The National FAA Safety Team Presents

Topic of the Month – July
Stabilized Approaches & Landings

Presented to: WAFC and Friends

By: Stephen Bateman, CFI

Date: July 12th, 2021

Produced by: *AFS 850*
National FAA Safety Team

Welcome

- **Steve Bateman, CFI, AOPA Director of Flying Clubs**
  - Treasurer, maintenance and safety officer – Westminster Aerobats Flying Club
  - FAASTeam lead representative, Baltimore FSDO
- **Sponsor Acknowledgment – WAFC, AOPA, FAASTeam, Baltimore FSDO**
- **Please - MUTE your microphone.**
- **WINGS Credit: Yes…but give me a day or two…**
- **In-and-out…no time for questions, but send email:**
  - **steve.bateman@aopa.org**

Important!

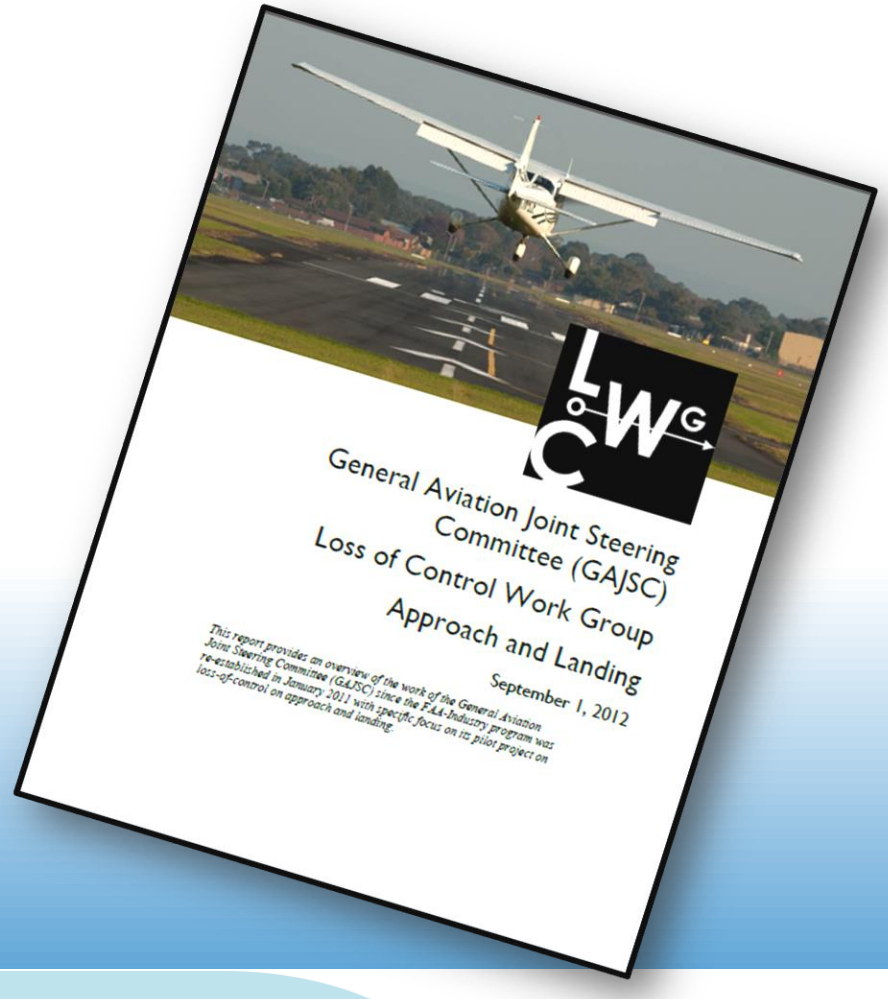
- Wilmington Delaware TFRs
- Extended P-40 TFRs
- Will be popping up like daisies…
- Check NOTAMs
- Subscribe to NOTAM notifications
- Call flight service when in flight

VIP TFR OVER WILIMINGTON, DE BEGINNING
TODAY SATURDAY, MARCH 6, 2021

VIP TFR OVER HAGERSTOWN/THURMONT, MD
BEGINNING FRIDAY, APRIL 2, 2021
(((CHANGE IN DEPARTURE TIME)))

General Aviation Joint Steering Committee (GAJSC) & FAA Accident Study Findings

Of the dozens of safety related issues found, "unstabilized approaches" and "inappropriate go-around procedures" were on their most wanted list.



LET'S TALK…

Stabilized Approach factors:

- **What the data tells us**
- **All about:**
  - The pattern (and entry)
  - The approach
  - The landing technique
- **Threats to safe landings**
- **Going around**
- **Best practices**

