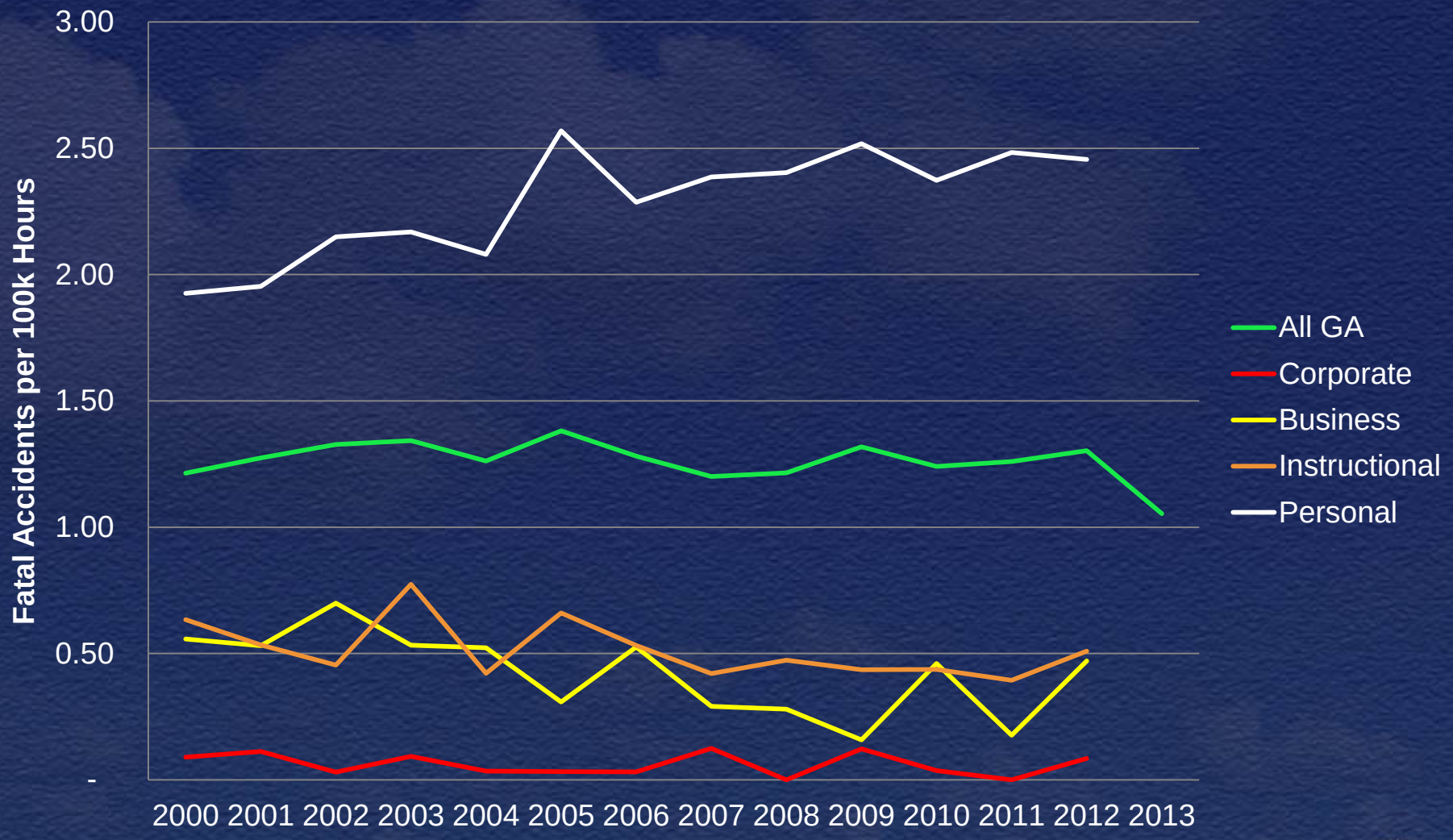
Fatal Accident Rates per 100k Flight Hours



*The 2011 GA Survey is currently not available. FAA is actively engaged in re-calibration efforts and expect to have validated 2011 data published at a later date..

Defining Fatal Accident Events All Part 91 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

NTSB 2015 Most Wanted List

- Disconnect from Deadly Distractions
- End Substance Impairment in Transportation
- Enhance Public Helicopter Safety
- Implement Positive Train Control in 2015
- Improve Rail Tank Car Safety
- Make Mass Transit Safer
- Prevent Loss of Control in Flight in General Aviation
- Require Medical Fitness for Duty
- Strengthen Commercial Trucking Safety
- Strengthen Procedural Compliance

2015 MWL - Distractions

- ***Disconnect from Deadly Distractions***
  - A factor in all modes of transportation
- Aviation emphasis
  - Sterile Cockpit
  - Appropriate use of PEDs
  - Manage distractions

