NTSB National Transportation Safety Board

Some General Aviation Safety Issues:

What Accident Investigators Are Seeing

Presentation to: The Twin Cessna Flyers

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Outline

- **NTSB 101**
- **Loss of Control**
  - **Taken from slides presented at 2015 Sun & Fun by Paul Cox, Senior Air Safety Investigator, Eastern Region**
- **Runway Accidents**
  - **Taken from slides prepared by Dan Bartlett, ATC Transportation Safety Specialist**
- **See and Be Seen**
  - **Taken from NTSB Safety Alert, "See and Be Seen: Your Life Depends on It," Issued May 2015**
- **Mountain Flying**
  - **Taken from slides prepared by Dr. David Bowling, Chief, Central Region Air Safety Investigation**

What the NTSB Does

- Independent federal agency, investigate transportation accidents, all modes
- Determine probable cause(s) and make recommendations to prevent recurrences
- Do not determine blame or liability
- Independence
  - Political: Conclusions and recommendations based upon facts and evidence rather than politics
  - Functional: Impartial and unbiased because no “dog in the fight”

Purpose

- Single focus is ***SAFETY***
- Primary product: Safety recommendations issued to any entity that has authority to address the problem
- Response to recommendations: > 80% acceptable

General Aviation Investigations

- Statute requires investigation of all aviation accidents
  - Lesser requirements for other modes
- About 1,500 GA accidents per year
- Most investigated, with FAA help, by about 50 regional investigators
- Upward trend in accidents involving personal (non-business) flying

