

FOQA

Unstable Approach Mitigation



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FOQA Program Manager

Crew Contacts

Favorite Pilot Quotes

**Exchange between a Gatekeeper and
an A321 Captain after an unstable
approach into Las Vegas...**

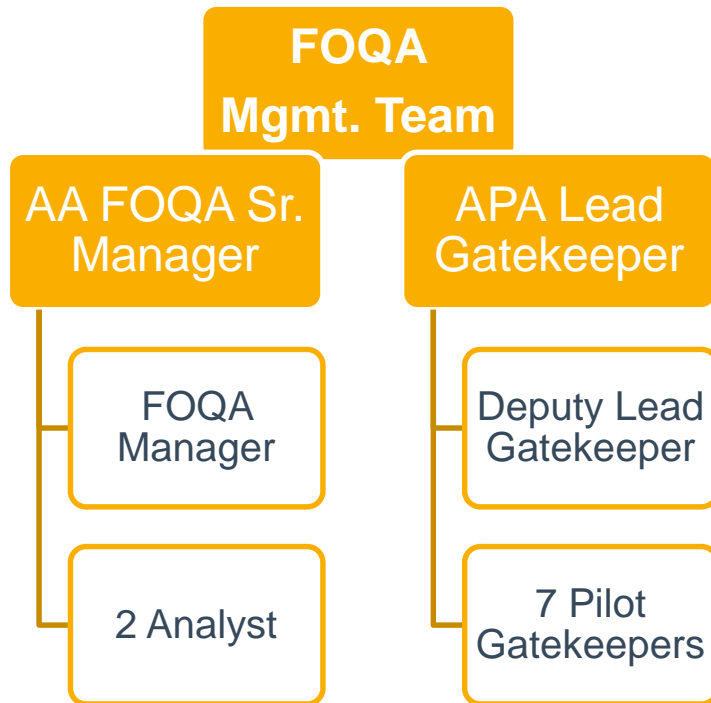
**Pilot: "I knew you guys might call, but
I was hoping what happens in Vegas
stays in Vegas!"**

FDM (FOQA)

Program Overview



- Implemented at AA in 2006 (ADi's first major customer)
 - NOV 2014 merger with US Airways approved
 - In JAN 2015 became the first LAA/LUS major program to be fully merged
- The AA FOQA program monitors...
 - 950 aircraft (97% equipped)
 - 9 different fleet types
 - ~80,000 flights per month
 - 96 American cities, 95 International cities, 55 Countries



Our singular collective goal...

To improve our decision making processes with the timely, accurate and progressive use of flight data.

The collaborative relationship between AA and APA safety will be the foundation of that success

Unstable Approach Policy

FAA AC 120-71A and IOSA FLT 3.11.50

- **Non-Conditional**
 - Fully configured for landing by 1,000'HAT
 - Gear Down
 - Final Landing Flaps
 - Speedbrake Armed
- **Conditional**
 - IMC 1,000' or VMC 500' HAT
 - On Speed: $V_{ref} -5/+10$
 - On path: with ROD <1,000fpm
 - Stabilized Thrust