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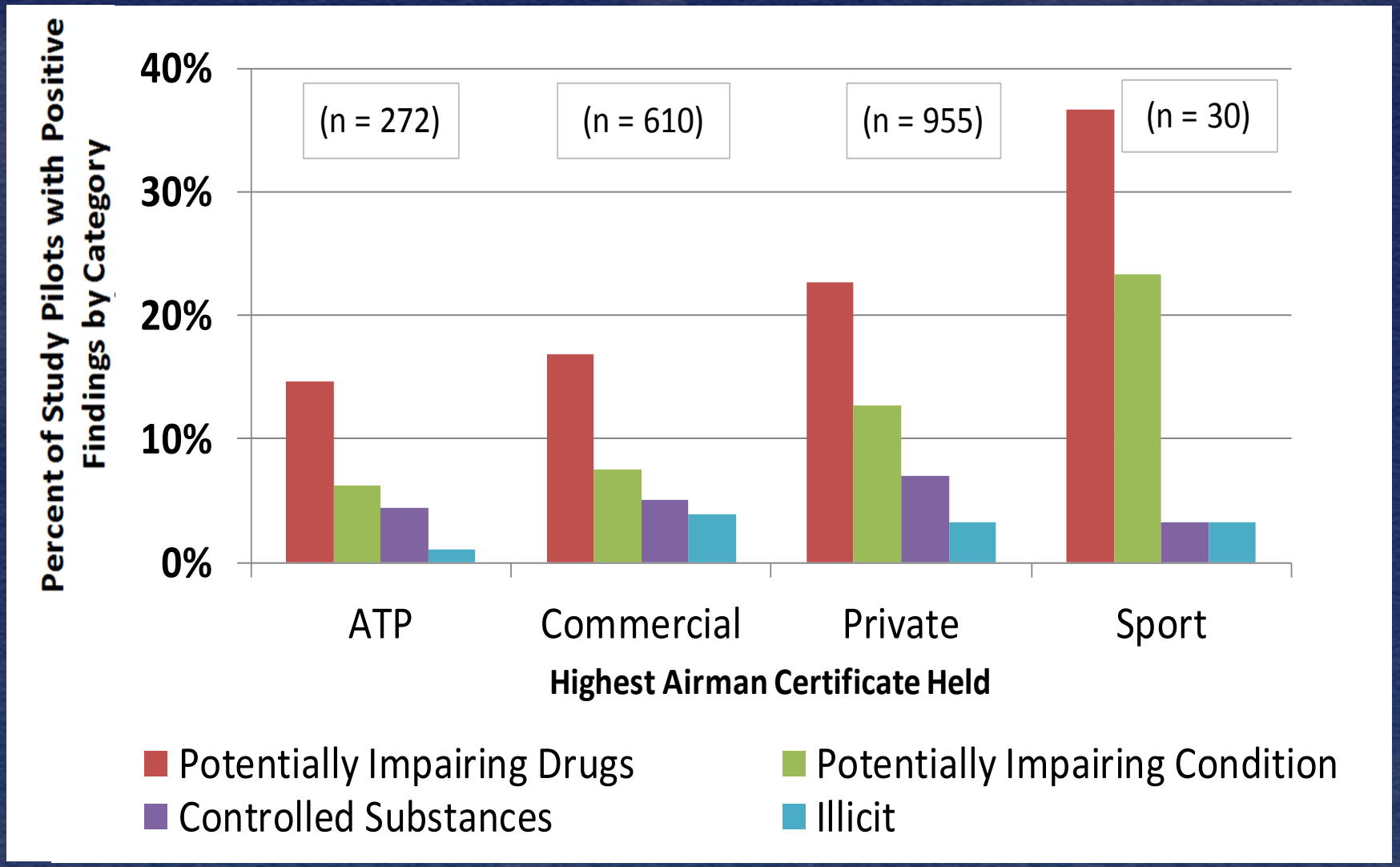
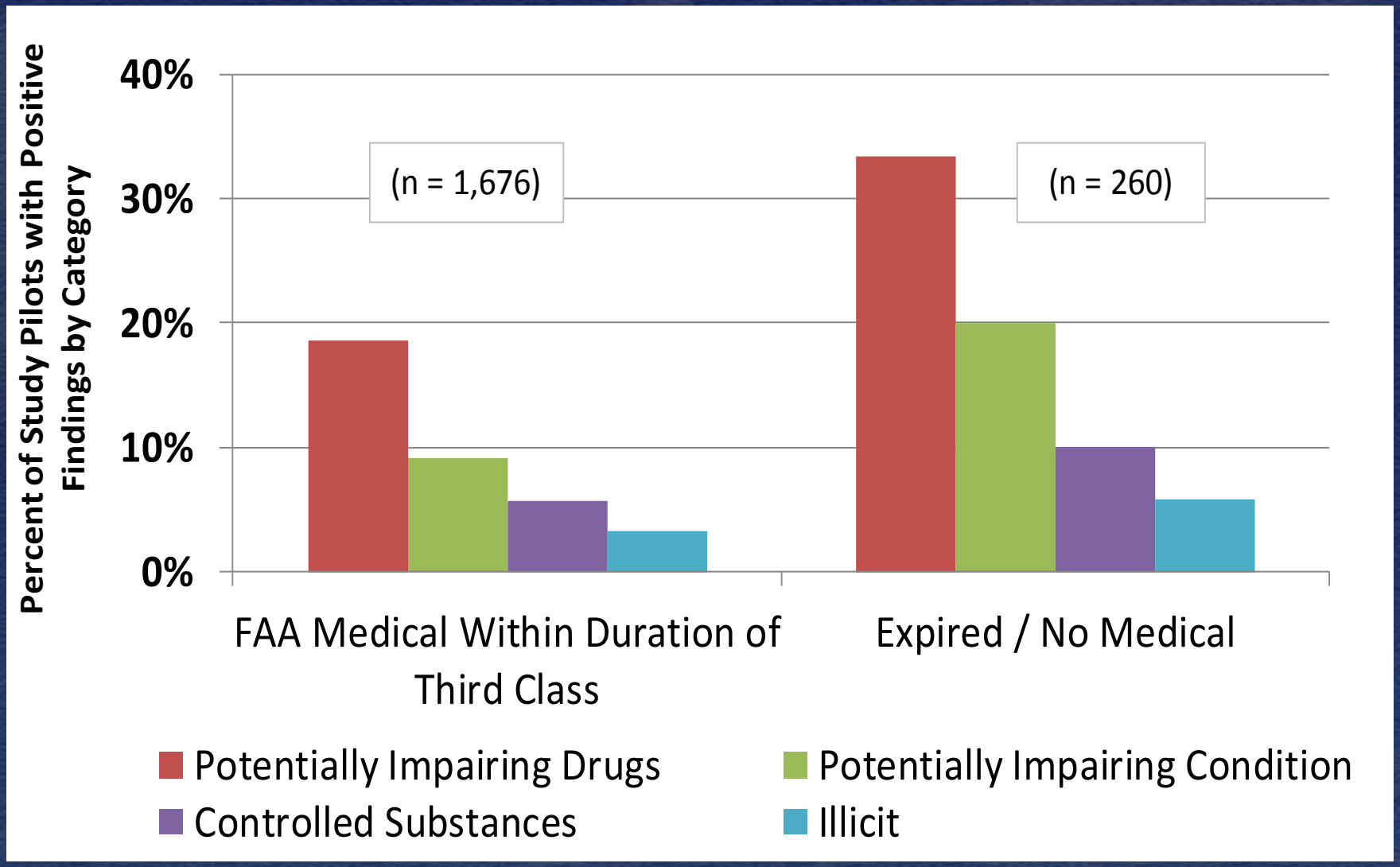
2015 MWL - Impairment

- ***End Substance Impairment in Transportation***
  - A factor in all modes
- Fatally injured pilots - potentially impairing drugs
  - 11% average 1990 - 1997
  - 23% average 2008 - 2012

Toxicology Findings by Certificate, 2005-2012



Toxicology Findings by Medical, 2005-2012



Medical Resources for Pilots

- FAA Publications
  - *Medications and Flying*
  - *Guide for Aviation Medical Examiners*
- Aircraft Owners and Pilots Association (AOPA)
  - Member resources

Medical Resources for Pilots

- General Aviation Joint Steering Committee (GAJSC)
  - 2013 Letter to pilots
  - 2014 Initiatives
    - Drug database
    - Training course

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2015 MWL – Fitness for Duty

- ***Require Medical Fitness for Duty***
  - A factor in all modes
- Airman Medical – fitness at exam time
- Pilots must self-assess fitness
  - Need for appropriate flight preparations
- Focus on medical conditions
  - Example – Obstructive Sleep Apnea
- Enhance medical knowledge

2015 MWL – Loss of Control

- ***Prevent Loss of Control in Flight in General Aviation***
- More than 40% GA accidents were LOC during 2001 – 2011
- Most deadly flight phases
  - Approach to landing
  - Maneuvering
  - Climb

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Why GA on the Most Wanted List?