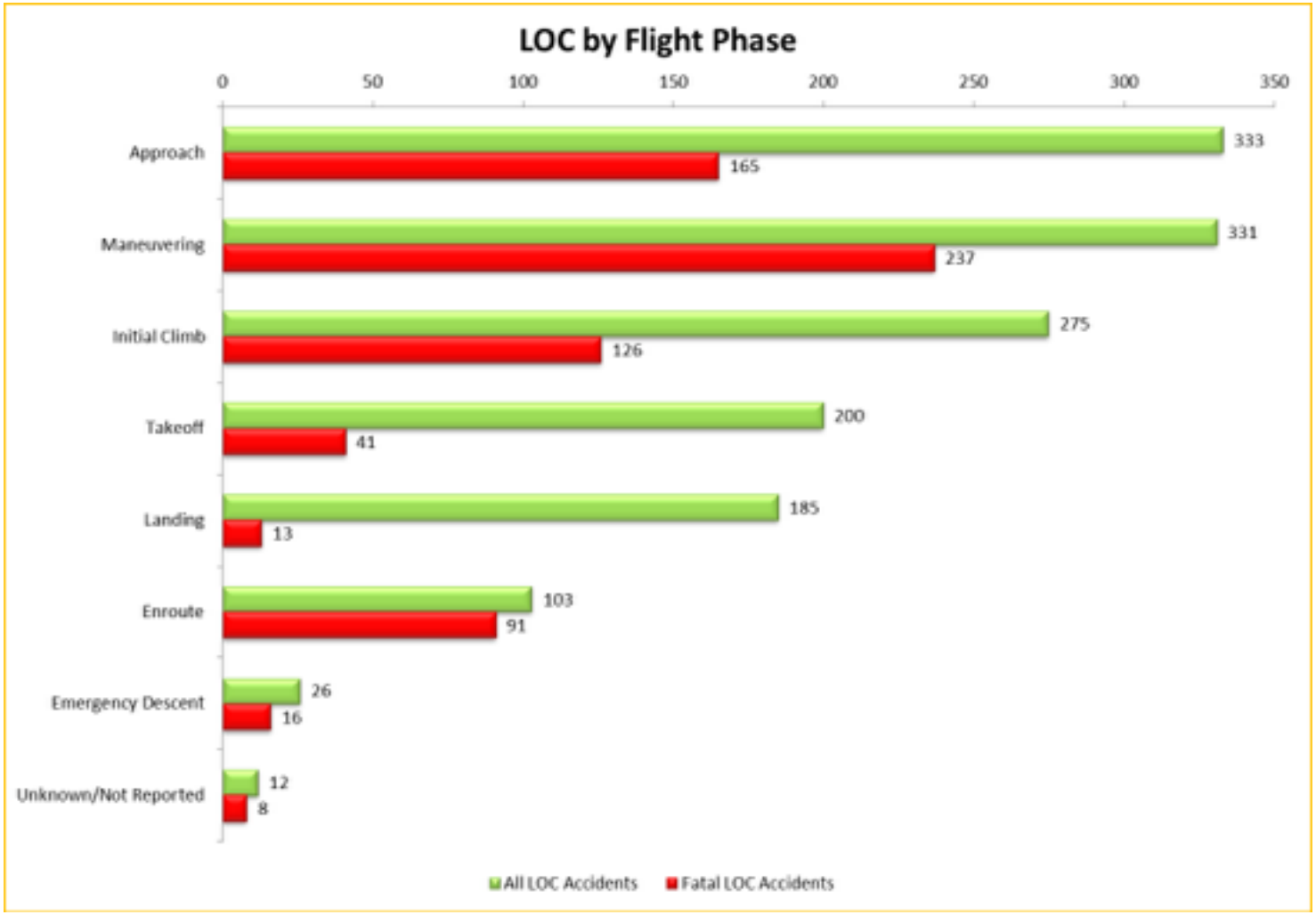
NTSB Advocacy Tools

- Accident reports, recommendations
- Testimony in Congress
- Convening conferences and forums
- Most Wanted List, issued annually
  - Specific to GA: Loss of Control
  - Also relevant to GA: Distraction, impairment, medical fitness, and procedural compliance
- Safety Alerts
- Participating in conferences