Unstable Approach Monitoring at 1,000'HAT

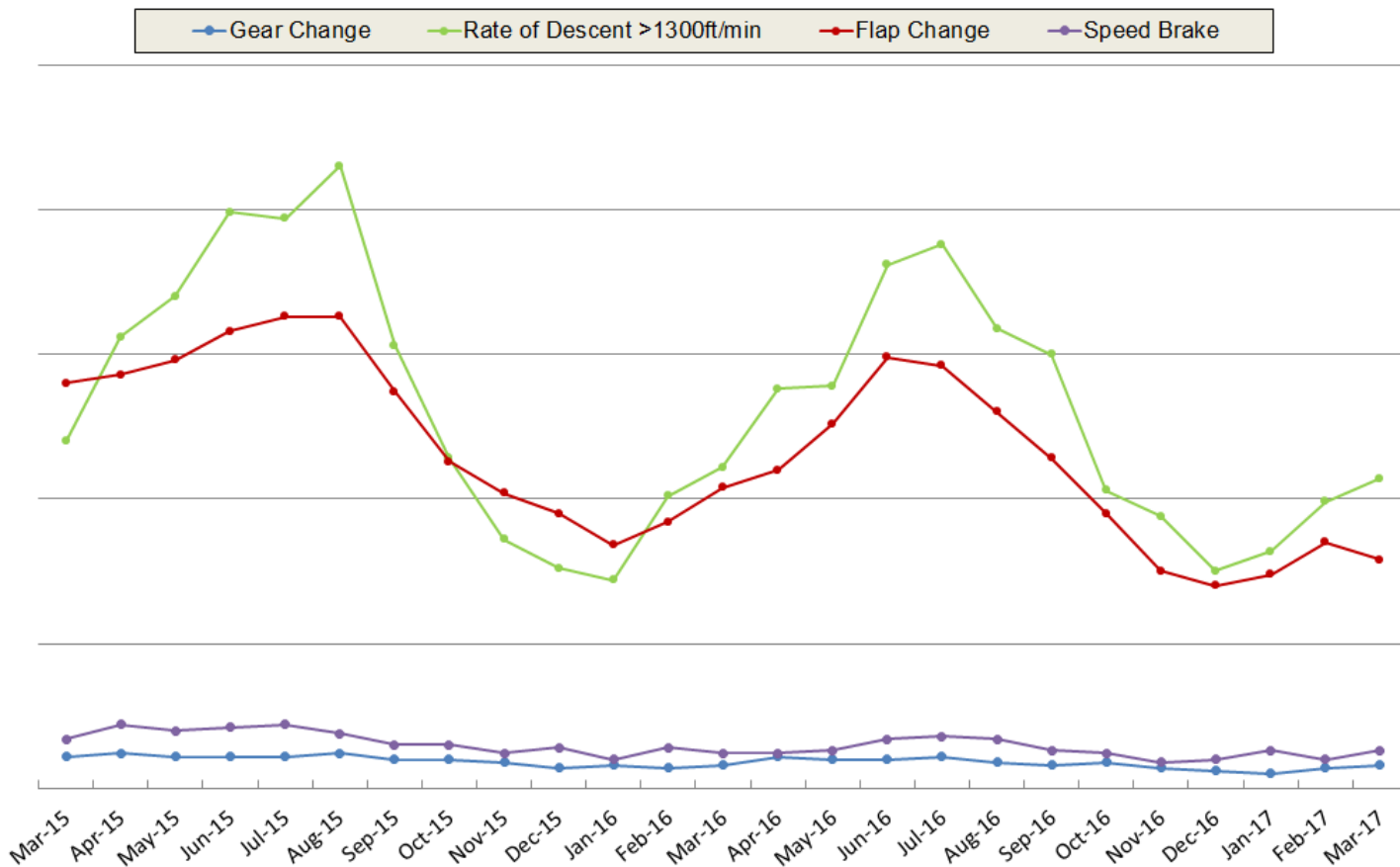
Unstable Approach Events

FDM Definition

Above Desired Glide path <small>IMC flights</small>	Glideslope > 2 dots for 3 sec.
Below Desired Glide Path <small>IMC flights</small>	Glideslope < -1.3 dots for 3 sec.
Not Aligned with Runway <small>IMC flights</small>	Absolute localizer deviation > 1 dots for 3 sec.
Fast Approach <small>IMC flights</small>	Airspeed > Vref + 30kts for 3 sec.
Slow Approach	Airspeed < Vref - 5 kts for 3 sec.
High Rate of Descent	ROD > 1,300fpm for 3 seconds
Late Final Flap Extension	Height at Last Flap Surface change < 1,000ft Height
Final Flap not Valid for Landing	Final flap setting not authorized
Late Gear Extension	Height at Gear Extension < 1,000ft Height
Speed Brake Used in Approach	Speed Brake Usage below 1,000ft Height for 3 sec.

IMC
Only

Unstable Approach Drivers at 1,000' HAT



Unstable Approach Mitigation

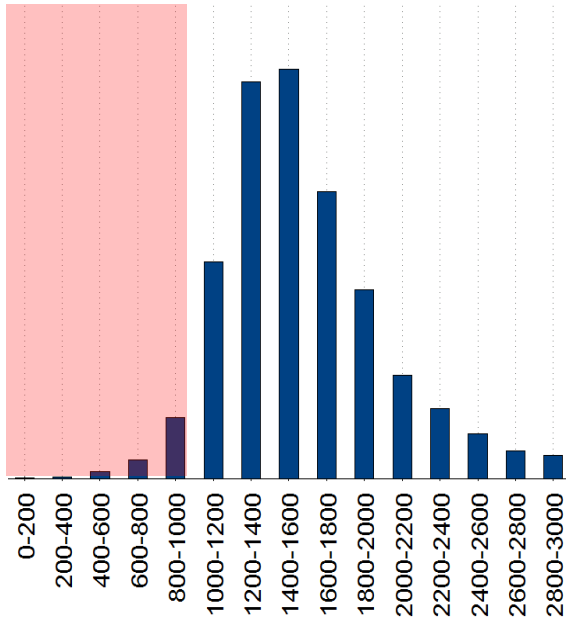
Initiated in Summer 2013

- Another carrier's landing accident in July 2013 caused introspection...
 - Could this happen to us at AA?
 - How do we prevent a similar occurrence in our own operation?
- Caused us to look at our unstable approach data even closer...**specifically, flap configuration trends**

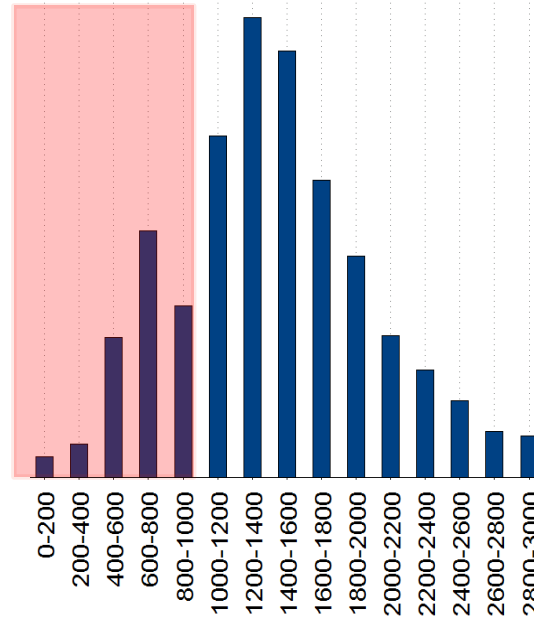
Correlation?

Final Flap Altitude Verses Stability

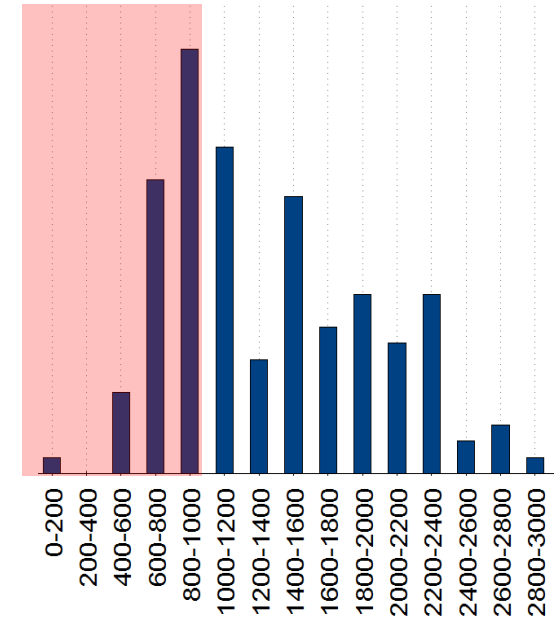
STABLE



UNSTABLE



EGREGIOUS

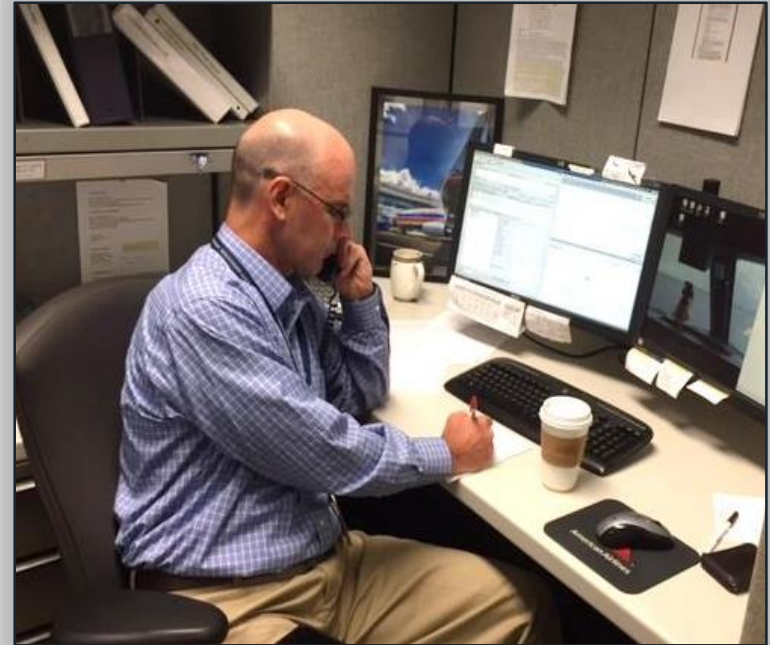


Final Flap Altitude < 1000' HAT

Gatekeeper Emphasis Item - Late Flaps

Initiated in Summer 2013

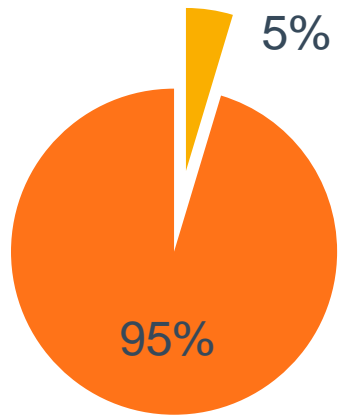
- Late flaps identified as a primary cause of our more severe unstable approaches
- Armed with this data, GKs began calling every single crew that had a flap change below 1,000' HAT
 - Awareness to crews
 - Data collection, root cause analysis



