



NTSB National Transportation Safety Board

Some General Aviation Safety Issues:

What Accident Investigators Are Seeing

Presentation to: AOPA Fly-In

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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
- **Last but not Least: Shoulder Harnesses?**

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**

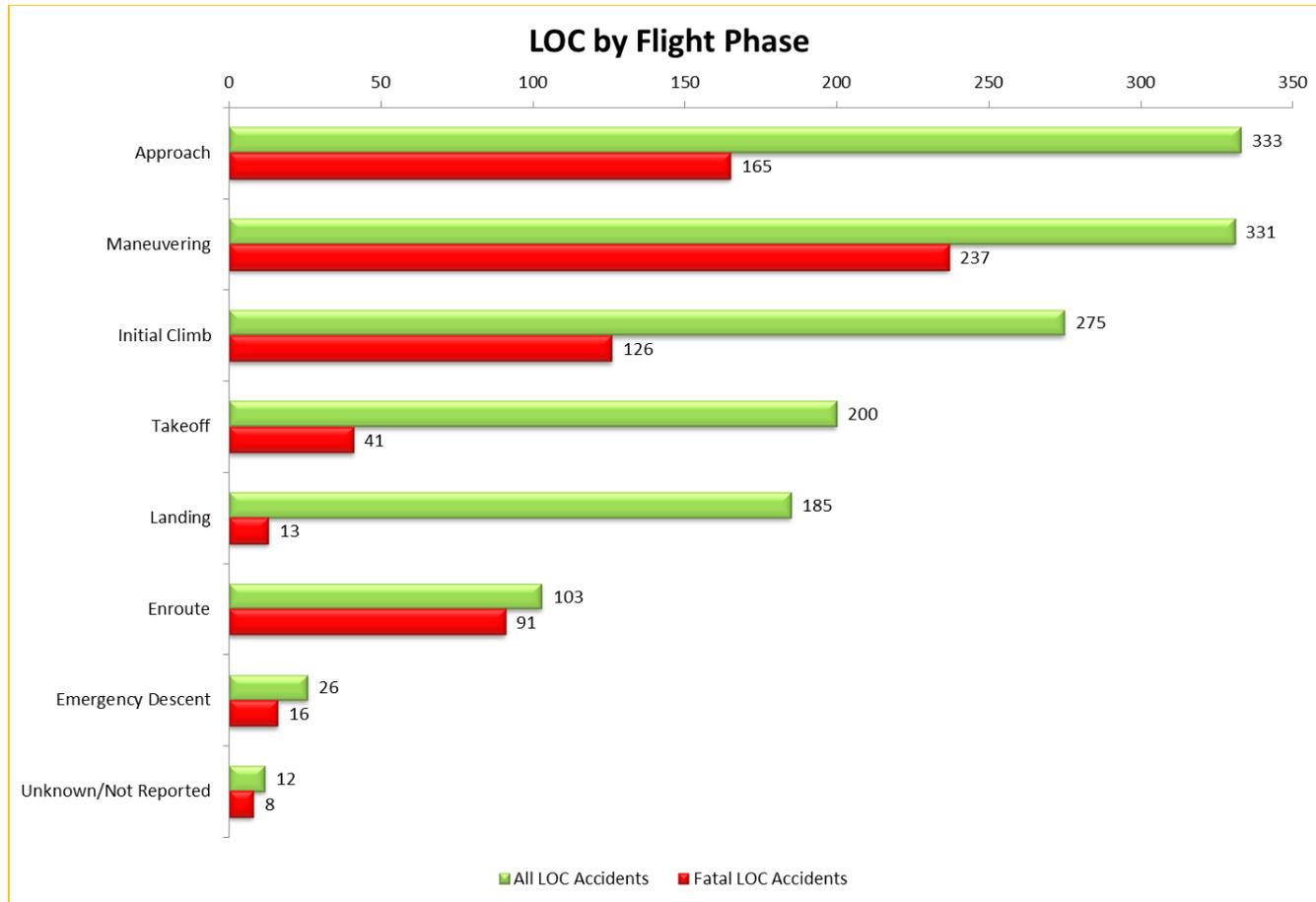
Appellate Function

- **FAA license suspension/revocation proceedings are heard first by administrative law judge**
- **Appeals heard by the full Board**
- **Changes from Pilot's Bill of Rights II?**