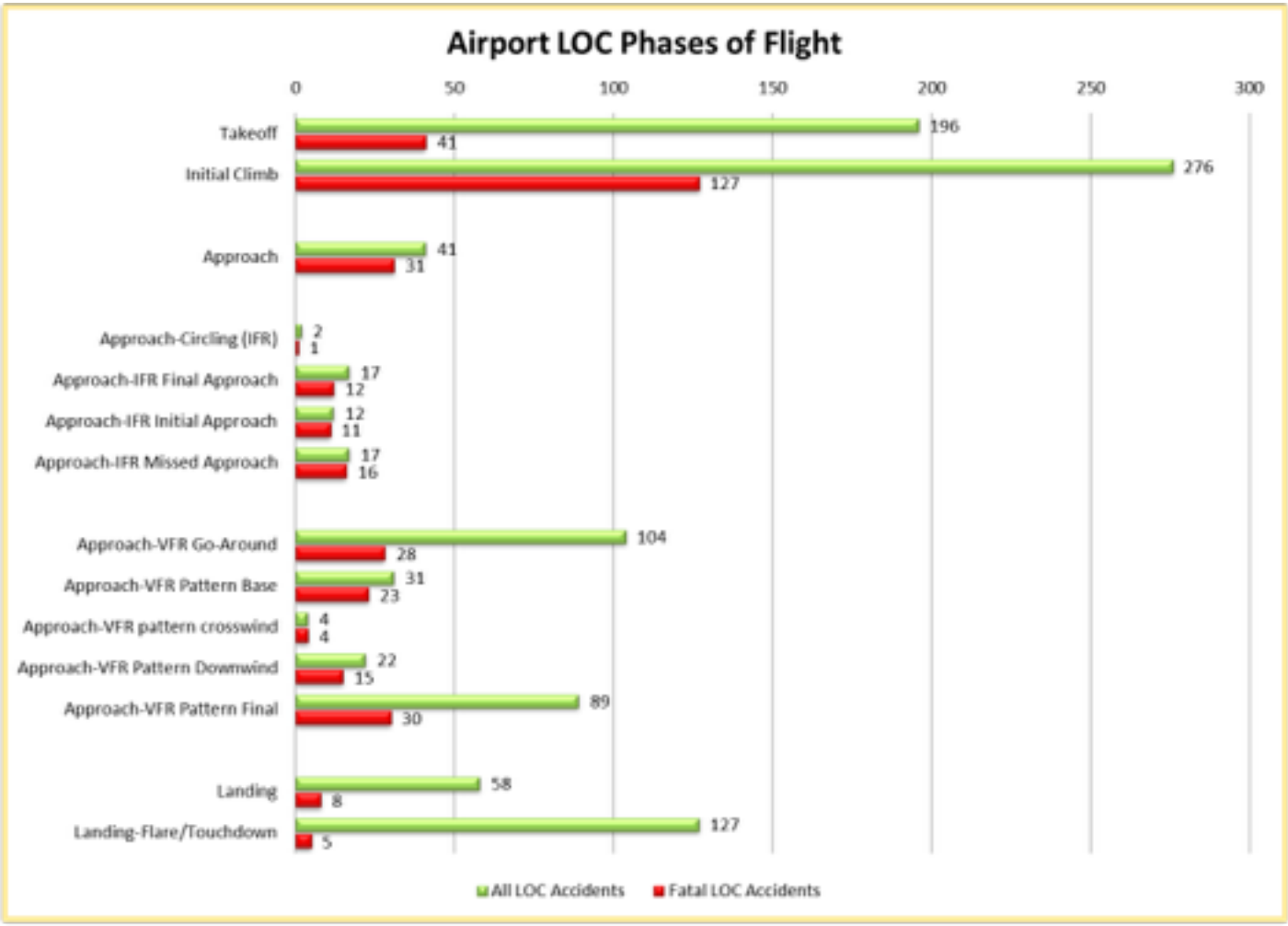
Loss of Control Accidents

- Largest single cause (>40%) of GA accident fatalities
- General Aviation Joint Steering Committee (GAJSC) formed a Loss of Control Work Group
- On NTSB 2015 Most Wanted List
- Not defined in FARs, AIM, Pilot Handbook of Aeronautical Knowledge
- But we know it when we see it

When Do LOC Accidents Occur?



LOC Accidents Near an Airport



Challenges Near the Airport

What's Happening in LOC Accidents?

- All aircraft: Typically some type of aerodynamic stall
  - Straight stall
  - Accelerated stall
    - ➢ More than 1 g
  - Takeoff/climb stall
    - ➢ Back side of the power curve
  - Yaw stall (spin)
  - Skidded turn/cross-controlled stall
- Multi-engine aircraft
  - All of the above plus Vmc roll

Case Study: Kitfox, April 14, 2013

- **Probable Cause: Pilot's failure to maintain adequate airspeed during the turn to final, which resulted in an exceedance of wing critical angle-of-attack and a subsequent aerodynamic stall**
- **Contributing: Pilot's combined use of two sedating antihistimines, which resulted in his impairment**

Accelerated Stall:
Cirrus SR22, February 29, 2012

- **Probable Cause: Pilot's abrupt maneuver in response to a perceived traffic conflict, which resulted in an accelerated stall and a loss of airplane control at low altitude**
- **Contributing: Air traffic controller's incomplete instructions, which resulted in improper sequencing of traffic landing on the same runway**

Takeoff/Climb Stall:
Cessna 177B, May 5, 2012

- **Probable Cause: Pilot pitching the airplane to an excessive nose-up attitude during an aborted landing, which resulted in increased induced drag, diminished airspeed, and an aerodynamic stall/spin**
- **Contributing: Pilot's use of a sedating antihistamine, which resulted in impaired mental and motor skills**