- NTSB investigates approximately 1500 GA accidents per year over the last decade
- Overall GA accident rate flat
  - Has improved little 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

- ***<u>GA safety needs attention</u>***

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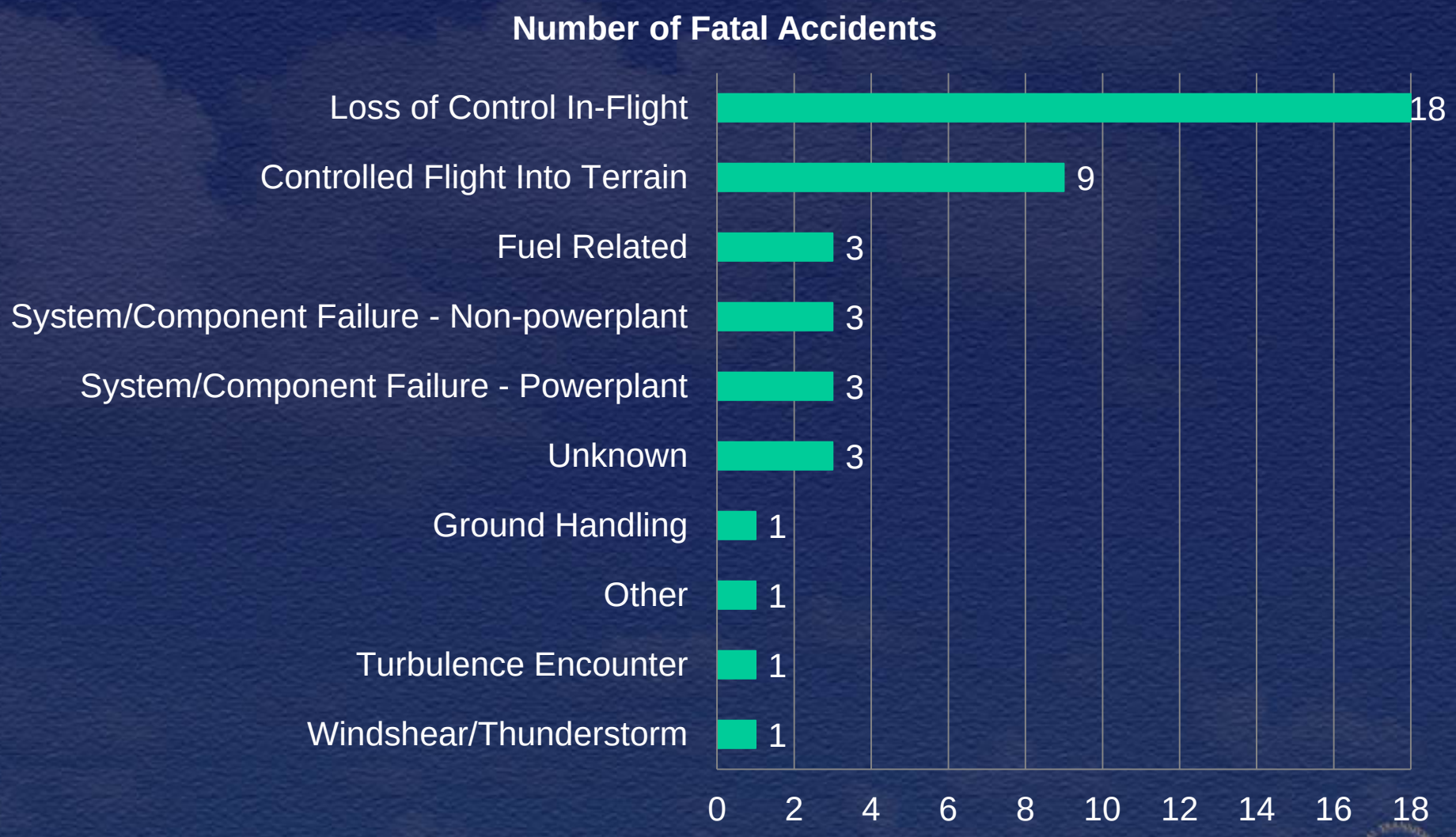
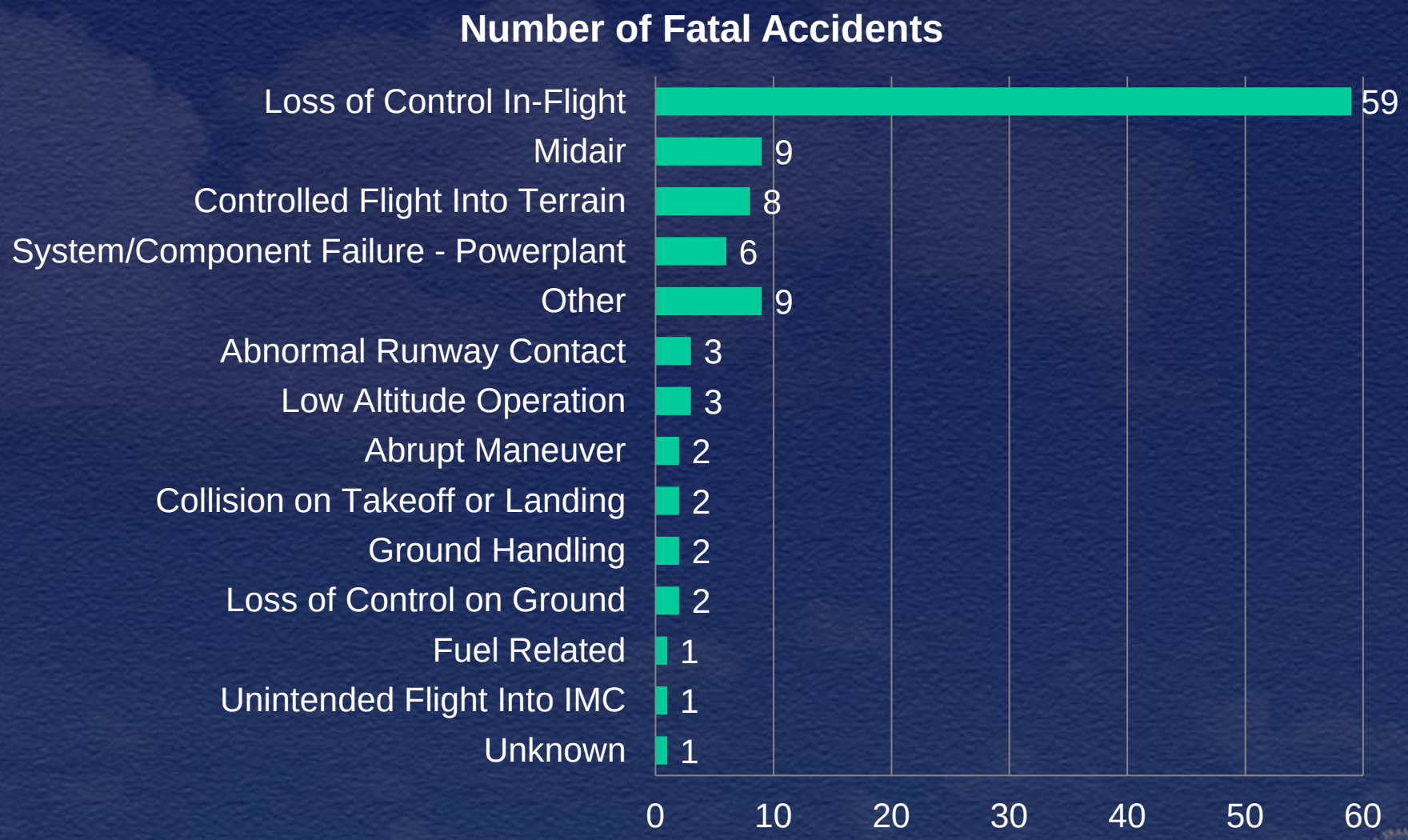
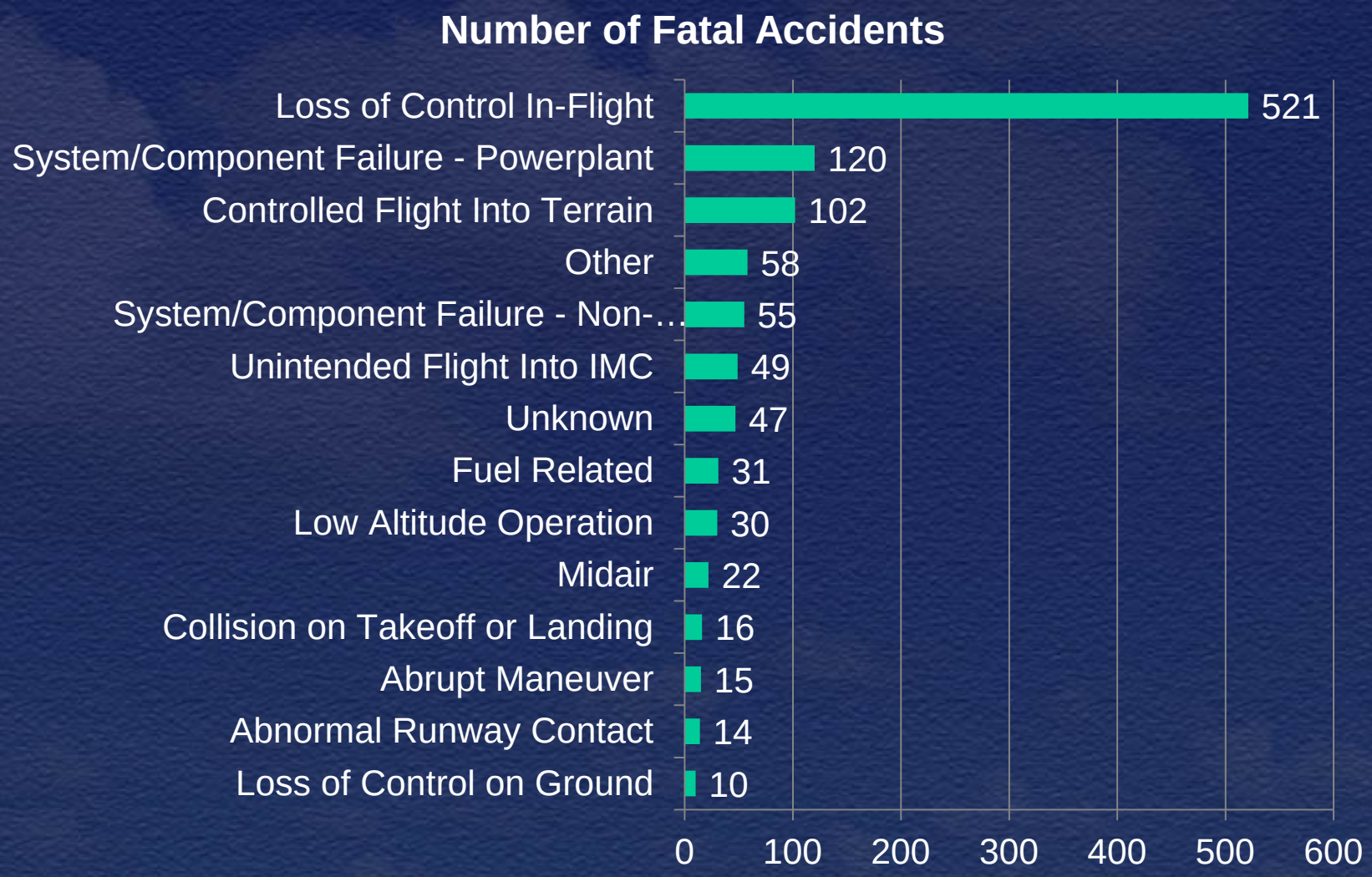
Business Flying, 2008-2013