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**

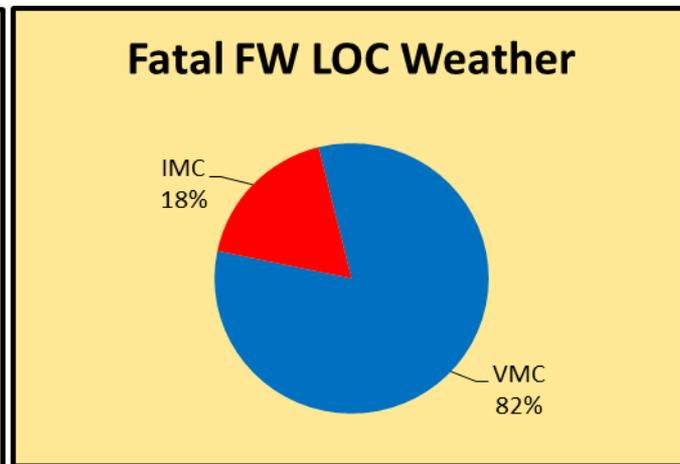
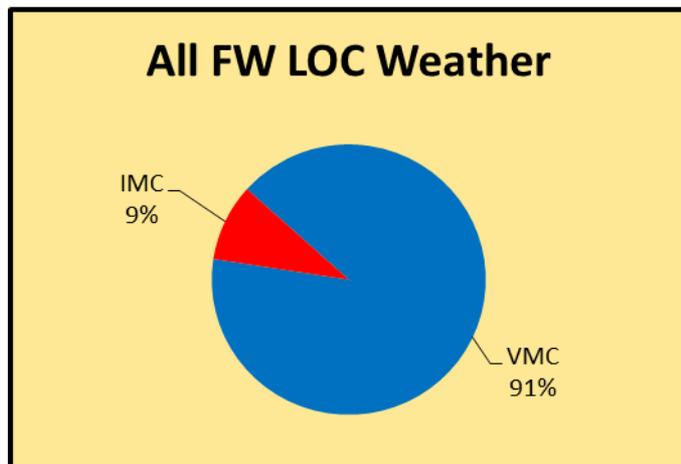
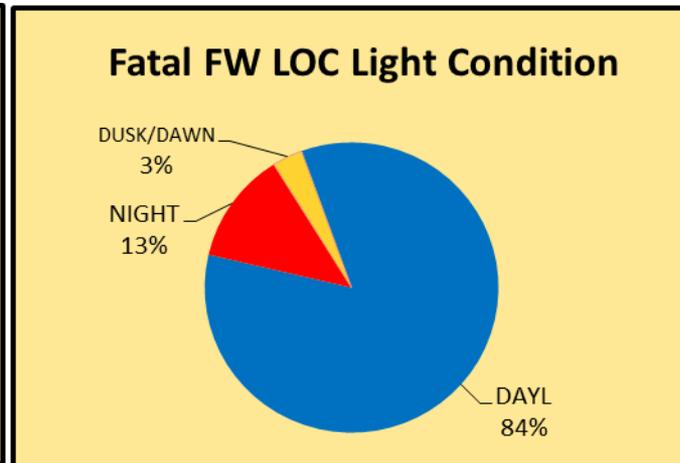
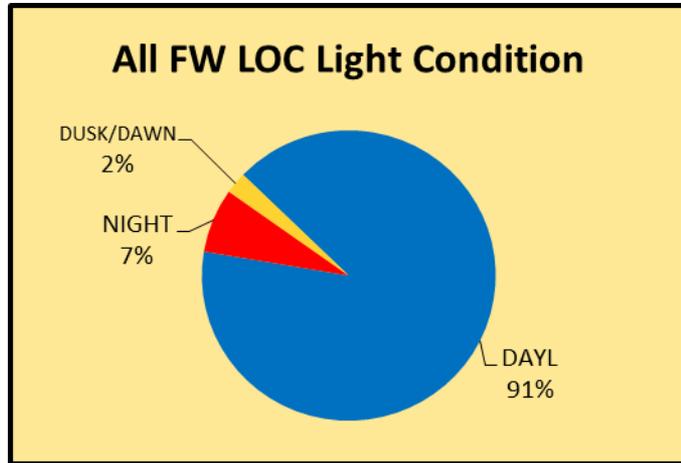
LOC Accidents: Phase of Flight