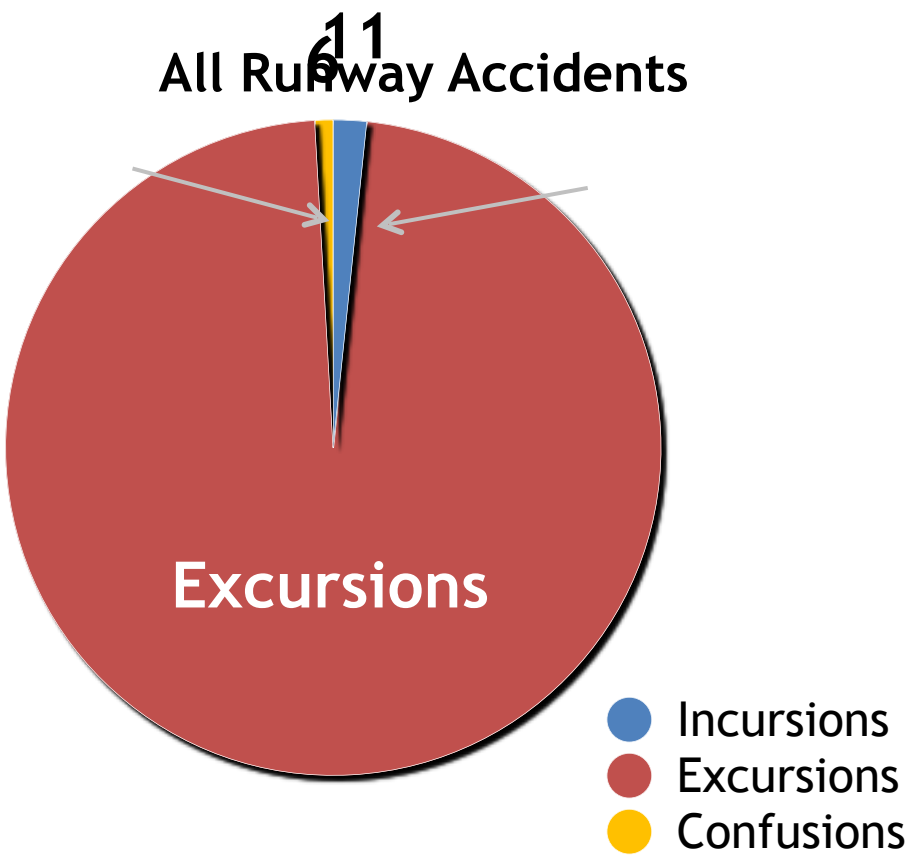
Vmc Roll: Cessna 441, December 22, 2012

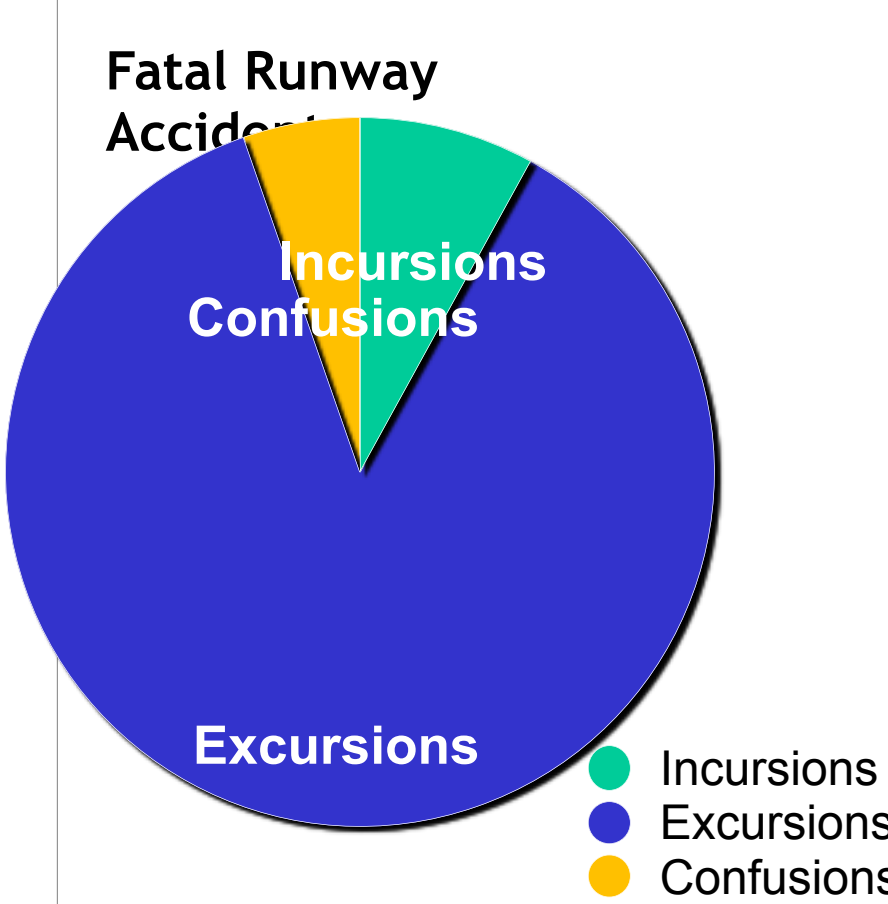
- **Probable Cause: Pilot's failure to maintain minimum control airspeed after a loss of power to the right engine which resulted in an uncontrollable roll into an inadvertent stall/spin**
- **Contributing: Failure of the right engine for undetermined reasons and the pilot's subsequent turn toward that inoperative engine while maintaining altitude**