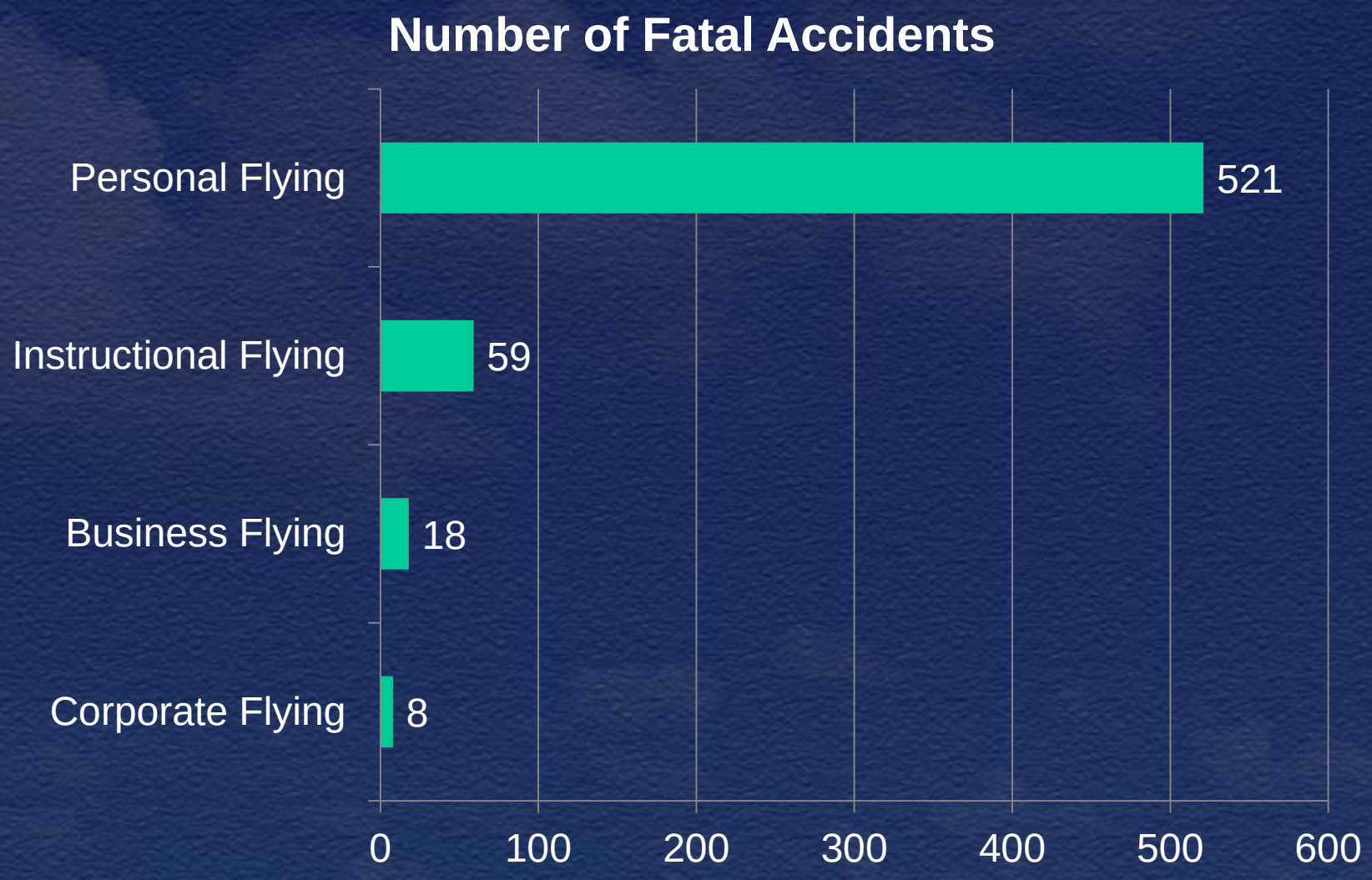
Instructional Flying, 2008-2013



Personal Flying, 2008-2013



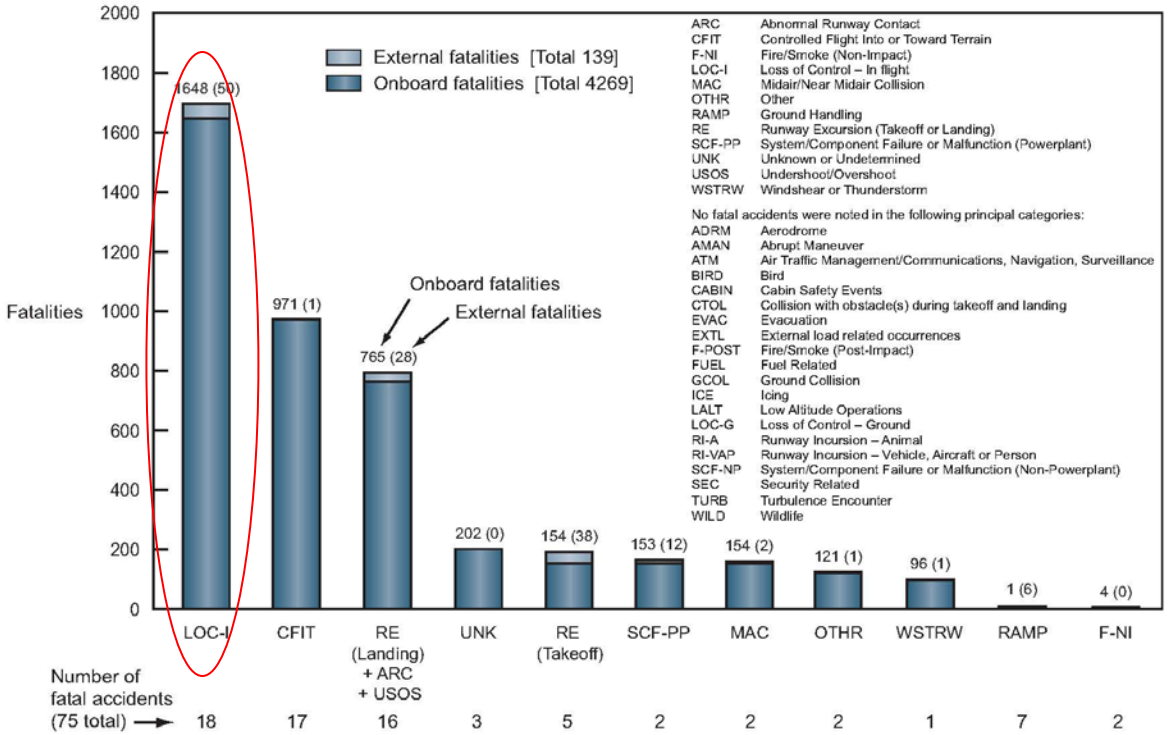
Loss of Control In-Flight, 2008-2013



Boeing Annual Statistical Summery

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

Fatal Accidents – Worldwide Commercial Jet Fleet – 2003 Through 2012



ARC	Abnormal Runway Contact
CFIT	Controlled Flight Into or Toward Terrain
F-NI	Fire/Smoke (Non-Impact)
LOC-I	Loss of Control – In flight
MAC	Midair/Near Midair Collision
OTHR	Other
RAMP	Ground Handling
RE	Runway Excursion (Takeoff or Landing)
SCF-PP	System/Component Failure or Malfunction (Powerplant)
UNK	Unknown or Undetermined
USOS	Undershoot/Overshoot
WSTRW	Windshear or Thunderstorm

No fatal accidents were noted in the following principal categories:

ADRM	Aerodrome
AMAN	Abrupt Maneuver
ATM	Air Traffic Management/Communications, Navigation, Surveillance
BIRD	Bird
CABIN	Cabin Safety Events
CTOL	Collision with obstacle(s) during takeoff and landing
EVAC	Evacuation
EXTL	External load related occurrences
F-POST	Fire/Smoke (Post-Impact)
FUEL	Fuel Related
GCOL	Ground Collision
ICE	Icing
LALT	Low Altitude Operations
LOC-G	Loss of Control – Ground
RI-A	Runway Incursion – Animal
RI-VAP	Runway Incursion – Vehicle, Aircraft or Person
SCF-NP	System/Component Failure or Malfunction (Non-Powerplant)
SEC	Security Related
TURB	Turbulence Encounter
WILD	Wildlife

Note: Principal categories as assigned by CAST.