What Did the Gatekeepers Learn?

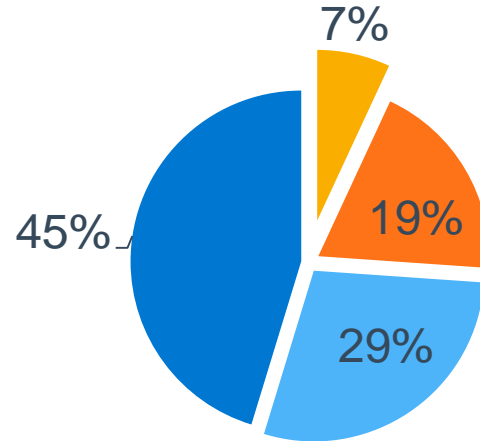
PF Demographics of Unstable Approaches

By Status



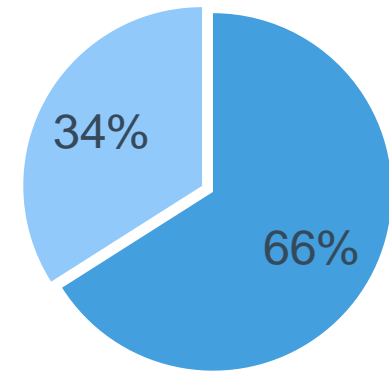
■ IOE/Training
■ Line Qualified

By Experience



■ < 100 Hrs
■ 100-499 Hrs
■ 500-1999
■ 2000 or Above

By Pilot Flying



■ Captain
■ First Officer

What Did the Gatekeepers Learn?

Of the Pilots that Continued to a Landing...

63% of the events had a PF with less than 600 hours in type.

8% incorrectly believed that 500'HAT was the minimum flap configuration altitude when VMC.

18% incorrectly interpreted their HAT (AGL vs. MSL).

31% felt that making a flap change below 1000'HAT was authorized as long as it was from one authorized landing setting to another (e.g. 30 to 40, 3 to FULL).

What Did the Gatekeepers Learn?

Of the Pilots that Continued to a Landing...

When asked why did they continue the approach once realizing they were not within SOP, crews consistently answered that continuing was the safer course of action due to:

1. Fuel state (already at Min. Fuel)
2. Weather (TS on or near the field)
3. Traffic (intersecting runway departures)
4. Risk incurred during a G/A (flap overspeed, altitude excursion)

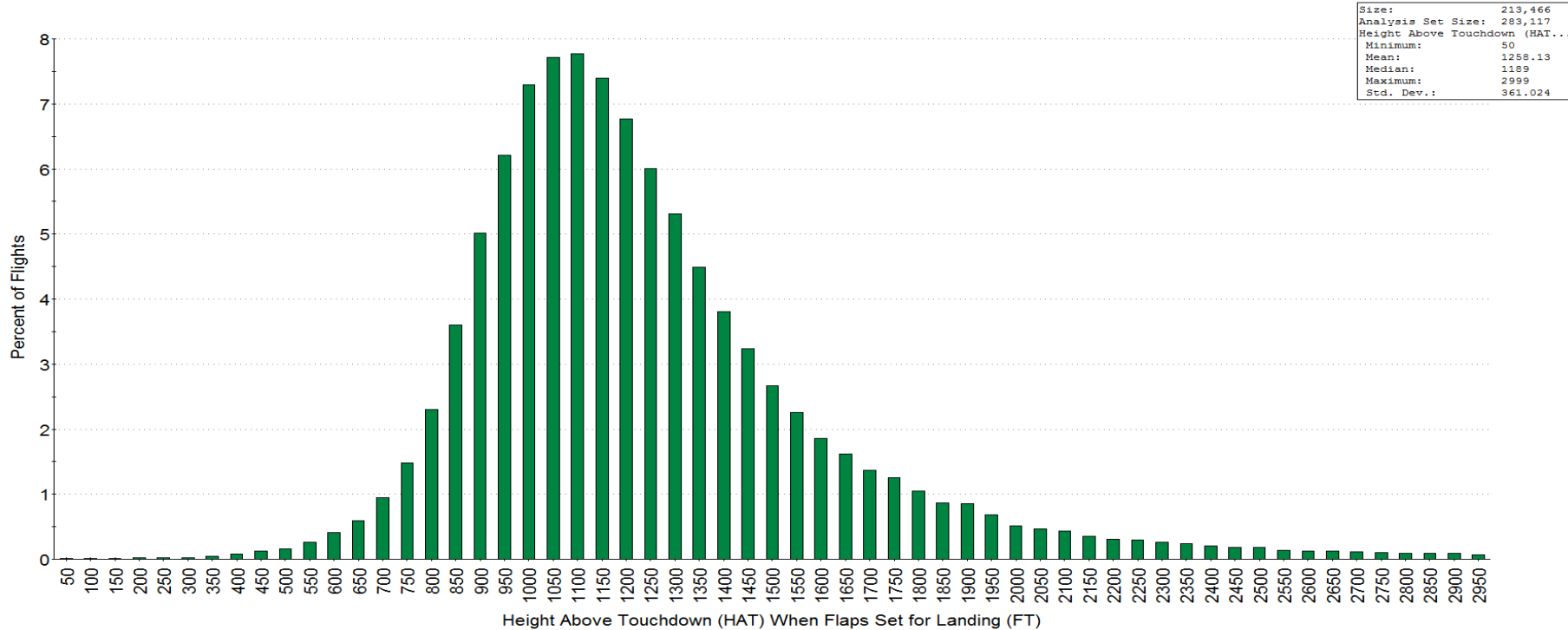
Unstabilized Approaches

Mitigation Strategies Over Time

- ✓ Proven that there is a correlation between flap configuration altitude and approach stability
- ✓ Communicated that data to our pilots
 - Individually - Gatekeeper crew contacts
 - Collectively - HFST and simulator training
- ✓ How has our behavior changed?