Here’s what we know…

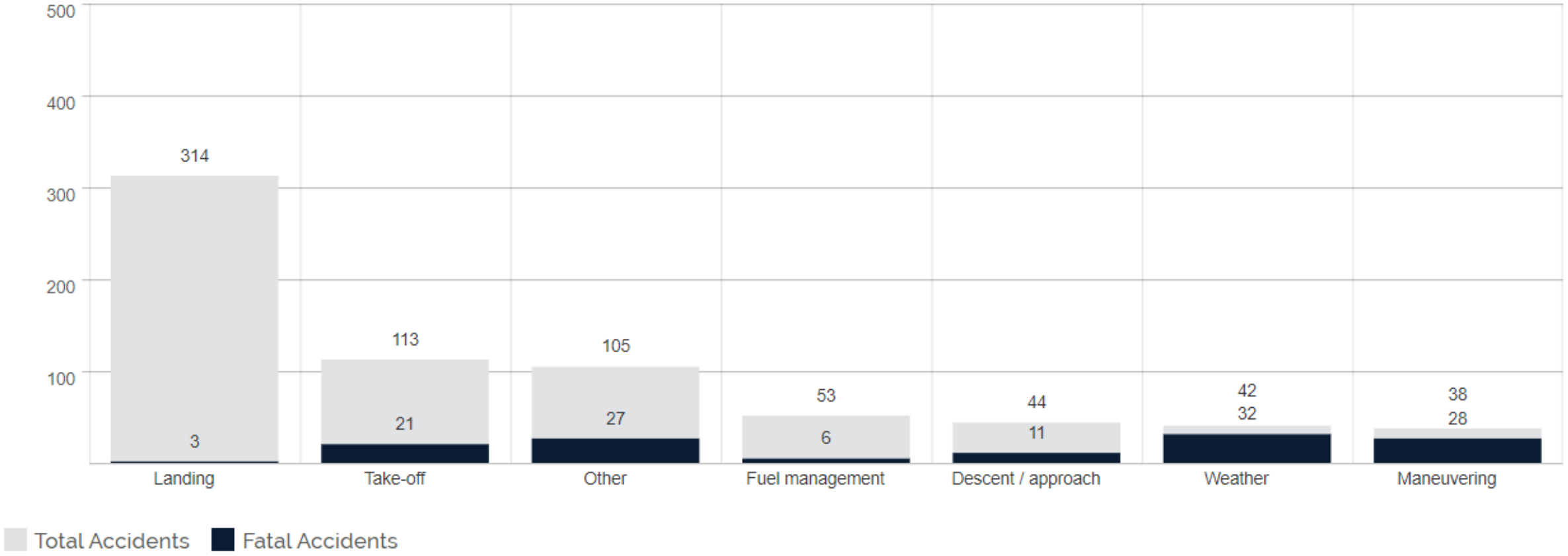
- **Stabilized approach criteria have successfully elevated the in-cockpit awareness of risk during approaches.**