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

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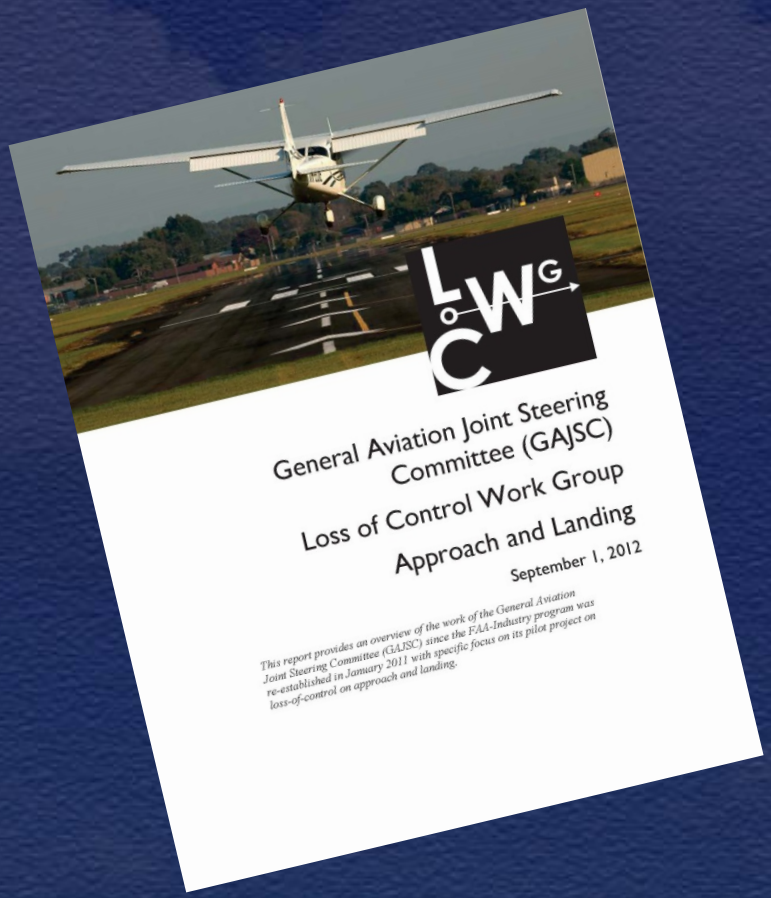
Primary category of accidents

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

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

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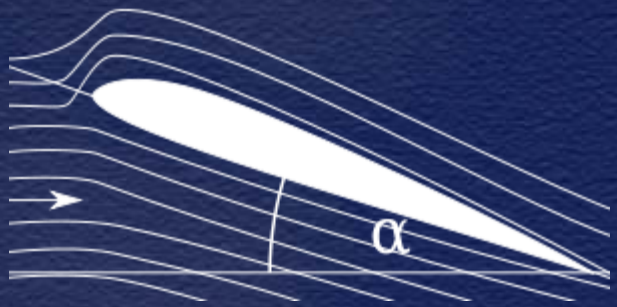
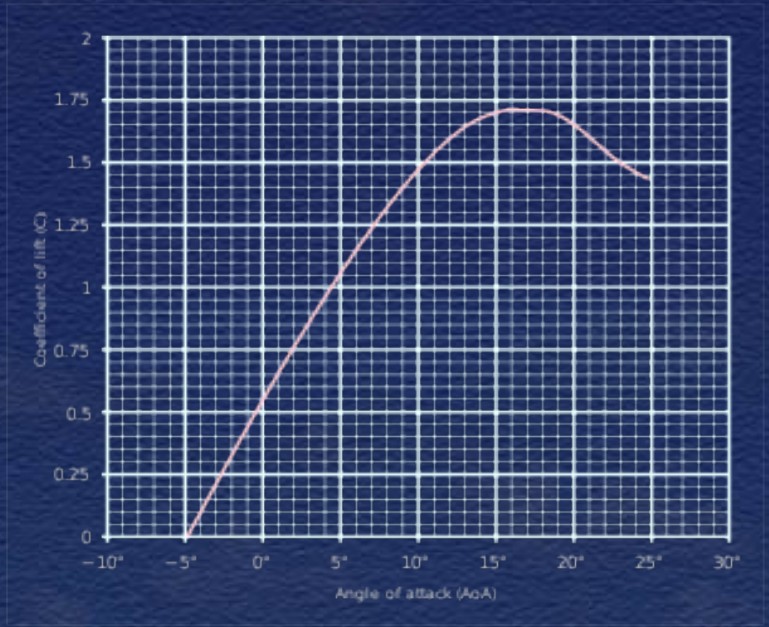
Lower Cost AOA Displays

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



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



FAA installation policy changed

Stall Recovery

- Reduce the angle-of-attack below stall AOA (Max CL)
  - Push over to eliminate stall warning
- Level wings
- Adjust thrust
  - Avoid overspeed and high G levels
- Pitch back to level flight
- Don't try to "***Power out of a stall***"

NTSB Safety Alerts

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

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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/AAR-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

2015 MWL – Procedural Compliance

- ***Strengthen Procedural Compliance***
  - More than a dozen related commercial aircraft accidents in last ten years
  - Equally applicable to corporate and business operations
    - Implement well developed procedures
    - Train to the procedures
    - Emphasize and reinforce operations to the procedures

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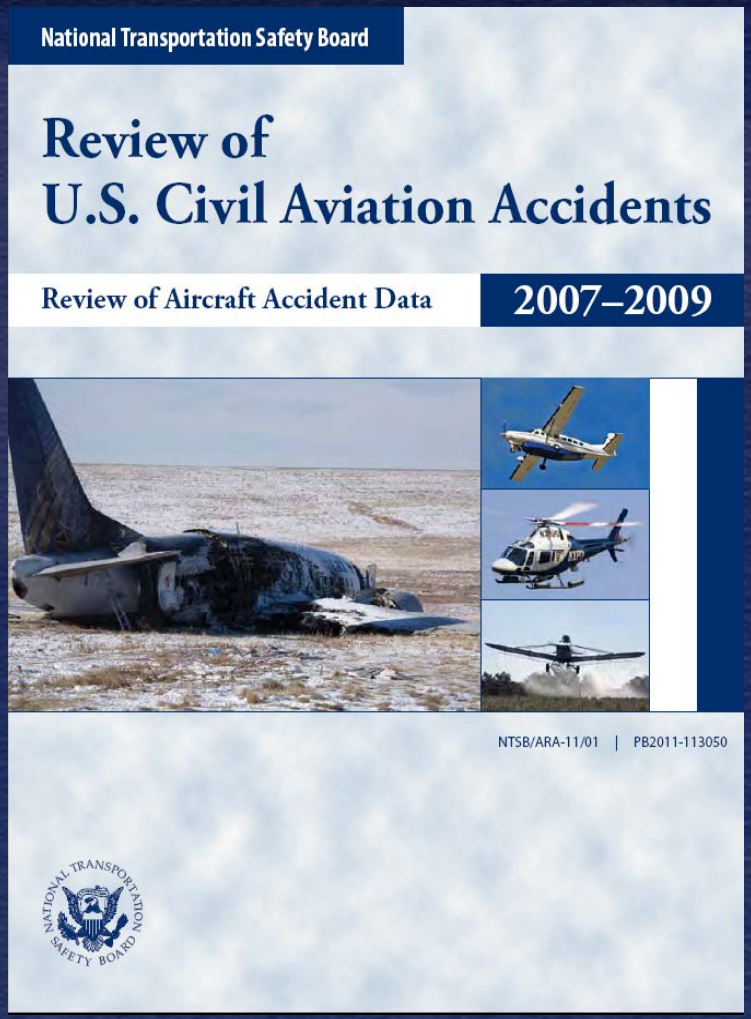
Accident Investigations



- 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

Alfred Sheinwold

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

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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."