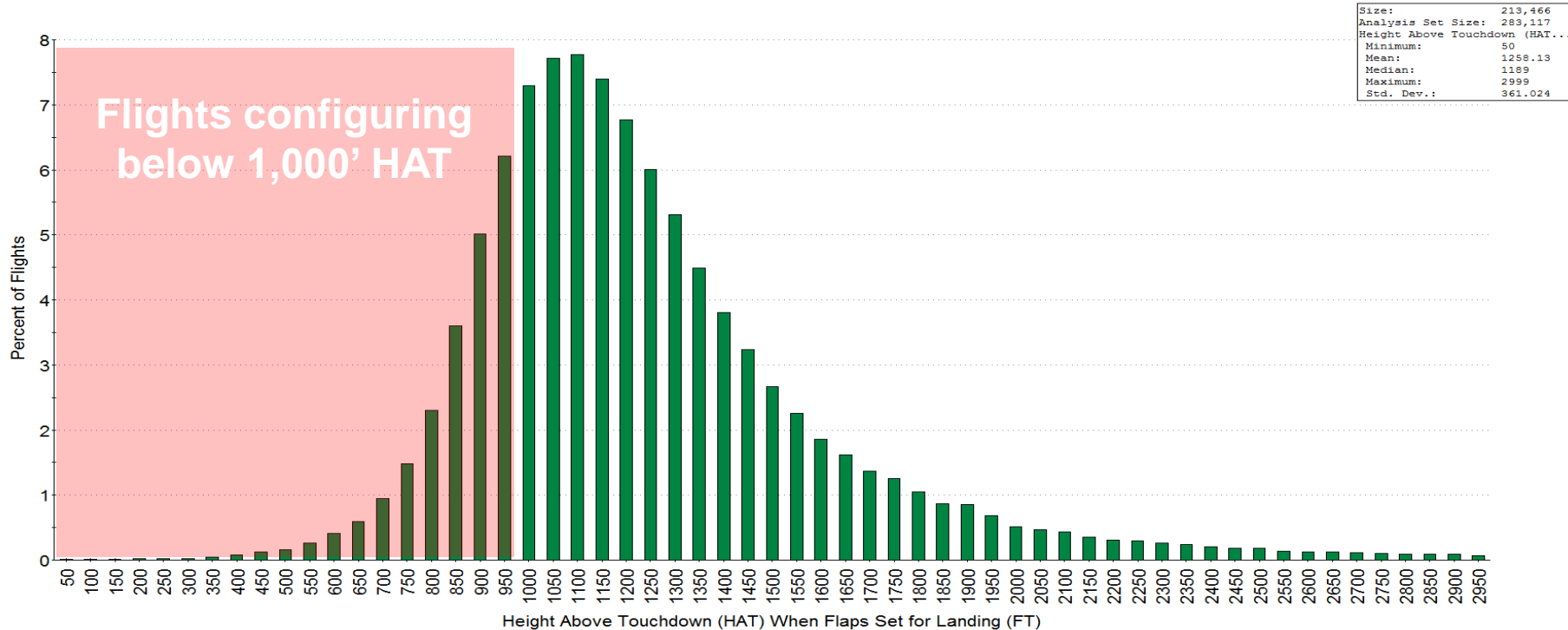
Final Flap Selection Altitude - HAT

2008



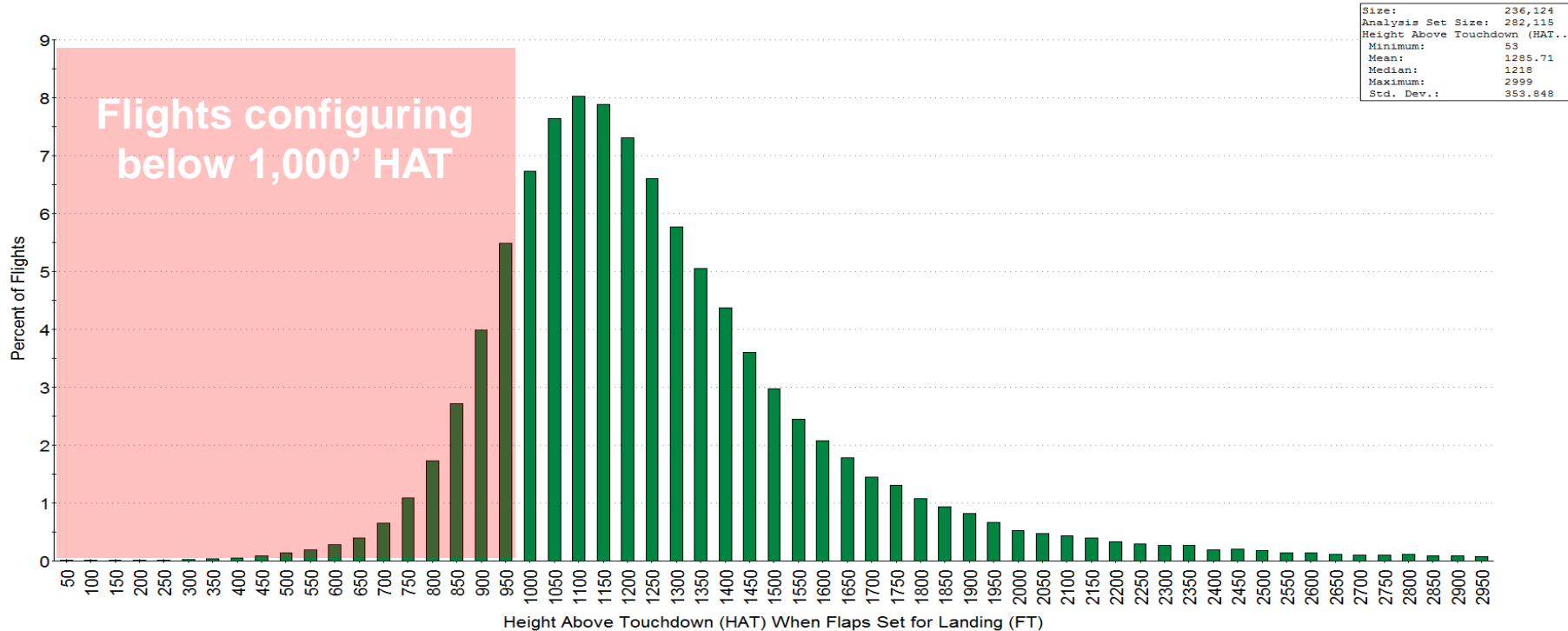
Final Flap Selection Altitude - HAT

2008