- **Runway accidents are *still* at the top of the list.**

29th Nall Report

Figure 1.11: Types of pilot-related accidents

2017 Non-commercial fixed-wing



30th Nall Report

Figure 1.11: Types of pilot-related accidents

2018 Non-commercial fixed-wing

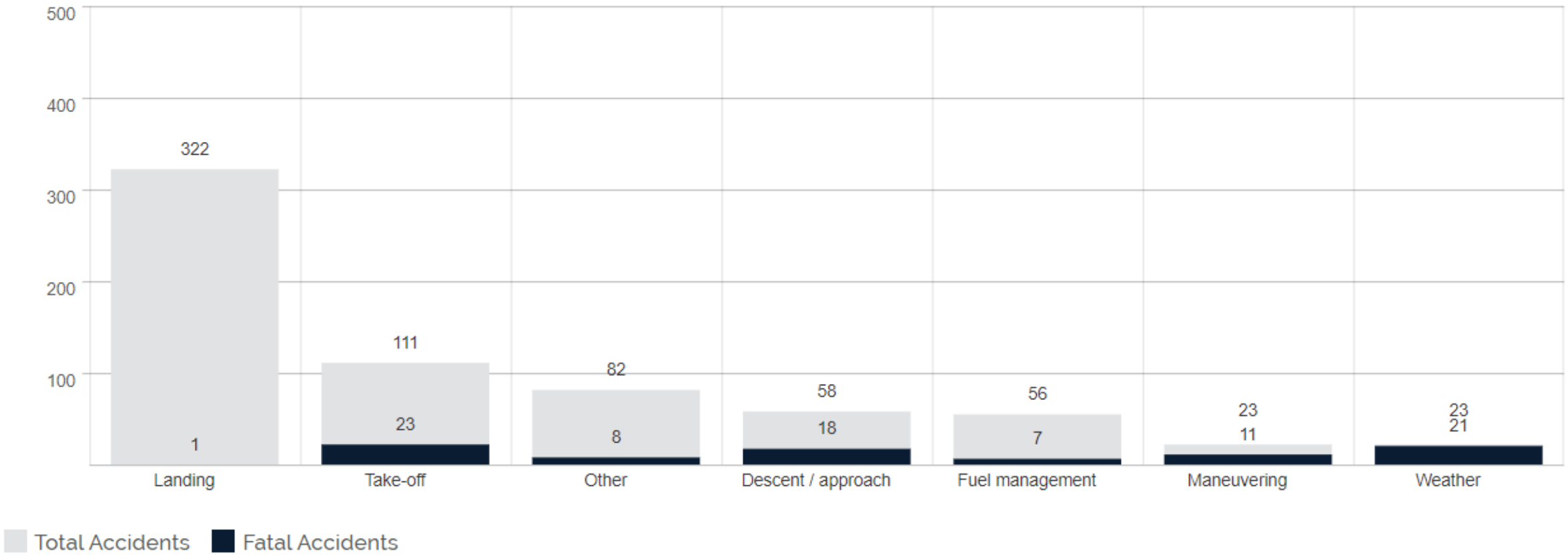


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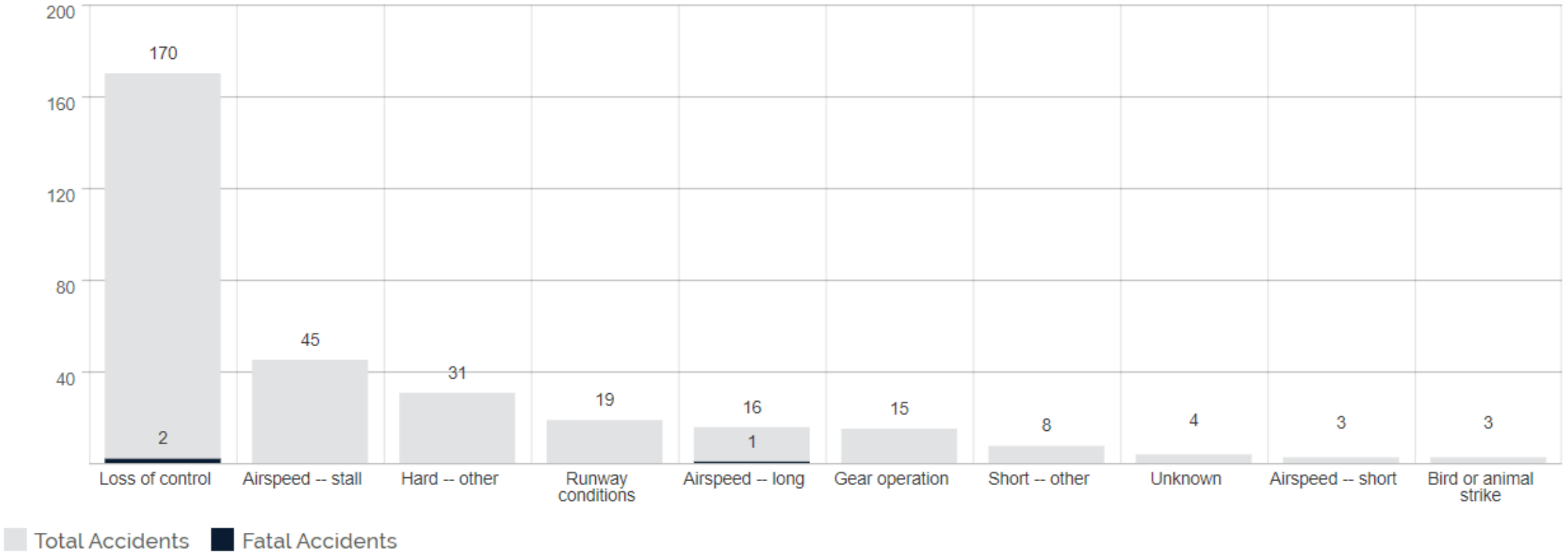
Figure 1.1.2: Types of Landing Accidents