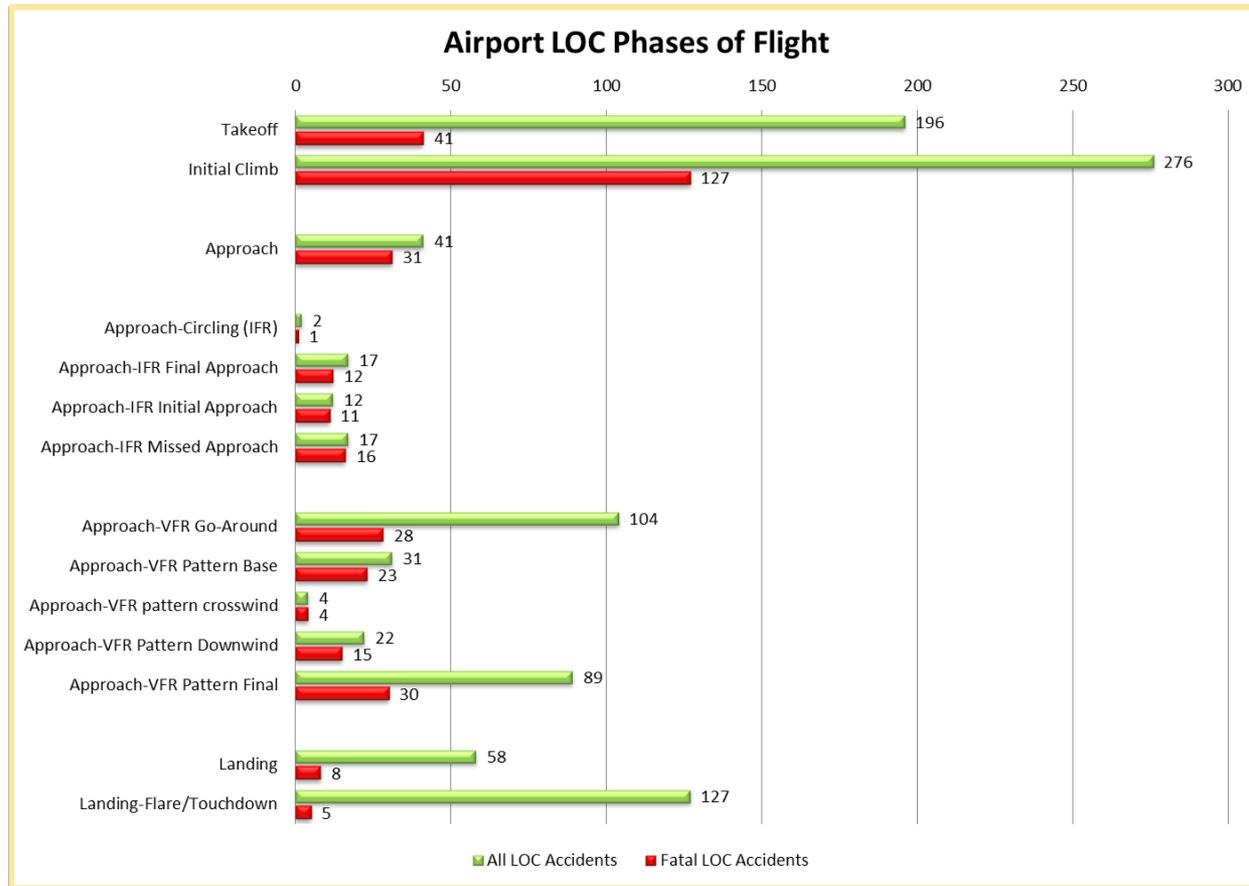
2008-2014



LOC Accidents: Time of Day, Weather

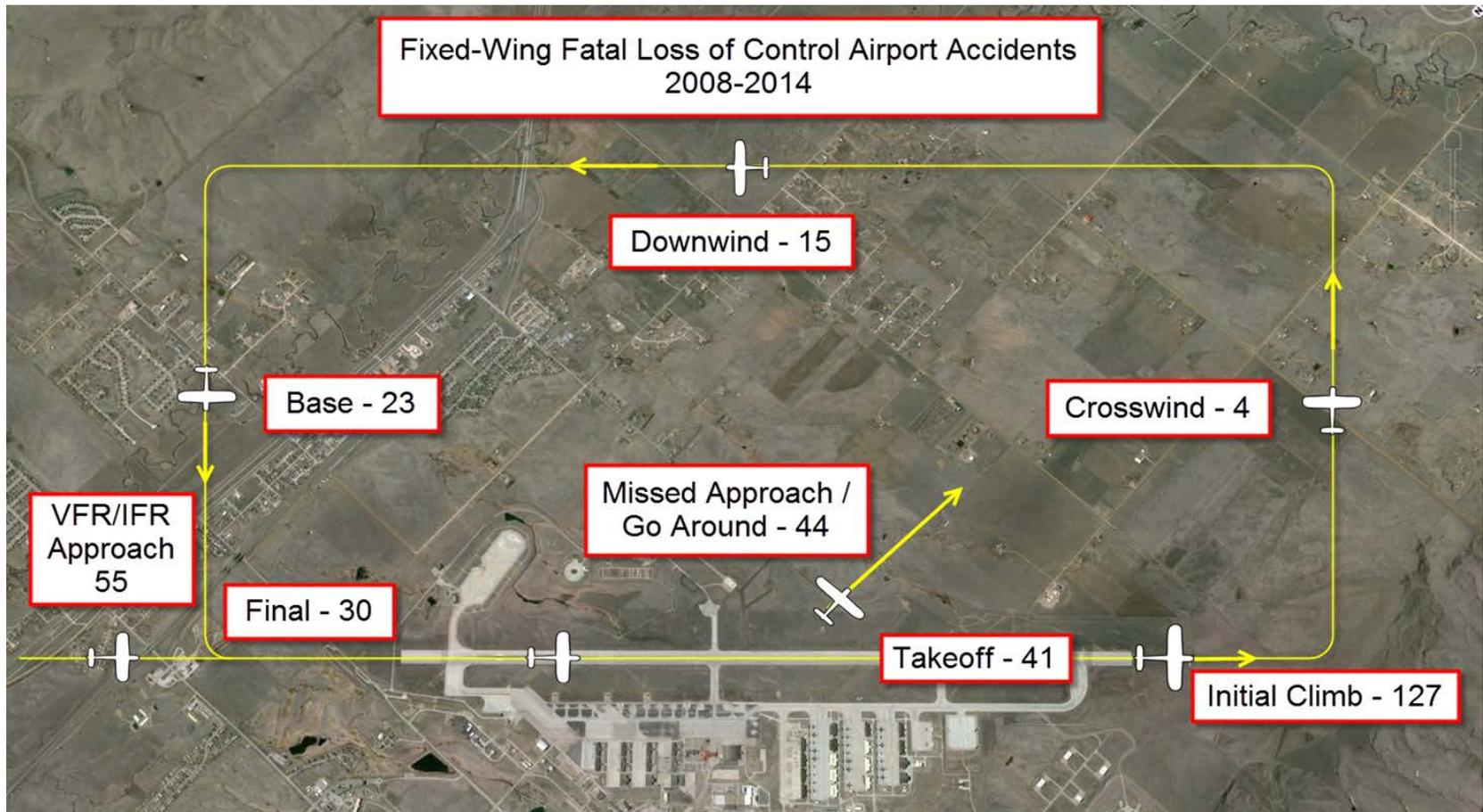


LOC Accidents Near an Airport



2008-2014

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 antihistamines, 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**