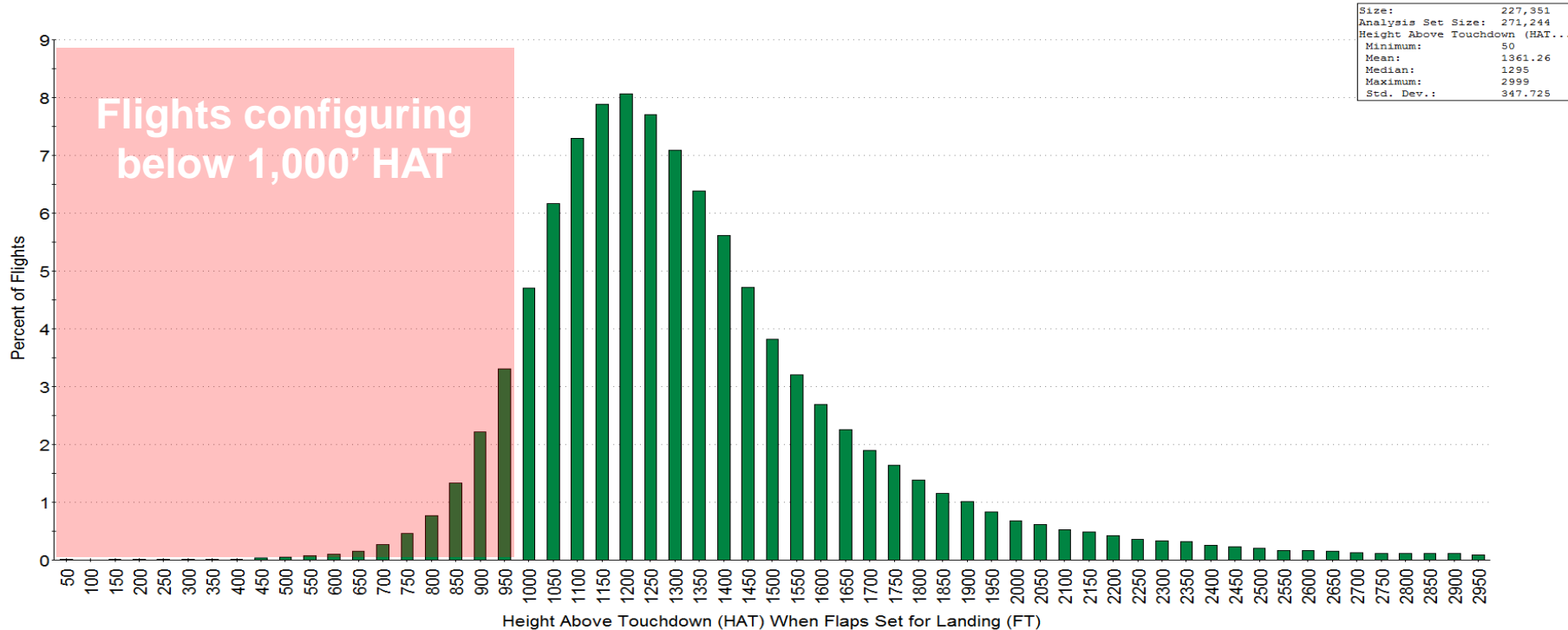
Final Flap Selection Altitude - HAT

2009



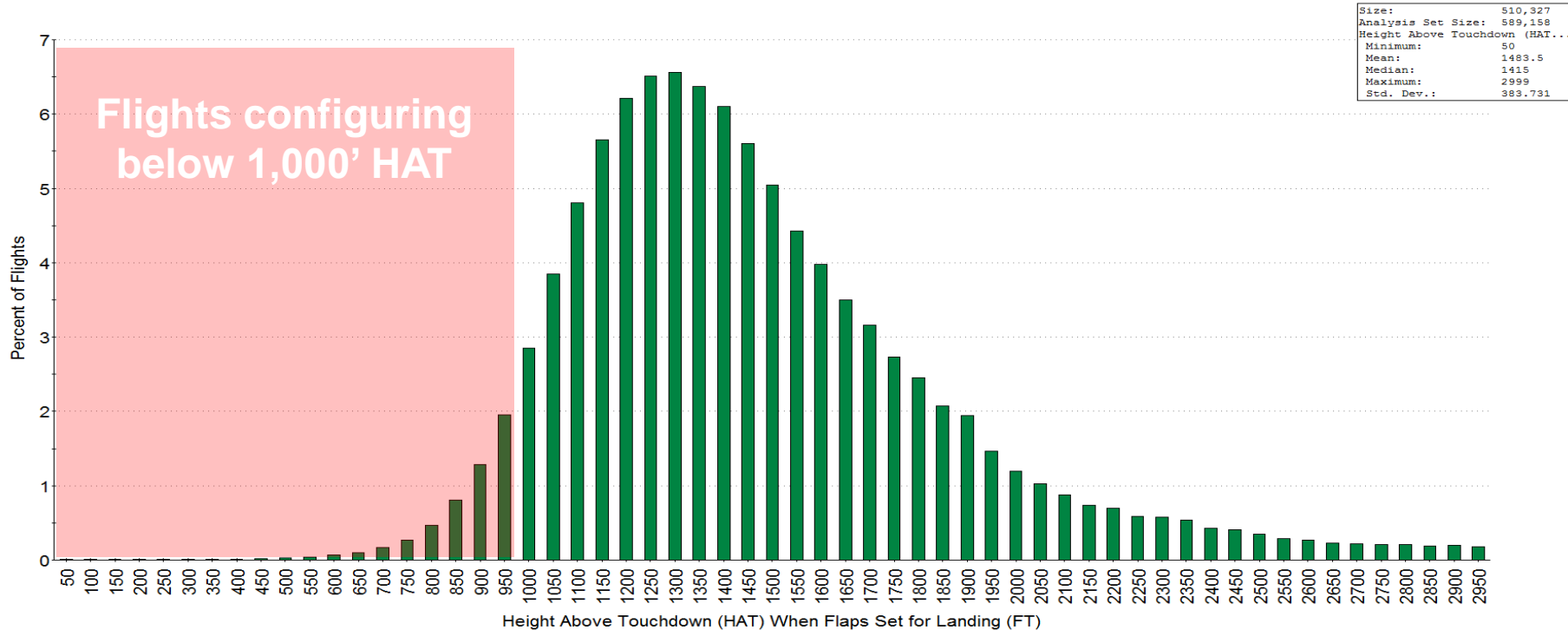
Final Flap Selection Altitude - HAT

2010