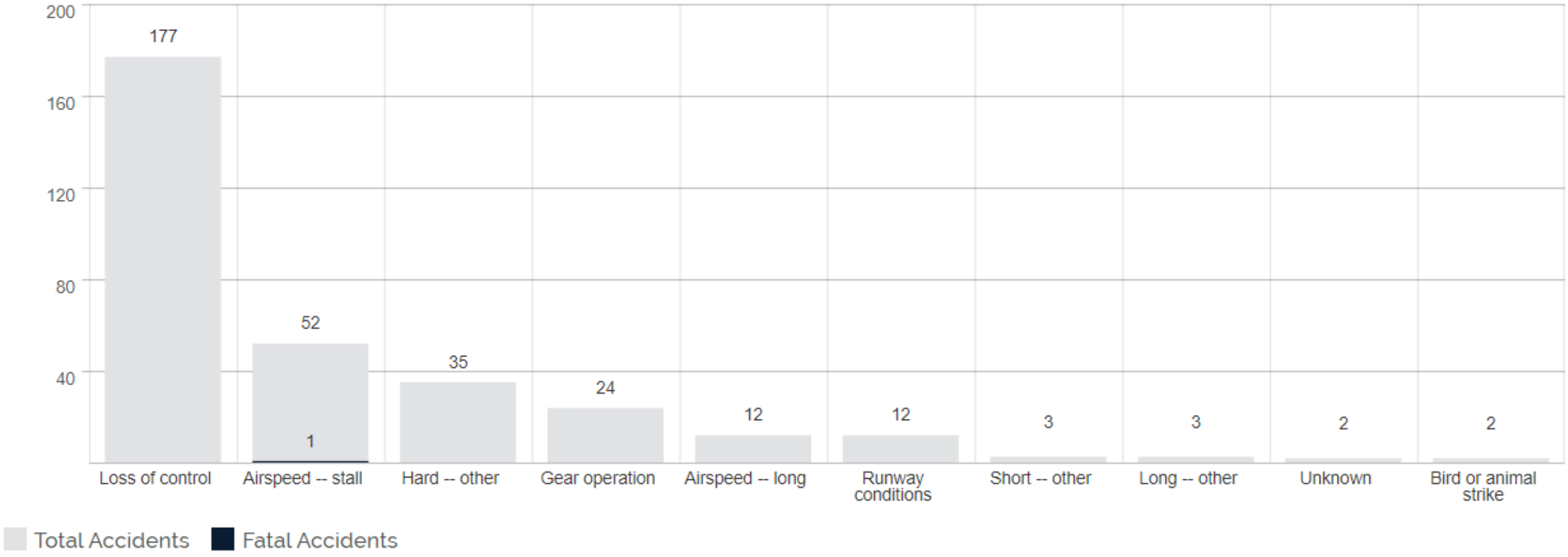
2017 Non-commercial fixed-wing



30th Nall Report

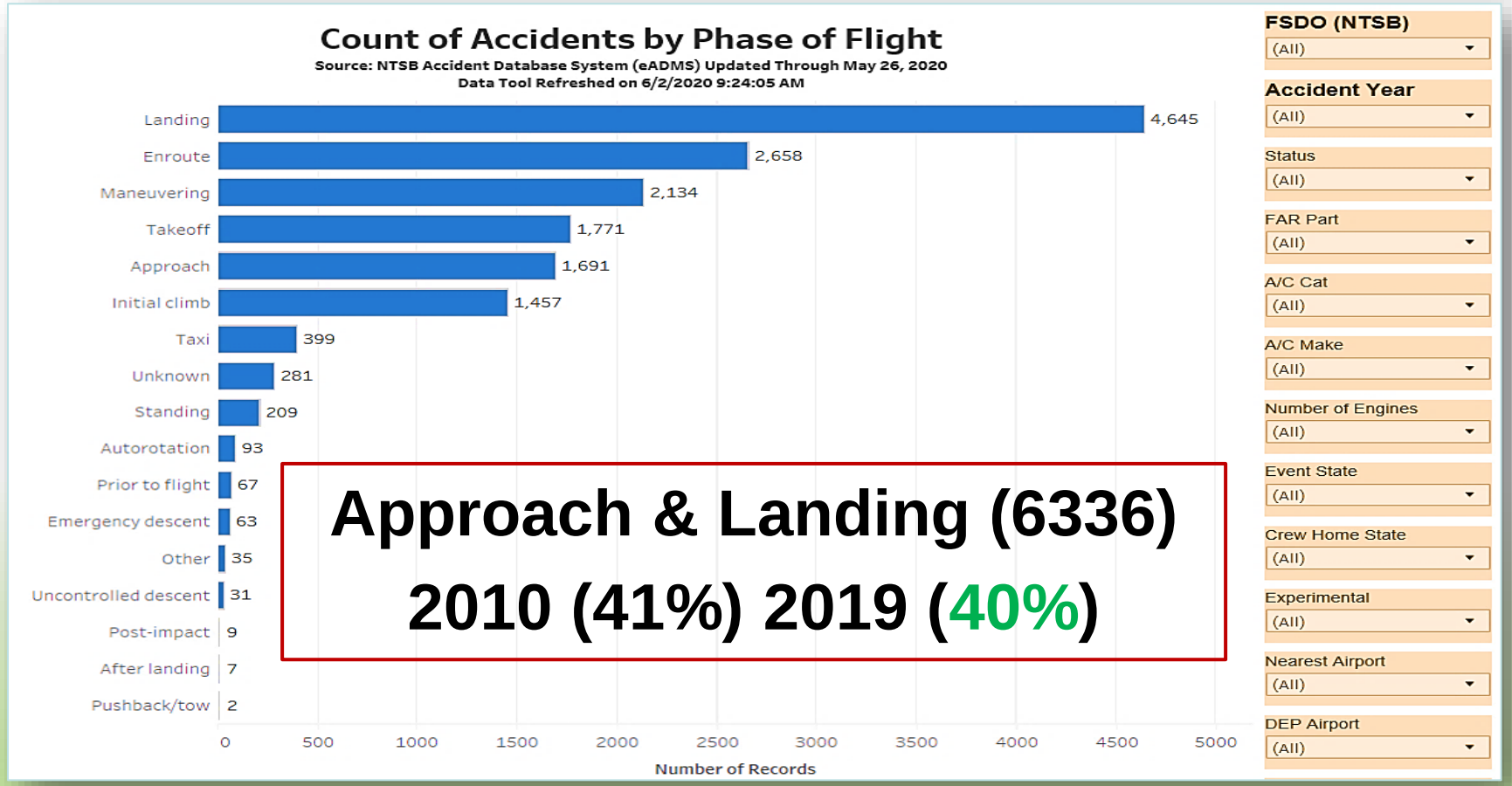
Figure 1.1.2: Types of Landing Accidents

2018 Non-commercial fixed-wing



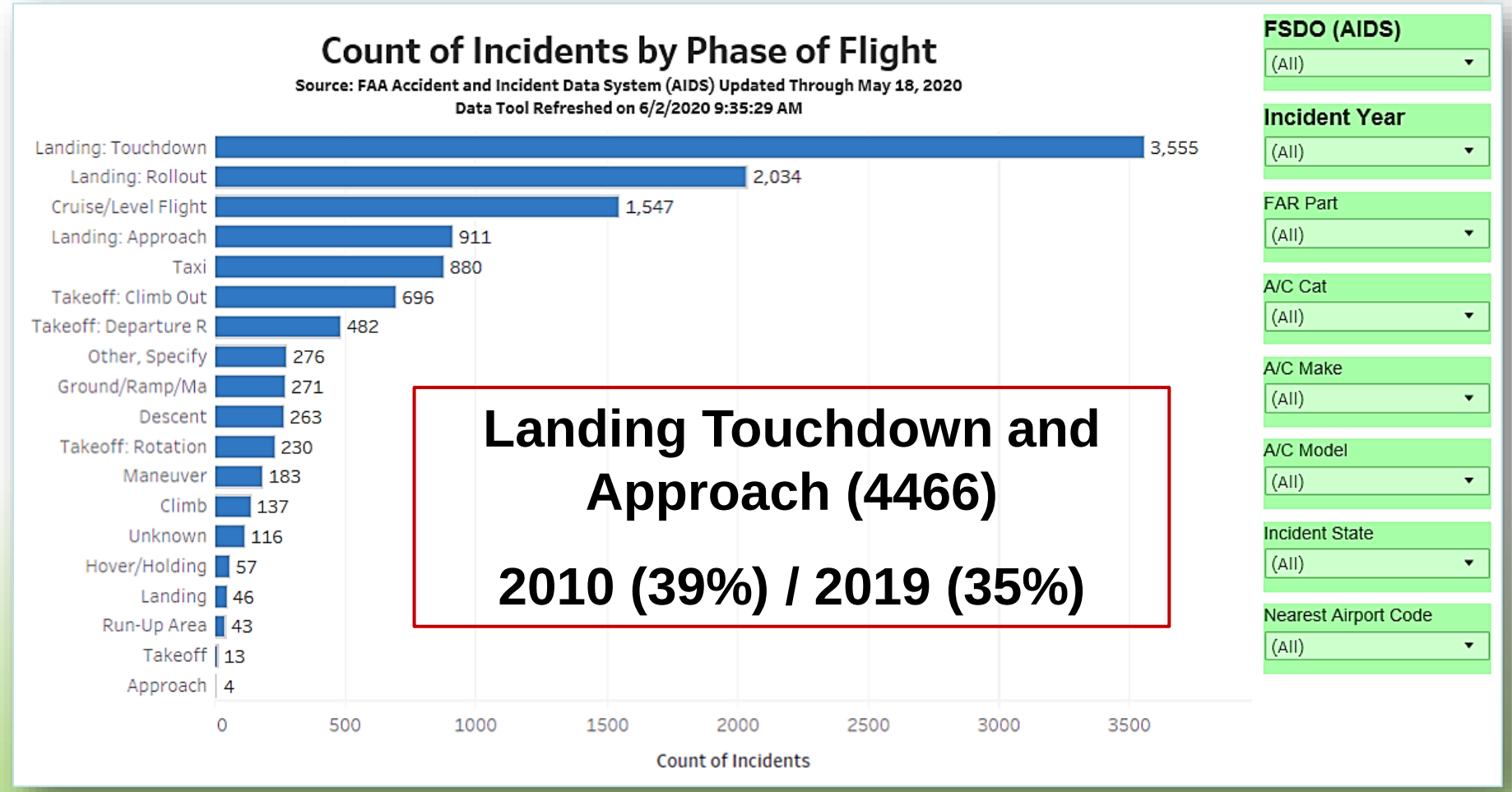
Approach & Landing ***Accidents***:

National 2010-2019 Accidents – Approach and Landing



Approach & Landing *Incidents*:

National: 2010 - 2019 Incidents – Approach and Landing



Top Four Environmental Causal Factors Affecting Approach:

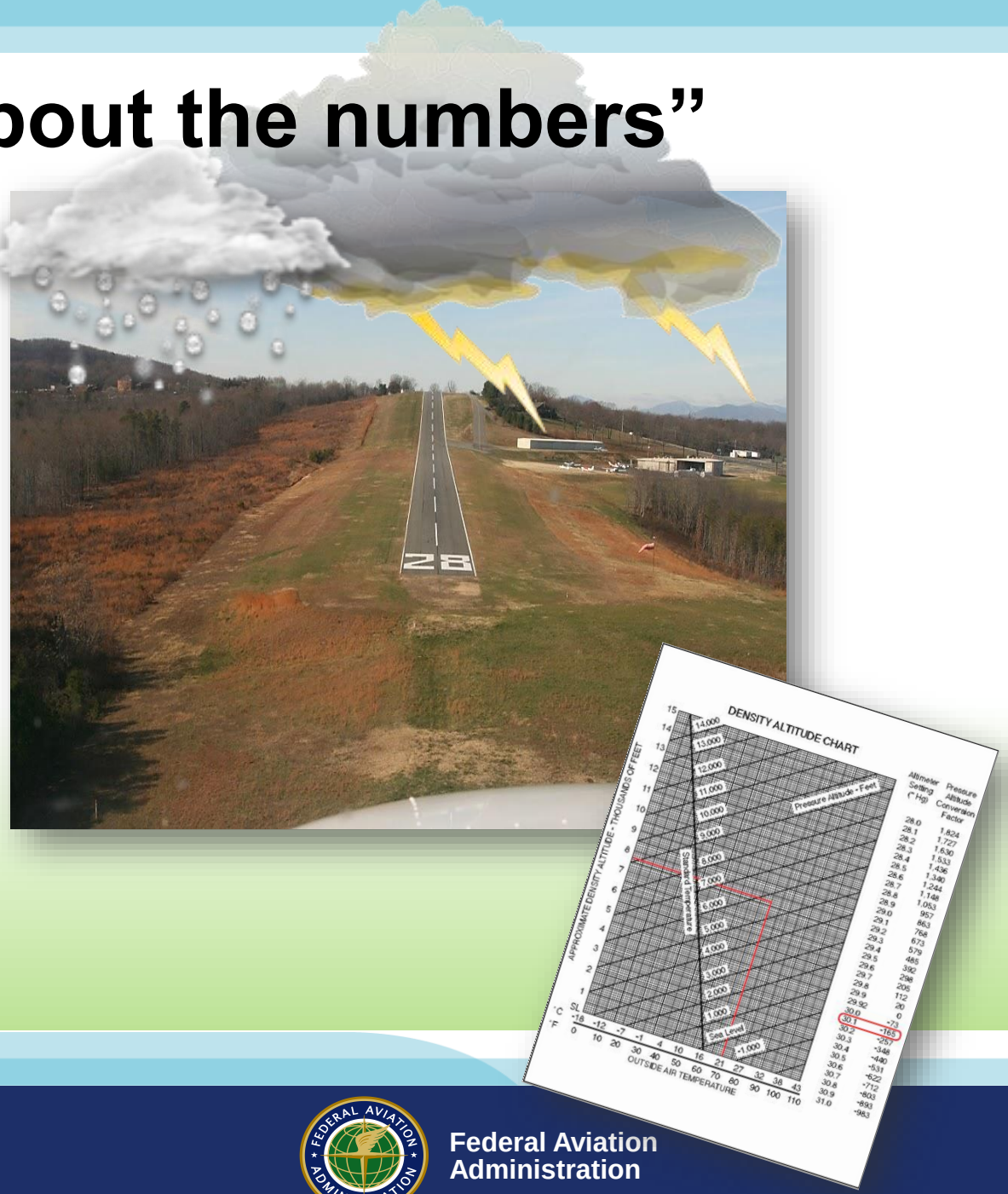
- **Wind**
- **Object / Animal / Substance**
- **Terrain**
- **Runway / Land / Takeoff / Taxi / Surface**

Honorable Mention:

- **Temperature / Humidity / Pressure**

“It’s not ONLY about the numbers”

- ❖ Landing Distance
- ❖ Take-Off Distance
- ❖ Air Density
- ❖ Wind Direction
- Runway Slope
- Runway Surface
- Rain, Snow, and Ice
- Aircraft Condition
- Pilot Proficiency



- Aircraft on final is way to high and fast - or
- Way to low and slow - or
- Other combinations.

How did the landings turn out?

- “Any landing you walk away from is a good landing” is…
- …absolute balderdash!
- We MUST be better than that!