Runway Accidents: Definitions

– Incursion

- 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

Definitions, con't

– Excursion

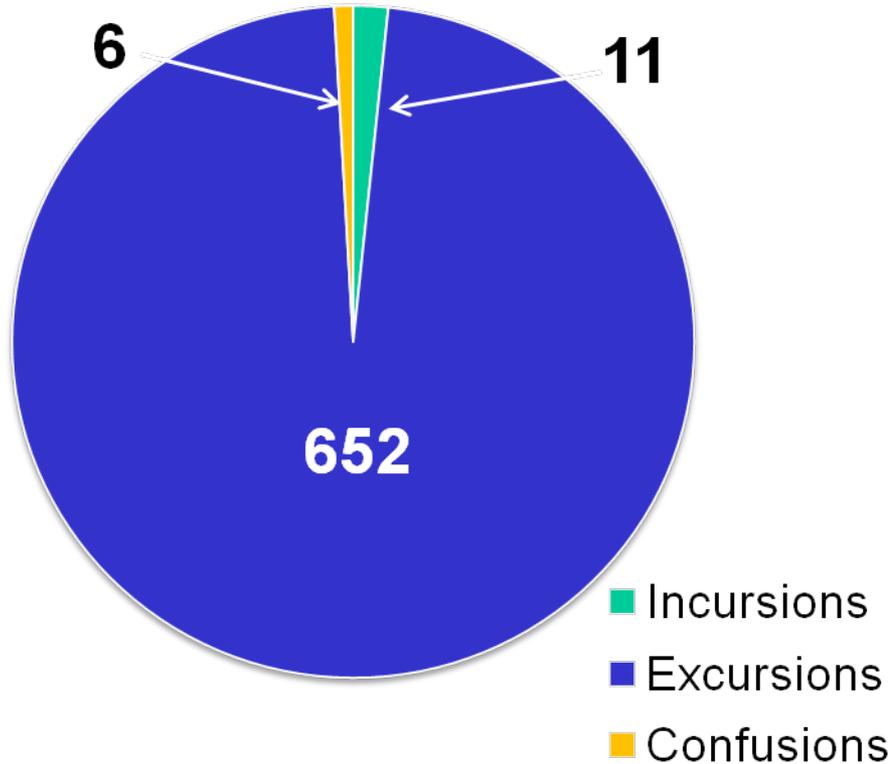
- Includes takeoff overruns, landing overruns, and departing the runway laterally during takeoff or landing
- Does not include landing short

– Confusion

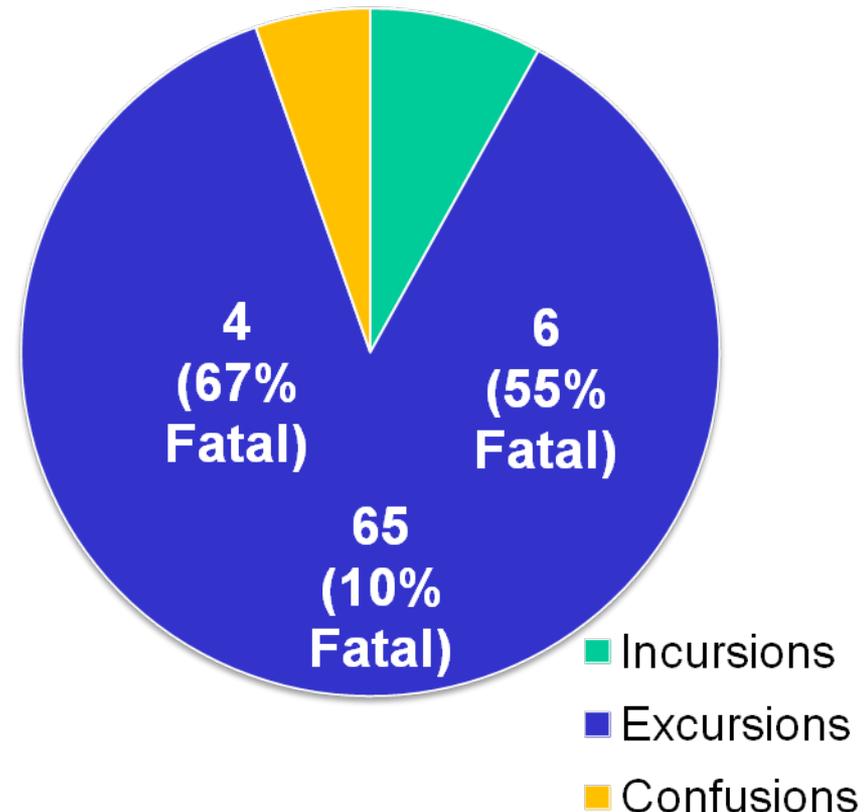
- Includes using other than dedicated or assigned surface for takeoff or landing, e.g., taxiway other than runway, or wrong runway