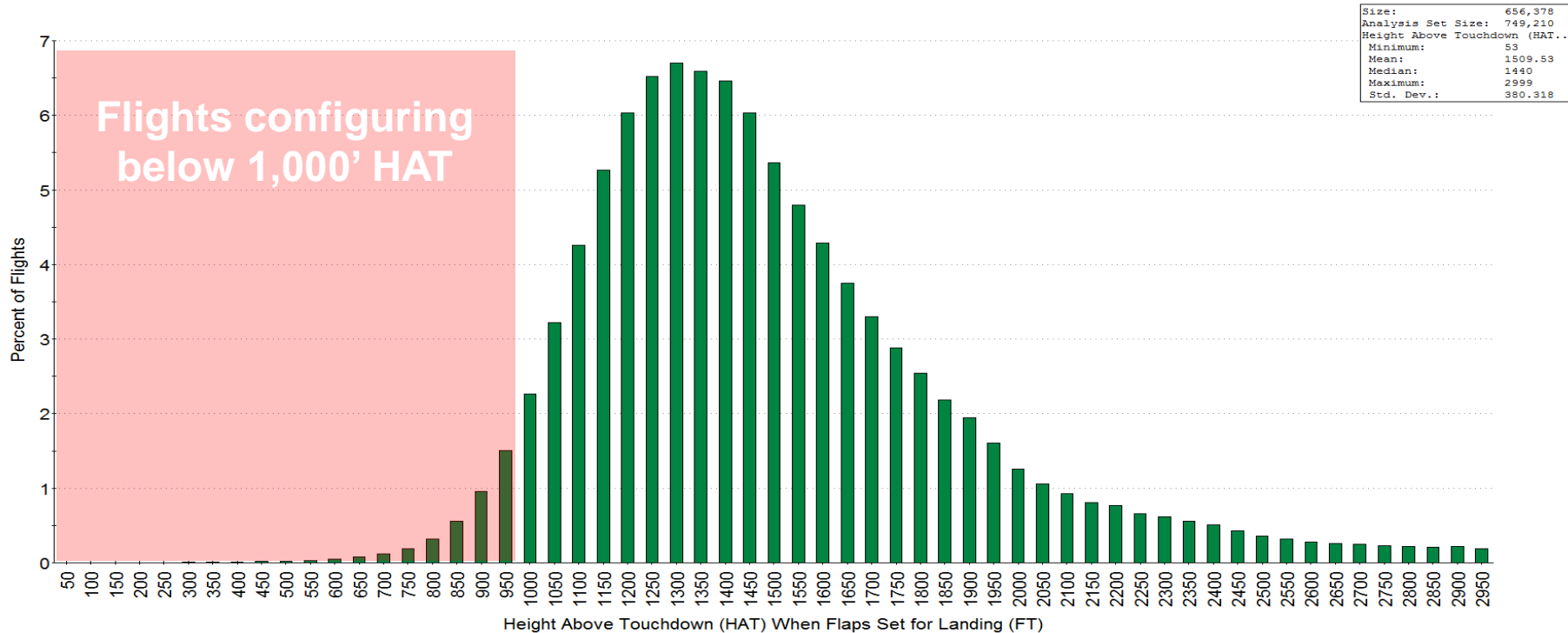
Final Flap Selection Altitude - HAT

2011



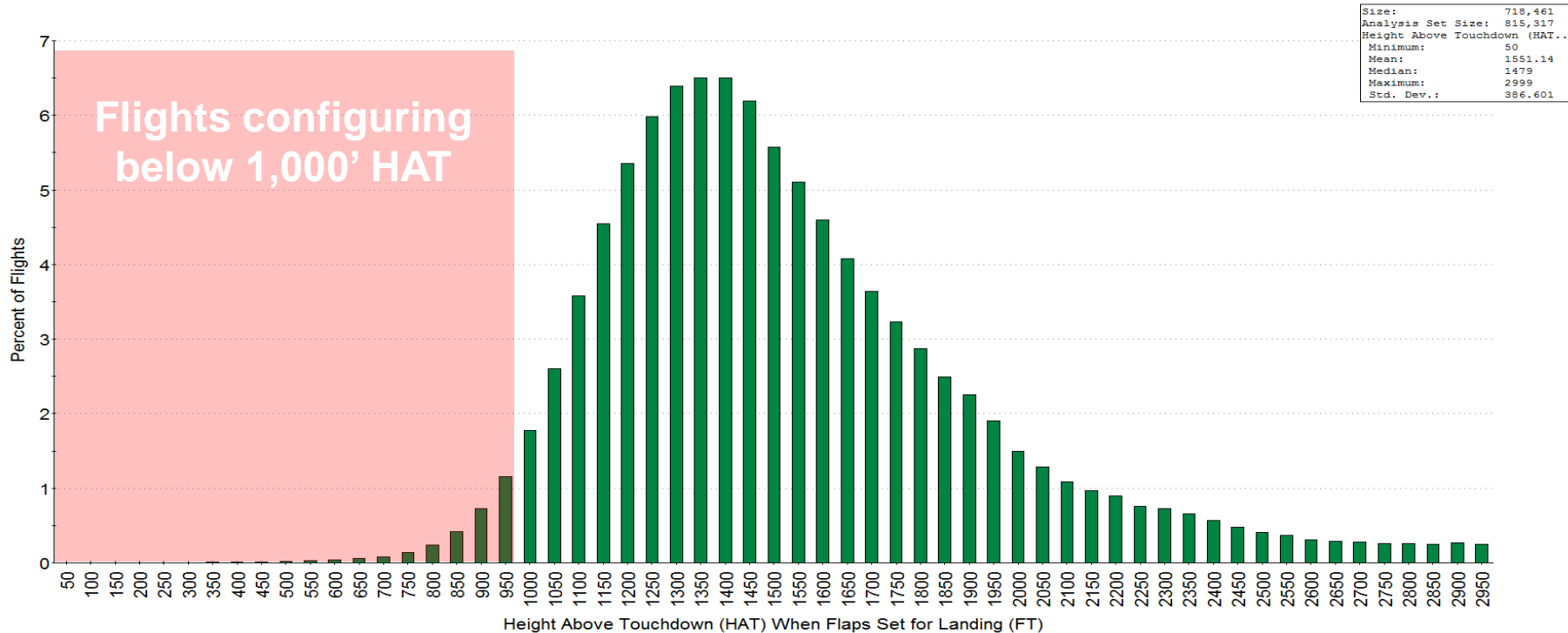
Final Flap Selection Altitude - HAT

2012