Remedies? Mostly Human Factors

- Be honest with yourself about your knowledge of stalls and your ability to anticipate and react to them
- Understand and maintain currency in the equipment and airplanes you fly
- Maximize training opportunities
- Prepare thoroughly for the environments in which you'll be flying
- Anticipate, manage, and minimize distractions
- Increase your situational awareness, e.g., angle of attack indicator

s, 1995-2010





Note: Of 1429 accidents involving major or substantial damage from 1995-2008, 431 (30%) were runway related

Runway Accident Fatalities, 1995-2010

Runway Incursions

- **Previously defined by FAA as *hazard created by* airplane or vehicle on the runway when it should not have been**

- **Now defined as "any occurrence at an aerodrome involving incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing or takeoff aircraft" *whether or not a hazard was created***

Runway Excursions

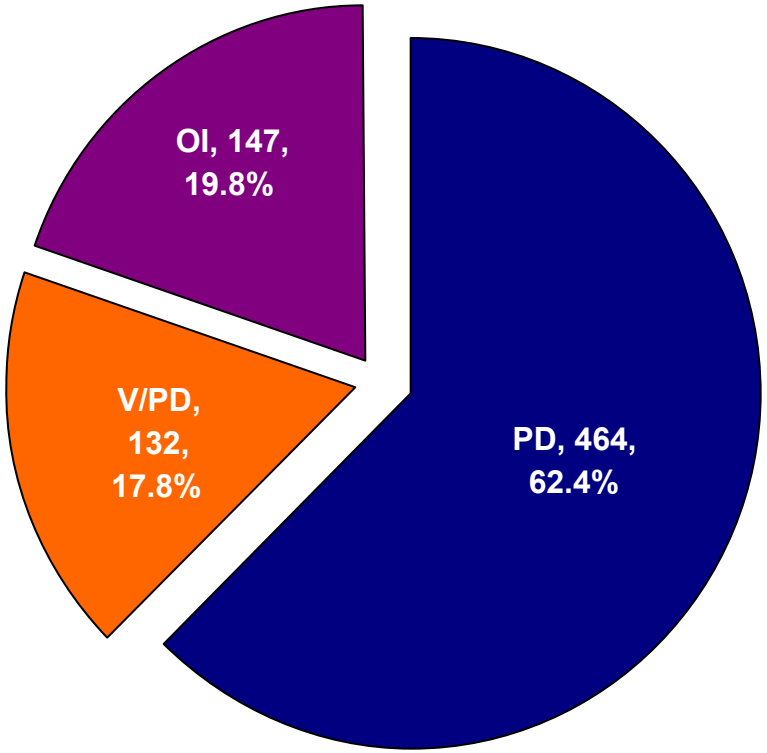
- Includes takeoff overruns, landing overruns, and departing the runway laterally during takeoff or landing
- Does not include landing short
- Almost 60 times more excursion accidents than incursion accidents
- Almost 11 times more fatal accidents, and almost 9 times more fatalities, from excursions than incursions