- **A stabilized approach gives you the best chance for a safe landing**
- **What is a stabilized approach?**

- **Configuration?**
- **Angle?**
- **Descent rate?**
- **IAS?**

- **Also, consistency**

- **An approach is like descending slow flight**
- **Speed controlled by…?**
- **Descent rate controlled by…?**

- **Power is a flight control!**

- **Good numbers for light GA a/c?**
  - Typical glide slope angle?
  - Typical FPNM?
  - Approach speed (IAS)?
  - FPM depends on…?
  - FPM at 90Kts…?

Approach Pattern and Landing: *Eight* Phases

1. ***The entry***
2. ***The downwind leg***
3. **The base leg**
4. **The final approach**
5. ***The level off in ground effect – dissipate energy***
6. **The round out (flare)**
7. **The touchdown**
8. **The after-landing roll**

Approach Pattern and Landing: Eight Phases

- **Put the training together…**
- **Landing is the *ultimate* ground reference maneuver**
  - Why do pilots forget everything about GRMs when landing?
  - Practice GRMs – especially rectangular course – drift control, etc.
- **Approach is draggy descending slow flight**
  - Power for altitude, pitch for airspeed
  - When did you last practice *descending* slow flight?
- **Level off is level slow flight, with reducing speed**
  - Power for altitude, pitch for airspeed
  - Power is a flight control!

Entry

- **Why is this so difficult?**
  - *Always* – enter on the 45 to downwind

- **Cessna1234,15-mile final, runway 37**

- **Carroll traffic, Cessna 123WW, 3-mile cross wind entry to left pattern, runway 34**

- **The idea is to make it easy for you and others**

Downwind Leg

- **Set-up and trimmed for level flight at target airspeed (S1)**
- **This WILL occur at a particular power setting (P1) (weight dependent)**
- **Counter wind drift (crab)**
  - This is why we practice rectangular course GRM!
- **Abeam:**
  - Carb heat on
  - Power to P2
  - White arc? 1 notch of flaps
  - Let go – it will stabilize at S2 in a descent at D2

Downwind Leg

- **What are S1, P1, S2, P2, D2 for your airplane?**

Know your Airplane's Numbers

- **Power, Pitch, Performance**
- **Predictable Behavior = Predictable Outcome**

Level Flight		
RPM	Pitch Angle	IAS
2000		
1900		
1800		
1700		

500FPM Descent First Flap, Carb Heat On		
RPM	Pitch Angle	IAS
		80
		70
		65

500FPM Descent Full Flaps, Carb Heat On		
RPM	Pitch Angle	IAS
		70
		65
		60

Base Leg

- One of the more important judgements made by the pilot in any landing approach – when to turn base to final…
- Beware the tailwind on base
- Messes-up the sight picture
- OK – you overshot final. Choices?
- Skidding base-to-final turn

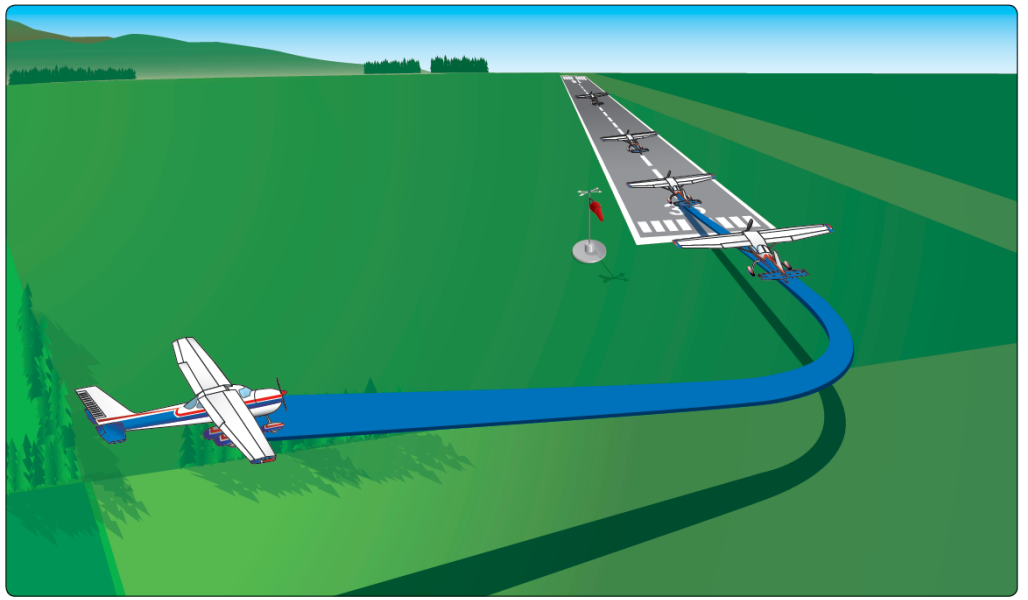


Figure 8-1. *Base leg and final approach.*

Final Approach

- Final configuration tweaks – and trim it
- Should not be like wrestling a crocodile…
- Get set-up at approach speed and descent rate
- IAS at Vref
- Side slip for drift and alignment
- Energy management!
  - Power for altitude
  - Pitch for airspeed

Final Approach

A stabilized descent angle is controlled throughout the approach so that the airplane lands in the center of the first third of the runway.