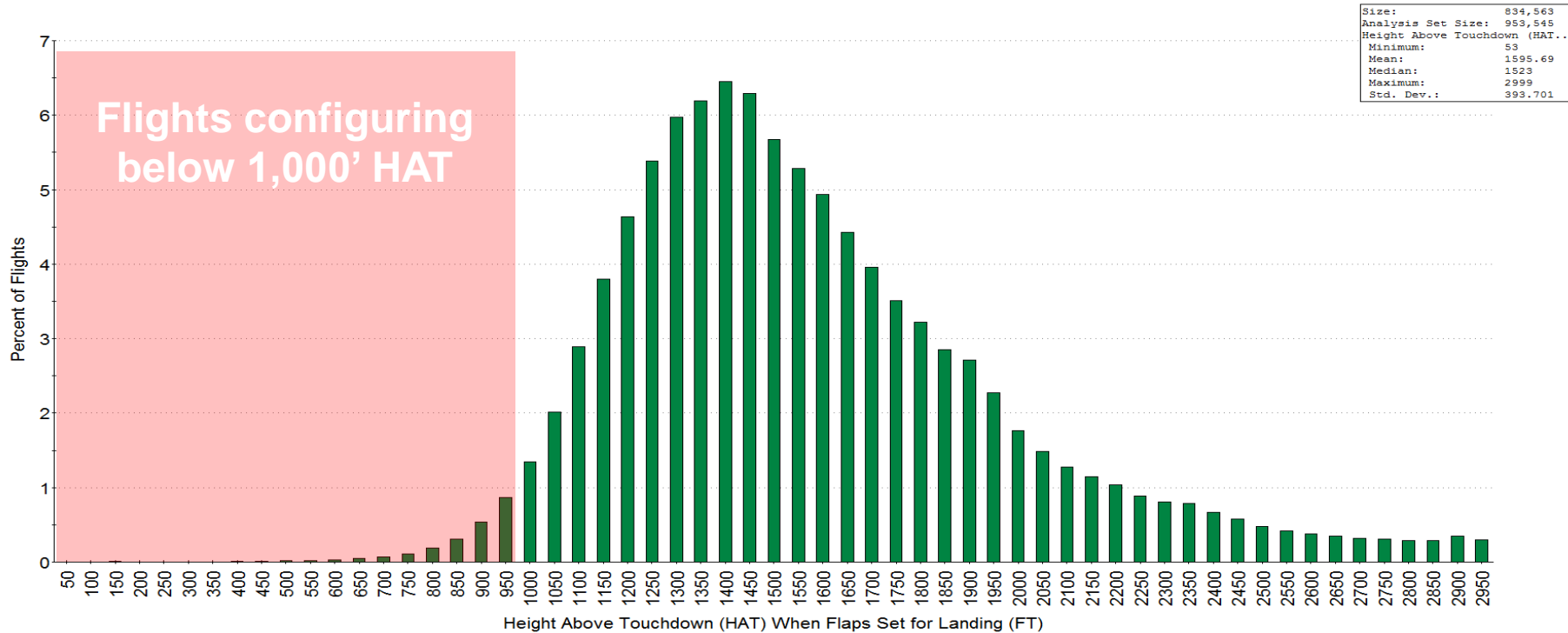
Final Flap Selection Altitude - HAT

2013



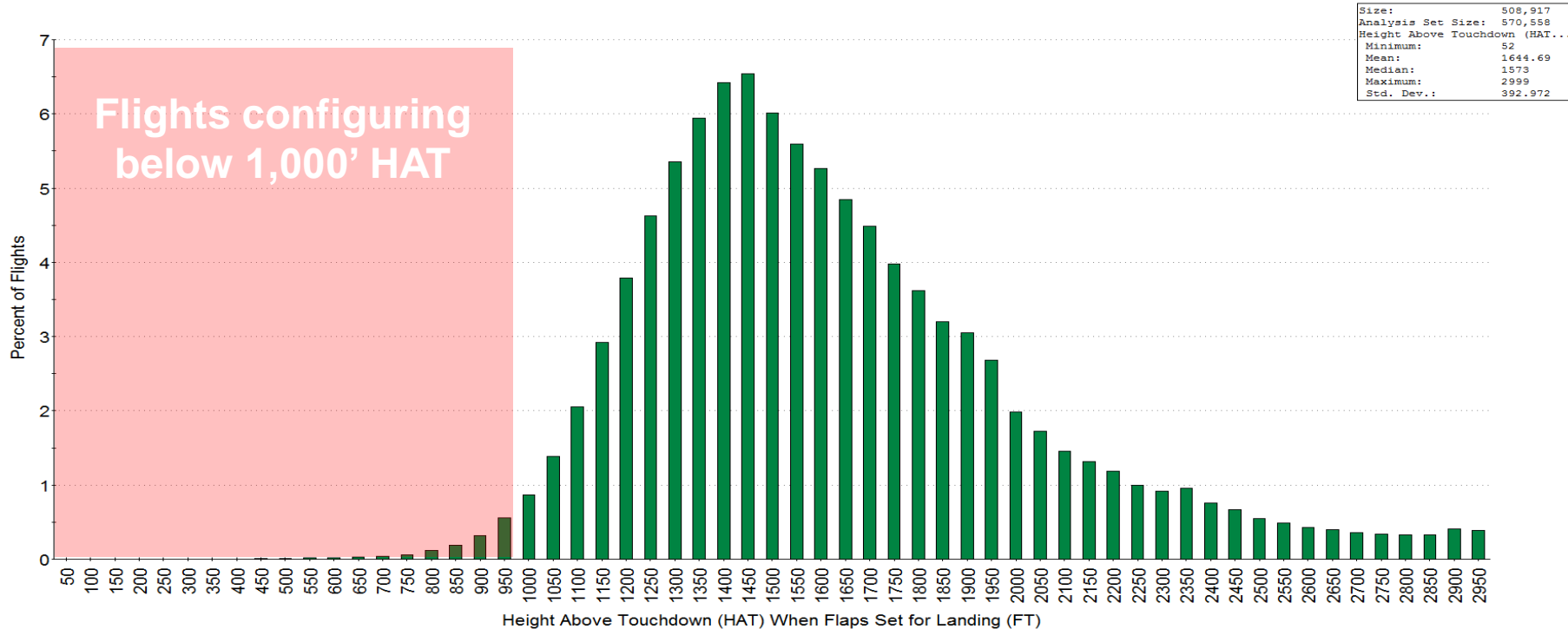
Final Flap Selection Altitude - HAT

2014