Runway Confusions

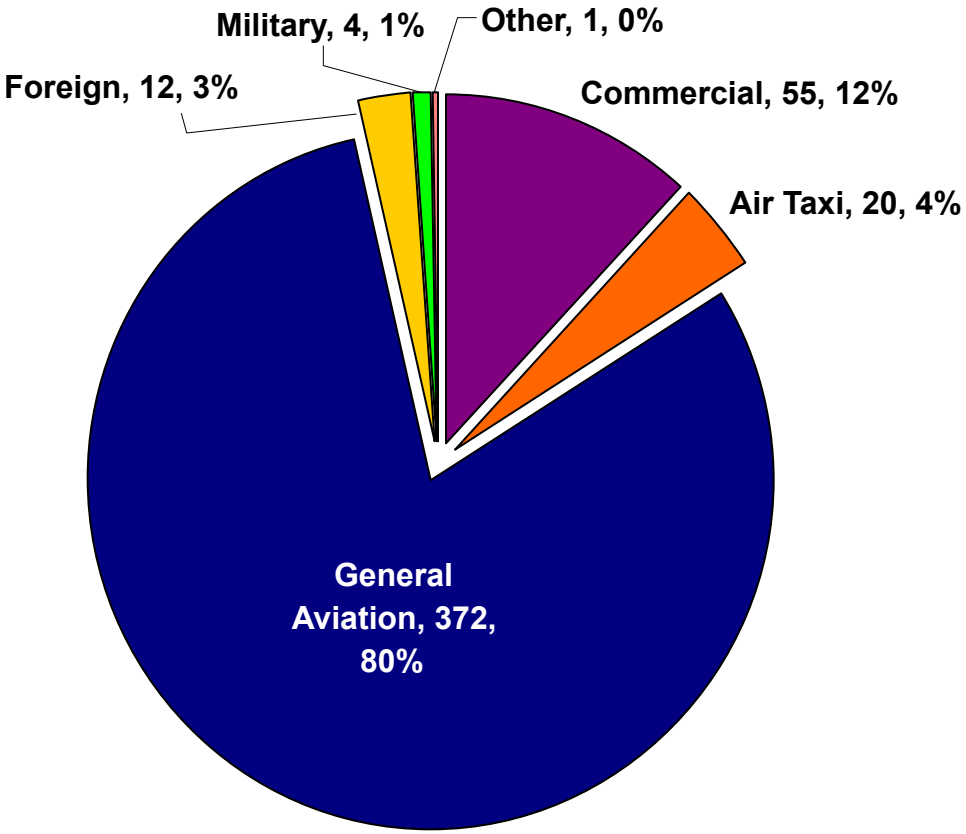
- Includes using other than dedicated or assigned surface for takeoff or landing, e.g., taxiway other than runway, or wrong runway