NATIONAL TRANSPORTATION SAFETY BOARD

E PLURIBUS UNUM

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Topics

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

Impairment

Continuum from fully awake and alert to unconscious

Ready to go **Unconscious**

Impairment in Transportation

- Occurs from a variety of factors
- Medical and psychiatric conditions
- Alcohol
- Drugs
  - Over-the-counter
  - Prescription
  - Illicit

Study Objectives

- Initial step
- Examine among fatally injured pilots
  - Prevalence of positive toxicology tests
  - Trends in positive toxicology tests
  - Comparison to the general population
  - Differences between categories of pilots

Why the Focus on Pilots?

- Fatally injured pilots
  - More than 1,300 drugs and metabolites
- DOT mandatory testing requirements
  - Urine specimen
  - 11 drugs
- Best opportunity to study trends in drug use by transportation operators

Data Sources: 1990-2012

- Bioaeronautical Research Laboratory at Federal Aviation Administration (FAA) Civil Aerospace Medical Institute (CAMI)
  - Toxicology test results database
- NTSB's Aviation Accident Database

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Safety Issues

- Enhance drug information for pilots
- Collect information to evaluate safety of pilots without medical certification
- Enhance communication between health care providers and patients about transportation safety risks
- Further research on relationship between drug use and accident risk

Mental and Physical Functions

- Perception
- Attention
- Executive functioning
- Cognitive processing
- Judgment
- Alertness
- Reaction time
- Mood

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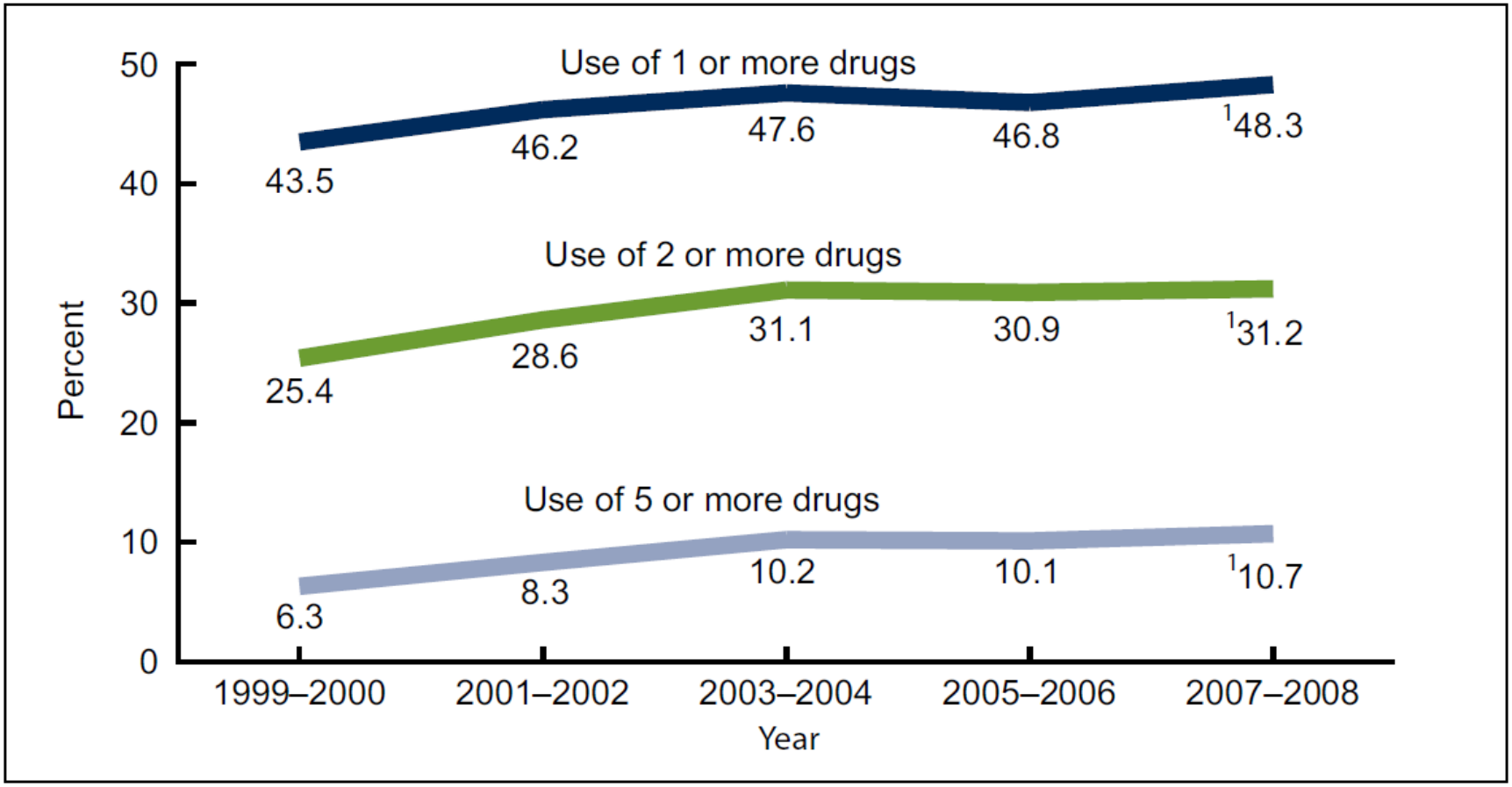
Prescription Drug Use by US Population



[1]Significant linear trend from 1999–2000 through 2007–2008.
NOTE: Age adjusted by direct method to the year 2000 projected U.S. population.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey.