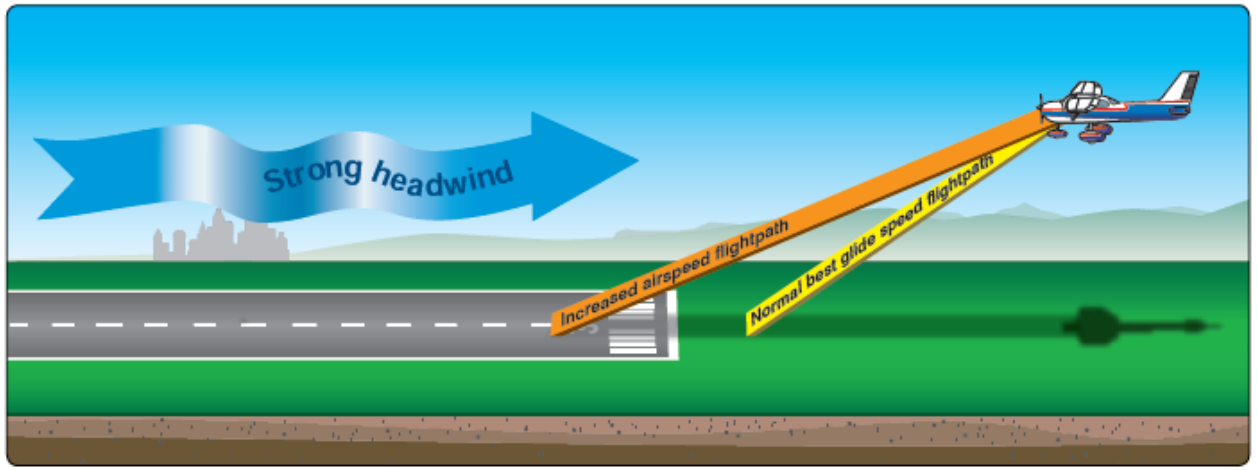


Figure 8-2. *Effect of headwind on final approach.*

Stabilized Final Approach

- The objective of a good, stabilized final approach is to descend at an angle and airspeed that permits the airplane to reach the desired touchdown point at an airspeed that results in minimum floating just before touchdown; in essence, a semi-stalled condition.
- Both the descent angle and the airspeed must be accurately controlled.

Use of Flaps

- Read the PoH
- Understand the pitch behavior of flap deployment and reattraction (on go around)
- Cessna C172 Vs. RV12

- Practice patterns, approaches and go-arounds at altitude!

Approach & Landing

- **Stabilized short field final approach**
  - Full flaps
  - 1.3Vso
- **Go around if not stable**
- **Go around if bounce**
- **Go around if you miss your predetermined spot**
- **Go around and fly for a bit longer**

Let’s Define Stabilized Approach

Stabilized Approach

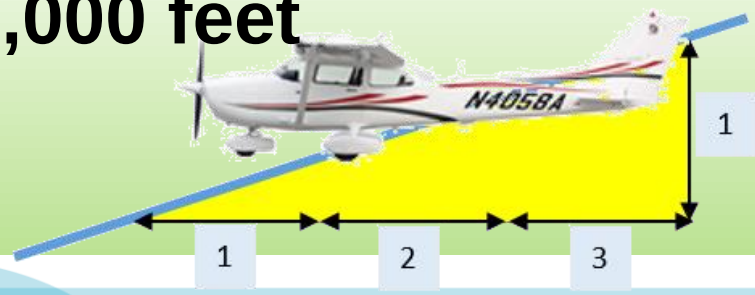
A Stabilized Approach is defined as on the correct flight path with only small corrections required, on speed +10/-5 knots, on glide slope / VASI or constant rate of descent not above 1,000 fpm, in the landing configuration, and landing checklist complete.

- **For IFR Flight it is recommended that you be stabilized at 1,000 feet above touchdown elevation**
- **For VFR Flight it is recommended that you be stabilized by 500 feet above touchdown elevation**
- **Do not try to “salvage an approach” if not stabilized by 500 or 1,000 feet GO-AROUND!**
- **Know your go-around and missed approach procedures and practice.**