- Less than 1% of runway related accidents

Incursion Numbers and Rates



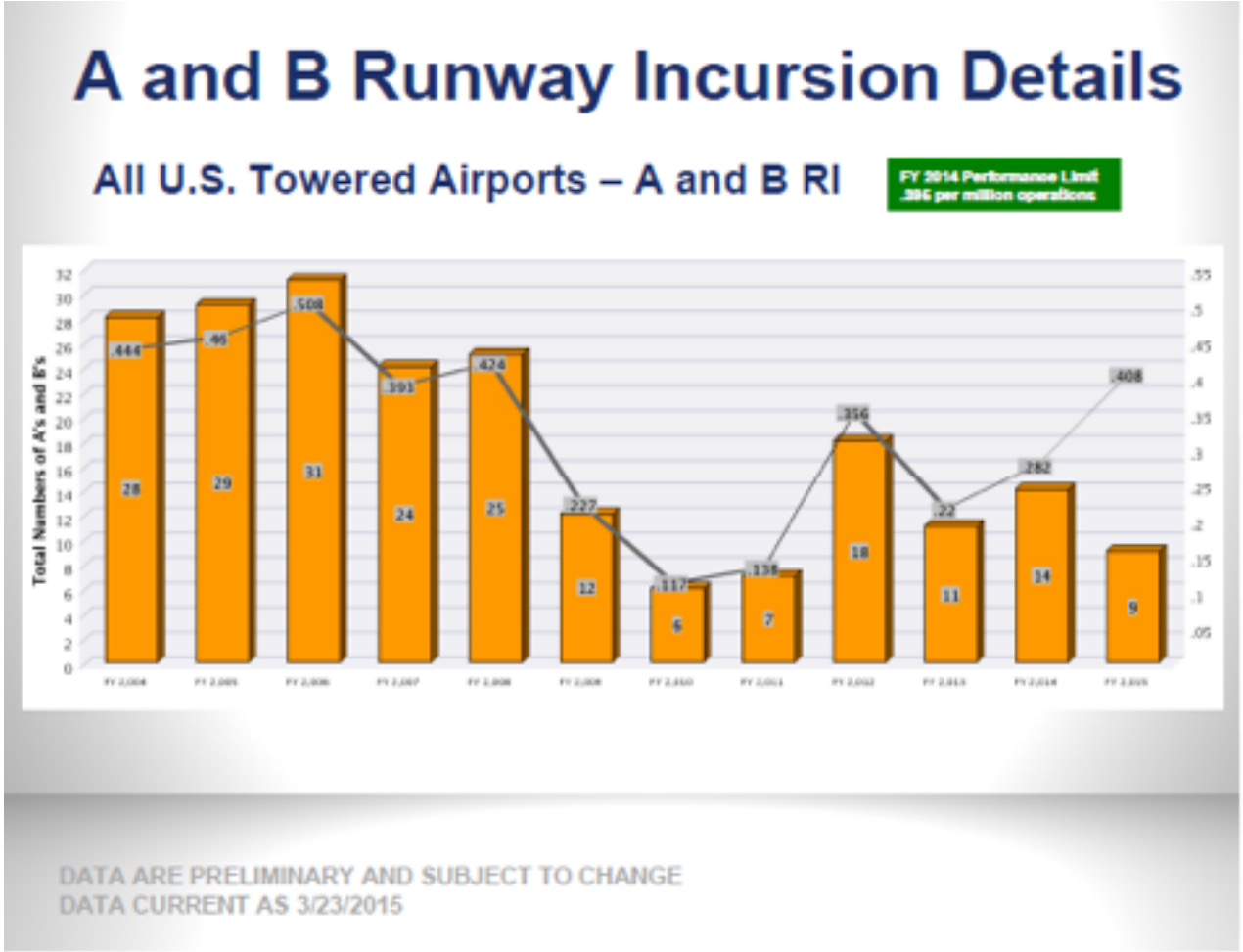
743 Runway Incursions



464 Pilot Deviations

Source: FAA, 1 Oct 2011 – 30 June 2012

Runway Incursions – Bad News



Makeup of GA Incursions

- Nearly half involve entry onto the runway or across the hold short line
  - In nearly half of those, the pilot received a clearance, acknowledged the clearance, and read it back correctly
  - In the remainder, the pilot either received no clearance, or received a clearance to, but not onto, the runway

The Paradigm Shift

- Previous Response: Punishment
  - Mostly pilots
  - Sometimes controllers
- The Good News: Runway Safety Council
  - Objective: Identify and fix problems, rather than punish
  - Collaborative activity, including FAA, airlines, labor, AOPA, and others
  - Quarterly meetings to determine root causes, re most recent RI's, make recommendations
  - Follow up on recommendations

Sample of Results

- Inclusion of chapter re Runway Incursion Avoidance in Pilot's Handbook of Aeronautical Knowledge
- Progress toward inclusion of runway incursion material in
  - Practical Test Standards
  - Instructor training
  - Part 142 curriculum
- Changes in ATC procedures
- Changes re airport signs and markings

Problems and Solutions: Airport Chart

- Have it
  - Incursions sometimes due to pilots unfamiliar, no chart
  - Get charts online
  - Encourage FBOs to provide charts
- Understand it (especially “Hot Spots”)
  - Incursions due to missed turn while programming FMS
  - Incursions due to failure to clarify confusing clearance
  - Incursions due to unawareness of “gotcha”
  - Wrong runway due to inadequate awareness of geometry

Expectation Bias
(Think You Hear What You Expect To Hear)

- **No Readback**
  - Pilot's readback did not specify which runway
  - Controller did not ask
  - Took off on wrong runway
- **Pilot Hears Clearance Incorrectly**
  - Pilot told to continue approach
  - Controller in long conversation re other matter
  - Pilot landed without clearance
- **Controller Hears Readback Incorrectly**
  - Readback re non-existent intersection should have alerted controller to problem