Runway Accidents, 1995-2010

All Runway Accidents

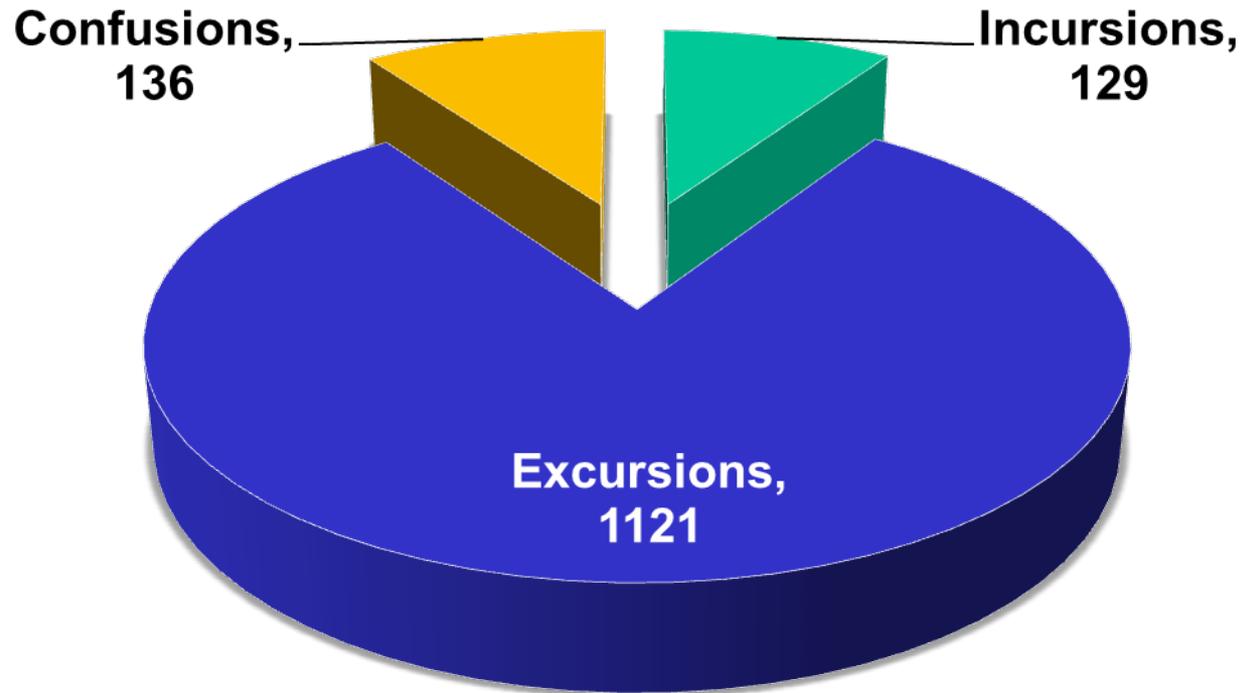


Fatal Runway Accidents



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

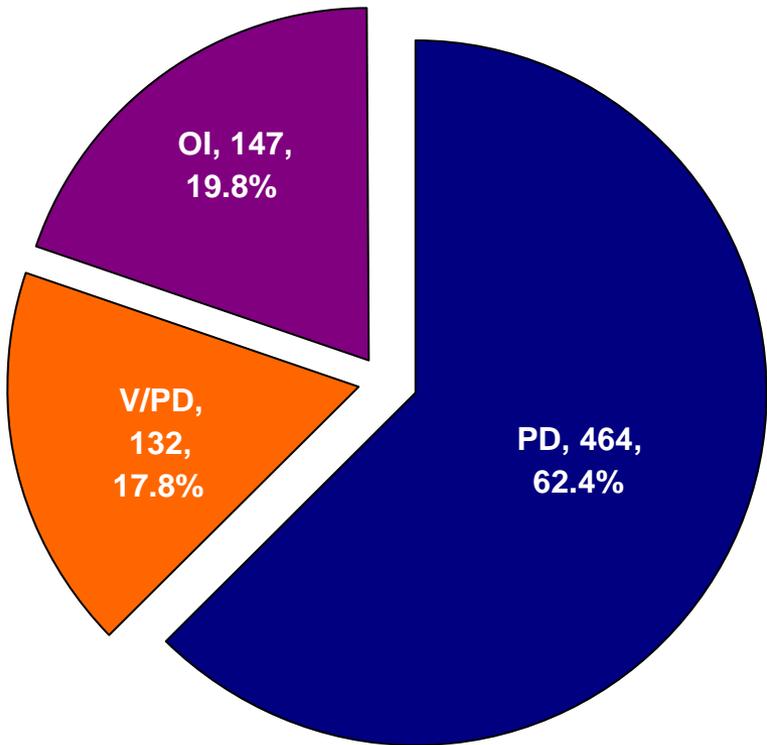
Runway Accident Fatalities, 1995-2010



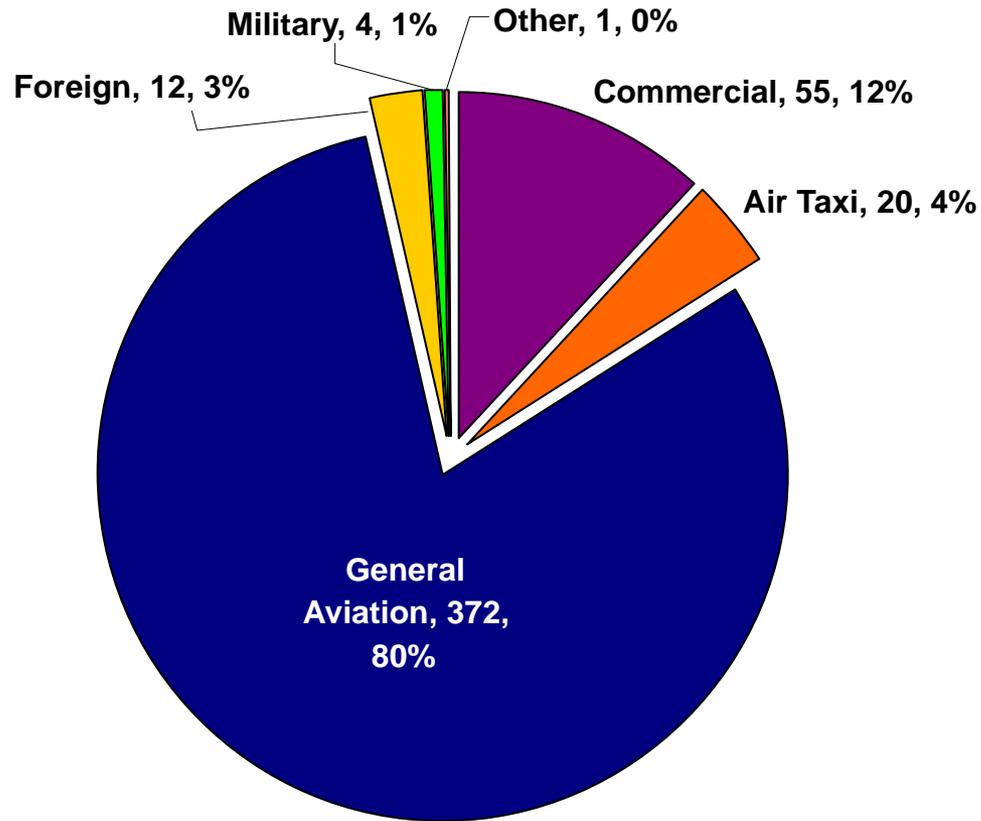
Relative Frequency