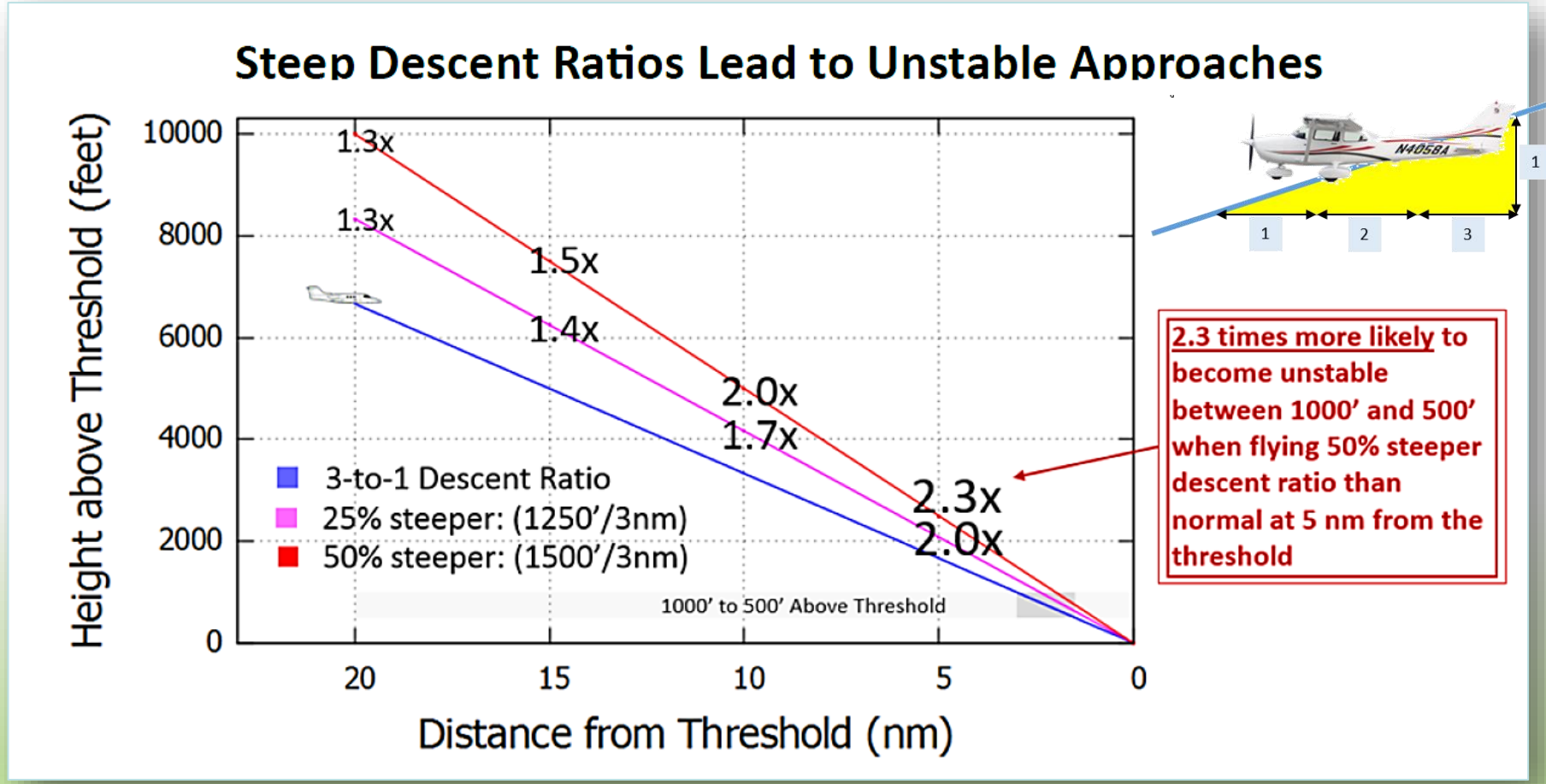
Descent Rate and Glide Angle

- **Typical airport glide slope is 3-degrees**
- **Doing the math, this is a descent rate of around 1,000 feet per 3NM**
  - Approx. 300 FPNM
- **This is the so-called 3:1 descent rate**

- **Set-up descent for 3-degree slope which is 1,000 feet descent for each 3NM travelled.**



Something to consider here…



Rate of Descent…in Feet per Minute

Rate of Climb/Descent Table (FPM)							
Rate of climb/descent in feet-per-minute (FPM) for various feet-per-NM & groundspeeds							
Descent angle (for the given F/NM) is also shown.							
Angle of Descent	**Feet per NM**	**Groundspeed (Knots)**					
		50	**60**	**70**	**80**	**90**	**100**
2.0	**212**	177	212	248	283	318	354
2.5	**265**	221	265	309	354	398	442
2.6	**276**	230	276	322	368	414	460
2.7	**287**	239	287	334	382	430	478
2.8	**297**	248	297	347	396	446	495
2.9	**308**	256	308	359	410	462	513
3.0	**318**	265	318	372	425	478	531
3.1	**329**	274	329	384	439	494	548
3.2	**340**	283	340	396	453	510	566
3.3	**350**	292	350	409	467	526	584
3.4	**361**	301	361	421	481	541	602
3.5	**372**	310	372	434	495	557	619
3.6	**382**	319	382	446	510	573	637
3.7	**393**	327	393	458	524	589	655
3.8	**404**	336	404	471	538	605	673
3.9	**414**	345	414	483	552	621	690
4.0	**425**	354	425	496	567	637	708

Configuration

The aircraft *must* be in the landing configuration, having flown *a stabilized approach at a speed of not less than Vref down to a 50 foot height*, amongst other requirements.

Threats to Safe Landings…

According to AC 91-79:

- **Failure to assess required landing distance**
- **Un-stabilized approach**
- **Excessive airspeed**
- **Excessive threshold crossing height**
- **Landing long**

  (Beyond the touchdown zone)
- **Adverse wind conditions**

Federal Aviation
Administration

Tips for staying stable…

- **Establish a "3:1" flight path profile further from the runway.**
- **Approximate descent rate in feet/minute** to maintain: a 3-degree glidepath is to multiply the ***groundspeed*** in knots by 5.

100Kts. x 5 = 500 feet/min.

- **Use a visual approach system such as a VASI or PAPI**, or *precision instrument approach to help maintain glidepath.*

How do we prepare…

- **Know what your aircraft can do**
  - Train at gross weight
  - Train light weight
- **Train or practice going around**
- **Practice descent and approach**
  - Set airspeed
  - Set Descent Rate
  - Trim, Trim, Trim
- **Don't just fly on fair weather days**
  - Push your limits with professional help

The decision making process includes the following:

Expect you may need to ***go-around***

- Plan on an alternate airport
- Fuel reserves?
- If not here, where else can I get gas?
- **Train** regularly with CFI
- **Know how the aircraft will react**
- **Know where your safe zone is**

Rest easy knowing you can do this without it being a distraction!

So, when do I go around?

A **stabilized approach** is one in which the pilot establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway.

- **Whenever the approach becomes unstable**
  - At or below ***1,000 ft. – IFR***
  - At or below ***500 ft. – VFR***
- **Whenever a landing can't be made**
  - Runway out of service
  - Traffic on runway
  - Runway overshoot
- **Make the decision early**
  - Stick to it - Changing your mind is de-stabilizing

Supporting all this…

- GAJSC website at **GAJSC.org**
- **Advisory Circular 91-79A.** Mitigating the Risks of a Runway Overrun Upon Landing
- **FAA Advisory Circular 61-98D,** "Currency Requirements and Guidance for the Flight Review and Instrument Proficiency Check," offers criteria for stabilized approaches.

Proficiency and Peace of Mind

- **Practice may make you perfect, will save your life!**
- **Fly often with a CFI**
- **Training is credited**
- **WINGS participation save you money**
  - Insurance discounts
  - Less bent metal!

The National FAA Safety Team Presents:

Topic of the Month
August

Use of Weather Information

Presented to:

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Next Month's ToM

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