Abnormal Operations

– **Construction**
  - **Lights inop**
  - **Routes may not be well marked**
  - **Procedures interim, may not be robust**

–**Other**
  - **Stuck mike -- Causal link in takeoff without clearance**
  - **Long conversation -- Resulted in landing without clearance**
  - **Controller forgot -- Resulted in simultaneous conflicting landing clearances**
  - **Mishap at airport – Resulted in incorrect clearance (procedures not robust or well-practiced)**

Moral of the Story

- **Many Good People Trying to Do the Right Thing, But the System is Clearly Not Perfect**
- **Trust But Verify**
- **When in Doubt – *ASK!!***

See and Be Seen

- The good news – It's a very big sky
- The bad news – One midair collision can ruin your whole day!
- Collisions are more likely in high traffic areas, e.g., near airports and ground-based navaids (less now since GPS)
- Can also happen enroute
- Emerging threat – distractions in the cockpit

Suggested Pilot Countermeasures

- Vigilant and methodical scanning . . . and not just in high-volume traffic areas
- Divide attention in and out of the cockpit, minimize distractions
- Maximize conspicuity of your aircraft
- Broadcast your intentions clearly
- Increase vigilance in situations that make aircraft spotting more difficult
- Encourage passengers to participate in spotting traffic
- Use on-board traffic advisory systems . . . but only as backup, not as a substitute

Mountain Flying

- **Lessons Learned from Accidents**
  - **If you have never operated at a high density altitude airport, consider some training**
  - **Be certain that you know the capability of your aircraft**
  - **Be certain that you are confident about the operation you are contemplating**
  - **Weather – Information is less robust, forecasts are uncertain, so when in doubt, consider going later**
  - **Good Preflight Planning is essential**

Case Study: PA-28-235, June 30, 2014

- Pilot, his wife, and 8 year old son, from Raymond, OH, departed Rocky Mountain Metropolitan Arpt, Jefferson County, CO (KBJC)
- No indication that the pilot had training in mountain flying
- At KBJC, pilot was looking for advice on flying through the mountains to get to Moab, Utah
- He was overheard saying that he would fly south to Interstate 70 and follow it through the mountains
- Took off, climbed to 10,400' msl and proceeded south to I-70, then turned west and proceeded into the mountains
- Witnesses who saw the airplane as it approached Loveland Pass saw the airplane at full power, nose raised, and not gaining any altitude. It then "snapped" into a left spiraling descent
- Elevation of crash site: 10,969' msl

The Conditions

- Engine: Lycoming IO-540-B4B5, fuel-injected, rated at 250 bHP
- Density Altitude: 12,850’
  - Temperature: 78 degrees F
  - Pressure: 30.03”
- Koch Chart in FAA Pamphlet 8740-2: Rate of climb would be decreased by greater than 90 percent

The Big Picture

- **The Problem: 39 accidents and 81 fatalities in the past 10 years involving pilots from lower elevations with no mountain flying education that crashed in the mountains in VMC conditions**
- **The Response**
  - **NTSB met with the Colorado Pilot's Association a few weeks after this accident occurred (during which time, two more mountain flying accidents happened in Colorado)**
  - **CPA issued a poster for display in FBOs**
  - **NTSB issued a Safety Alert for pilots**

CPA Poster, NTSB Safety Alert

Safety Alert: Go to NTSB.gov/safety/safety-alerts/Pages/default.aspx

Grassroots Safety Advocacy

- The Colorado Pilot's Association (CPA) is placing the "Flying Into The Mountains?" poster in FBOs, flight schools, and airport restaurants in the 73 public airports in Colorado
- The CPA is developing a mobile app that pilots can download to get information on Mountain flight planning
- The FAA is adding Mountain Flying education to its requirements for Flight Instructor Refresher Courses
- In Colorado, the CPA is putting on two weekend Mountain Flying Courses
- They'll be speaking at Oshkosh in July

Thank You, and Happy Flying!!!

Questions?