- **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**
- **Confusions represent less than 1% of runway related accidents**

Incursion Numbers and Rates



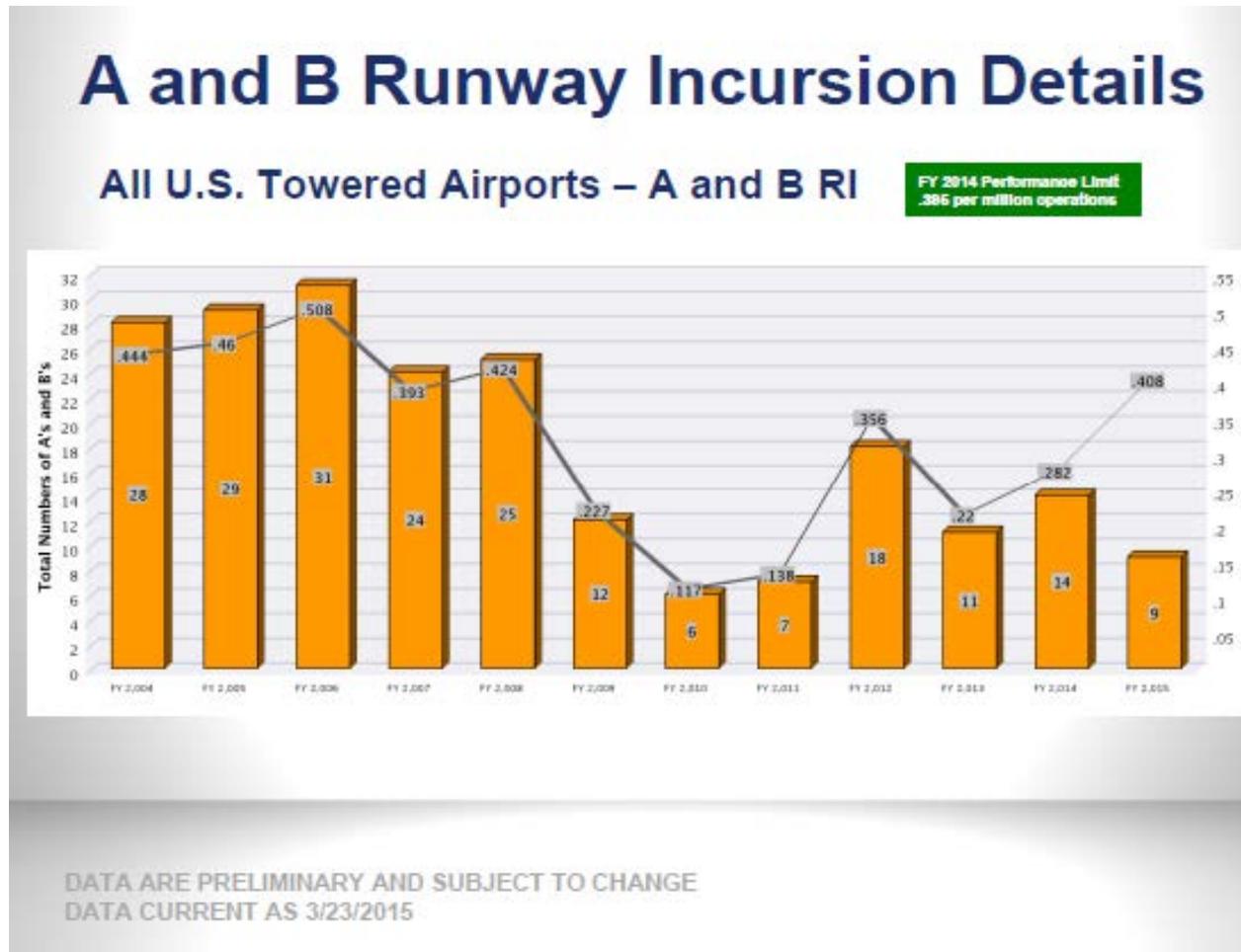
743 Runway Incursions



464 Pilot Deviations

Source: FAA, 1 Oct 2011 – 30 June 2012

Runway Incursions – Bad News



What's Going Wrong?