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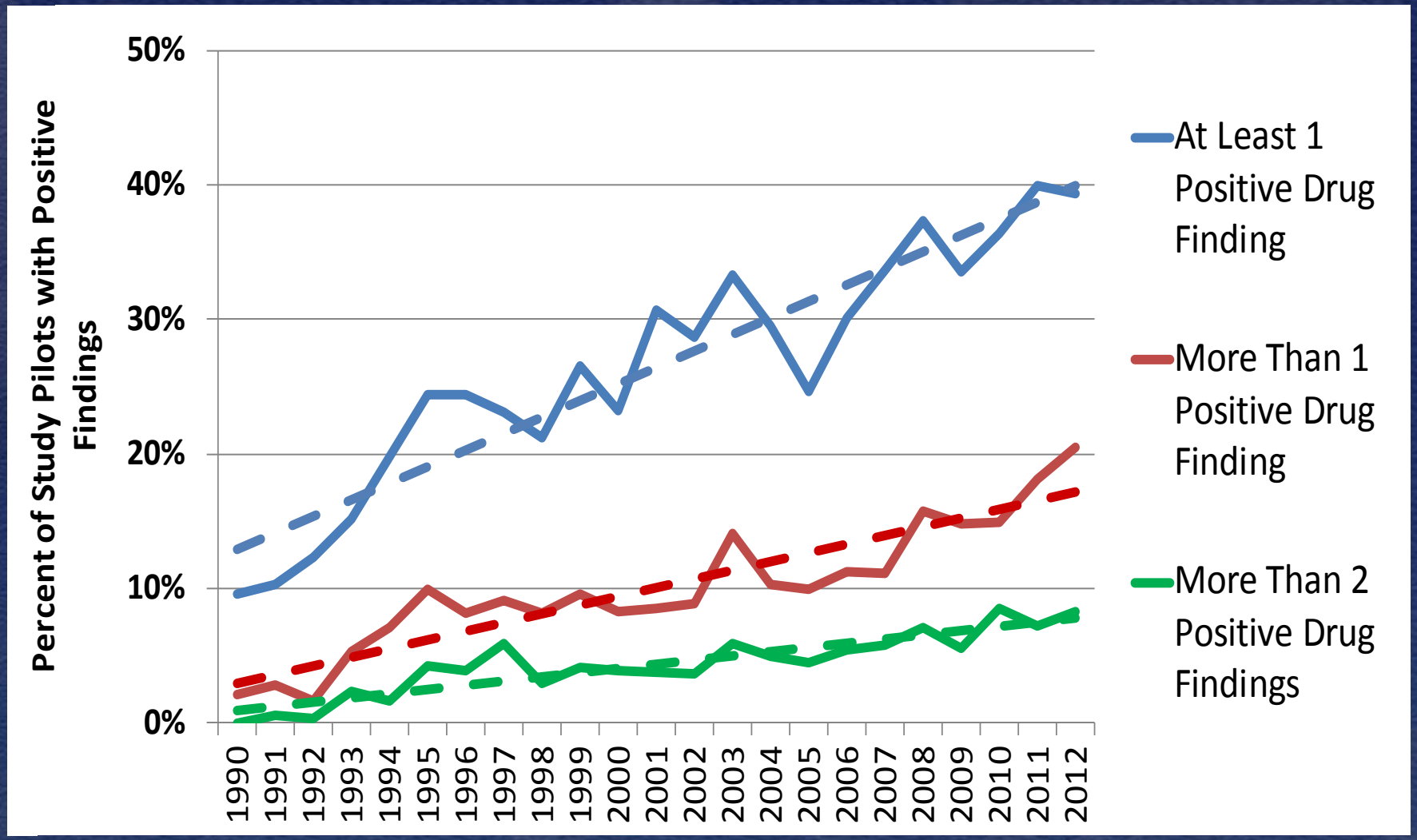
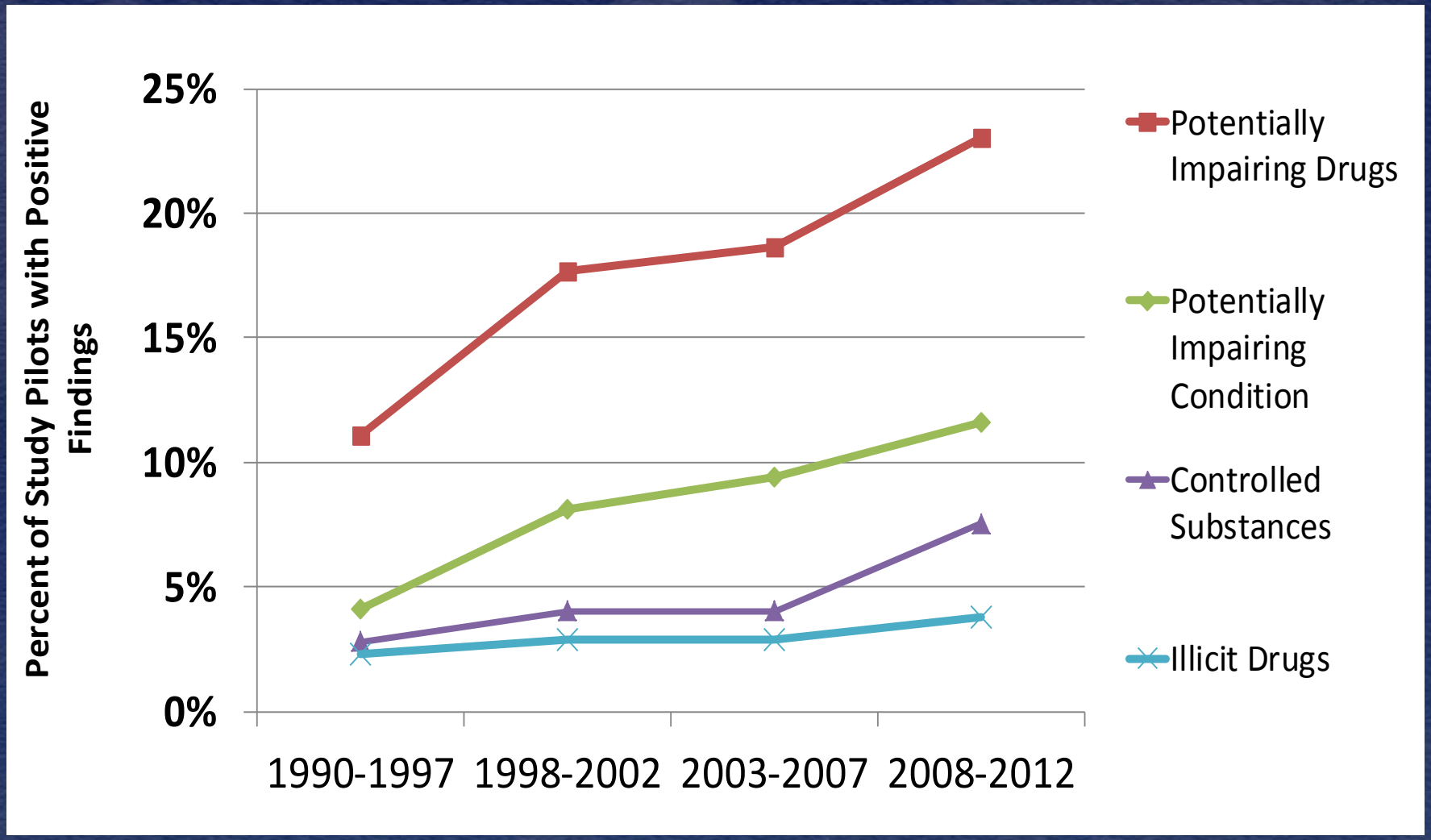
Toxicology Findings for All Drugs, 1990-2012



Toxicology Findings by Category, 1990-2012



Our Mission

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- The NTSB is responsible for the organization, conduct, and control of all civil (and most public use) aviation accident and incident investigations in the United States, U.S. territories and possessions.
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