Sometimes People Simply *FORGET!*

- Nearly half of GA incursions 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
- Controllers sometimes forget and issue simultaneous (conflicting) clearances

Other Error Sources: Abnormal Operations

– Construction

- Normal or construction lights may be inoperative
- 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
- Mishap at airport – Resulted in incorrect clearance (procedures not robust or well-practiced)

Result: New Paradigm

- **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

Problems and Solutions: Airport Chart

- Have it

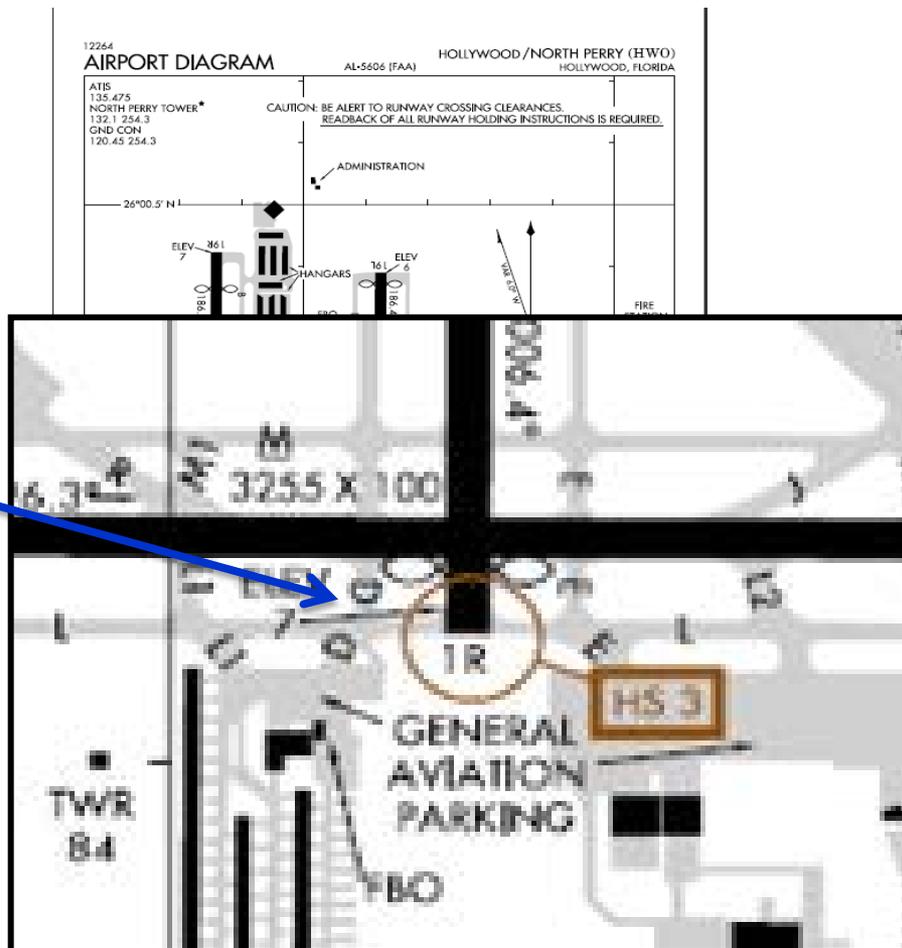
- **Incursions sometimes due to pilots unfamiliar, no chart**
- **Get charts online**
- **Encourage FBOs to provide charts**

- 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**

Unawareness of “Gotcha”

Note entry onto runway immediately after right turn out of FBO ramp



Expectation Bias

(Think You Hear What You Expect To Hear)

- **Pilot hears clearance incorrectly**
 - Pilot told to continue approach
 - Controller in long conversation re other matter
 - Pilot landed without clearance

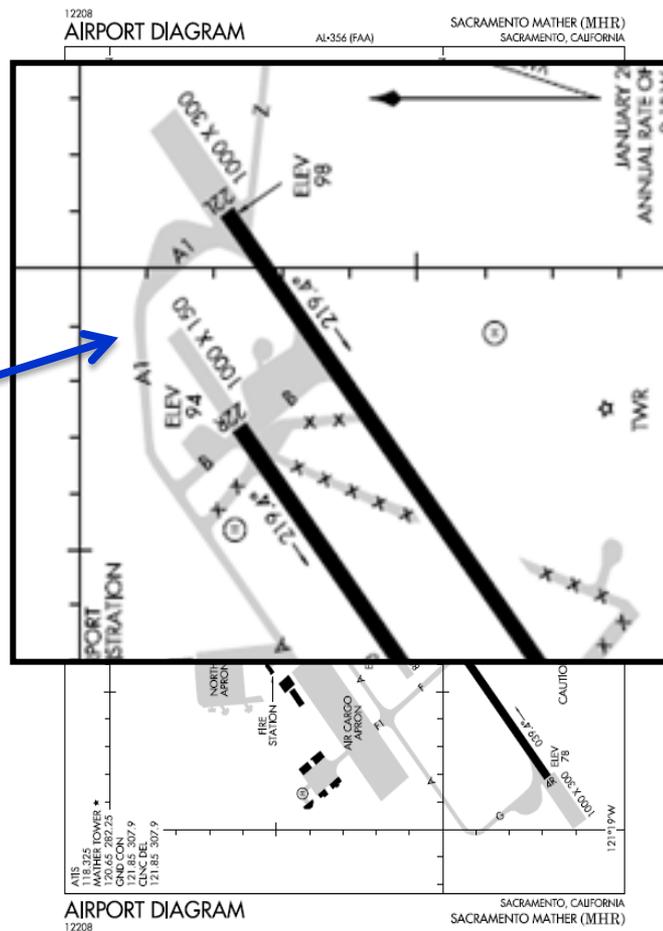
- **No readback**
 - Pilot's readback did not specify which runway
 - Controller did not ask
 - Pilot departed on wrong runway

- **Controller hears readback incorrectly**
 - Readback re non-existent intersection should have alerted controller to problem

No Readback; Wrong Runway

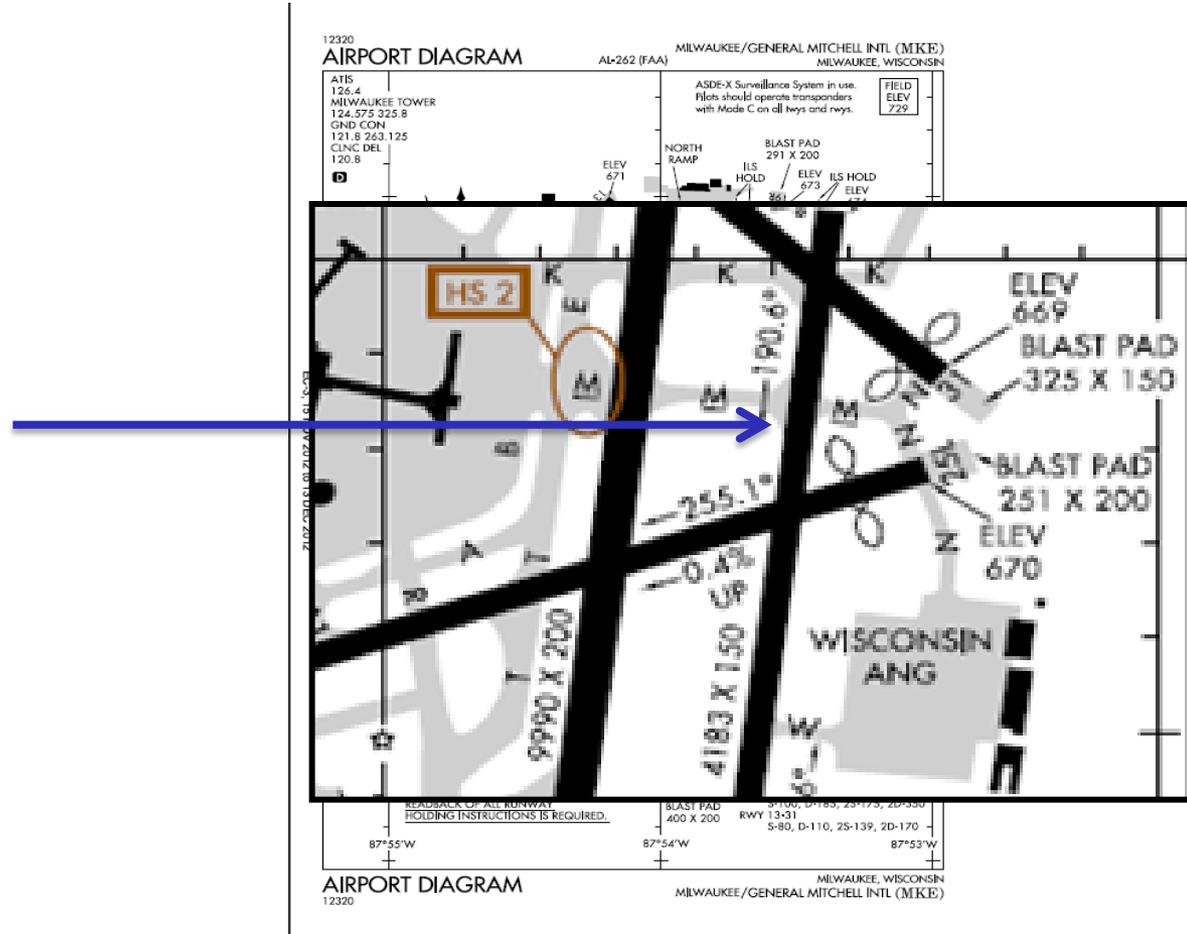
Note that

- *Taxiway A does not go to RW 22R; must turn right onto Taxiway B*
- *Taxiway A becomes Taxiway A1, but change not obvious*
- *Taxiway A1 goes to RW 22L*



Non-Existent Intersection

*Note that
Taxiway M
does not
intersect
RW 25L*



Lessons Learned

- Many airport safety issues examples involve
 - *At least one error by a pilot, and*
 - *At least one error by a controller*
- The system involves many good people trying to do the right thing, but pilots and controllers must always be alert for errors
 - *their own and others*
- Pilots and controllers: *Trust but verify*
 - Pilots: Always use the taxi chart; and when in doubt, **ASK!!**

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**

Recently Announced

- **FAA Runway Incursion Mitigation (RIM) Program**
 - **FAA developed a preliminary inventory of airport locations where runway incursions have occurred**
 - **Identified specific airport areas with risk factors that could contribute to a runway incursion, and identified those risk factors**
 - **Plan to work with airports to develop strategies to mitigate runway incursions at these locations**

Moral of the Story

*Identifying problems
and fixing them
improves safety
far more effectively
than punishment*

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 nav aids (less now since GPS)
- Can also happen enroute
- Emerging threat – distractions in the cockpit
- NTSB issued Safety Alert, May 2015

Safety Alert 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**

Final Note: Shoulder Harnesses?

- **Substantially better protection than lap belt alone**
- **Recommended by NTSB for nearly 40 years**
- **Required for front seats in newly built aircraft since 1978**
- **Required for all seats in newly built aircraft since 1986**
- **Substantial percentage of the fleet older, not equipped**
- **Many accidents might have been survivable with shoulder harnesses**
 - **If you don't have them, consider getting them, and**
 - **If you do have them, please make sure you use them!**
- **The choice is yours . . .**

Thank You, and Happy Flying!!!



Questions?