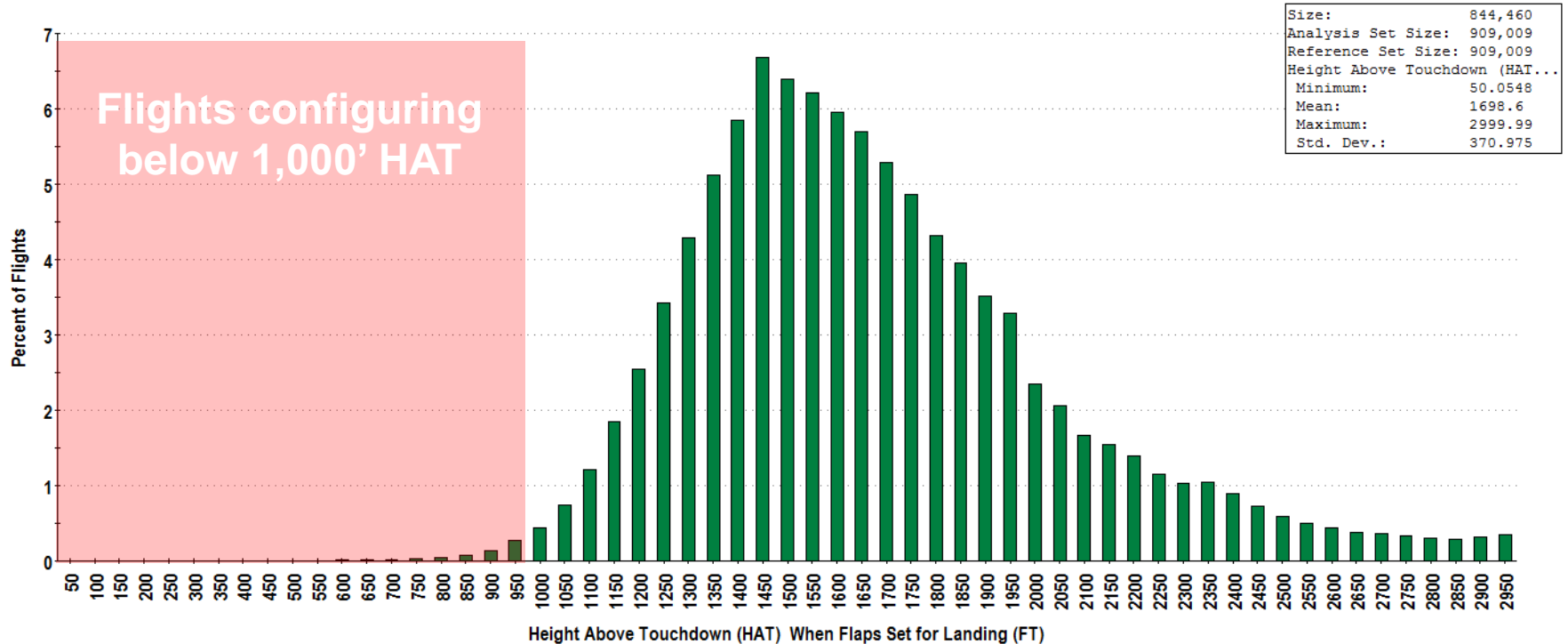
Final Flap Selection Altitude - HAT

2015



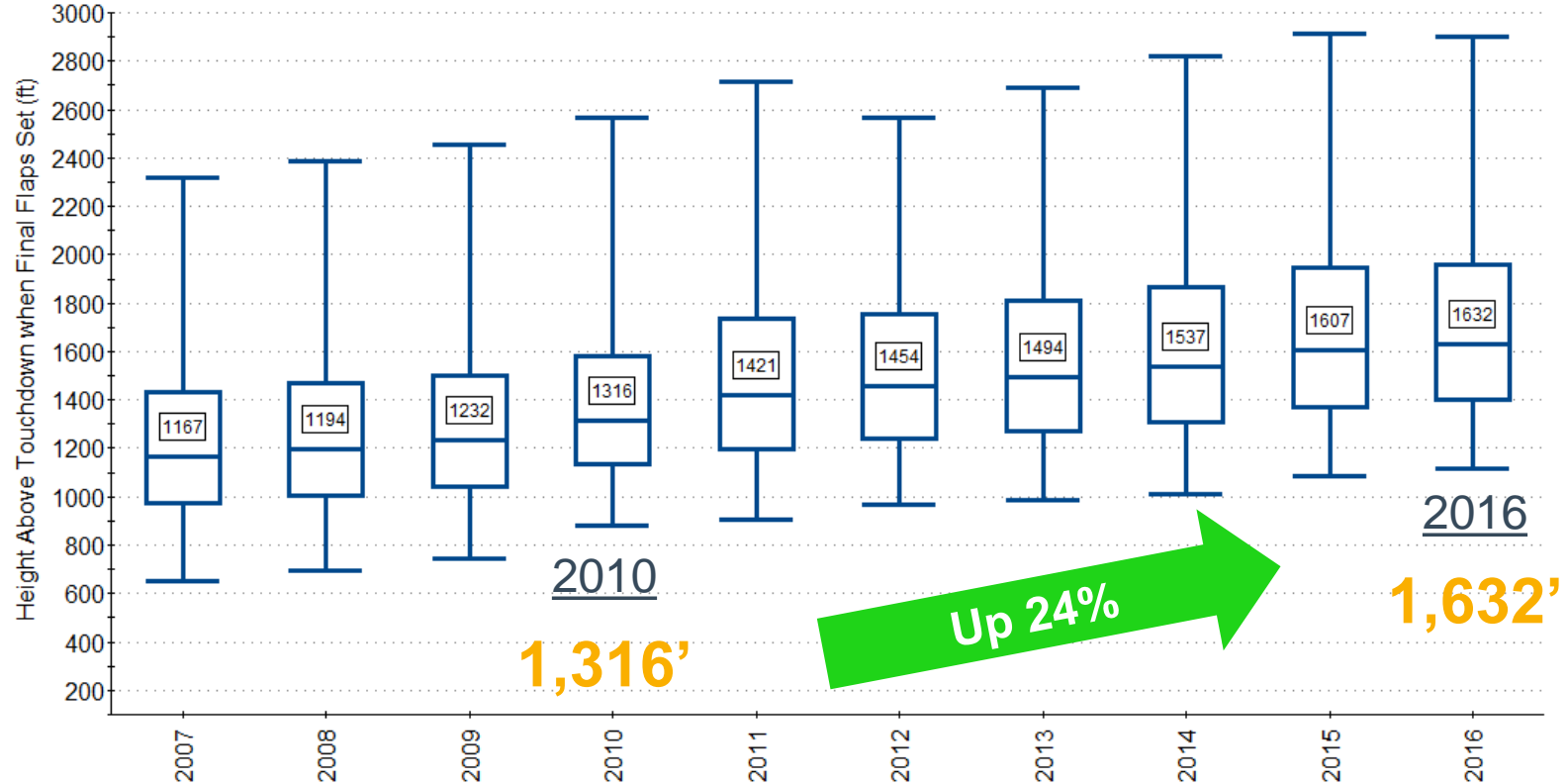
Final Flap Selection Altitude - HAT

2016



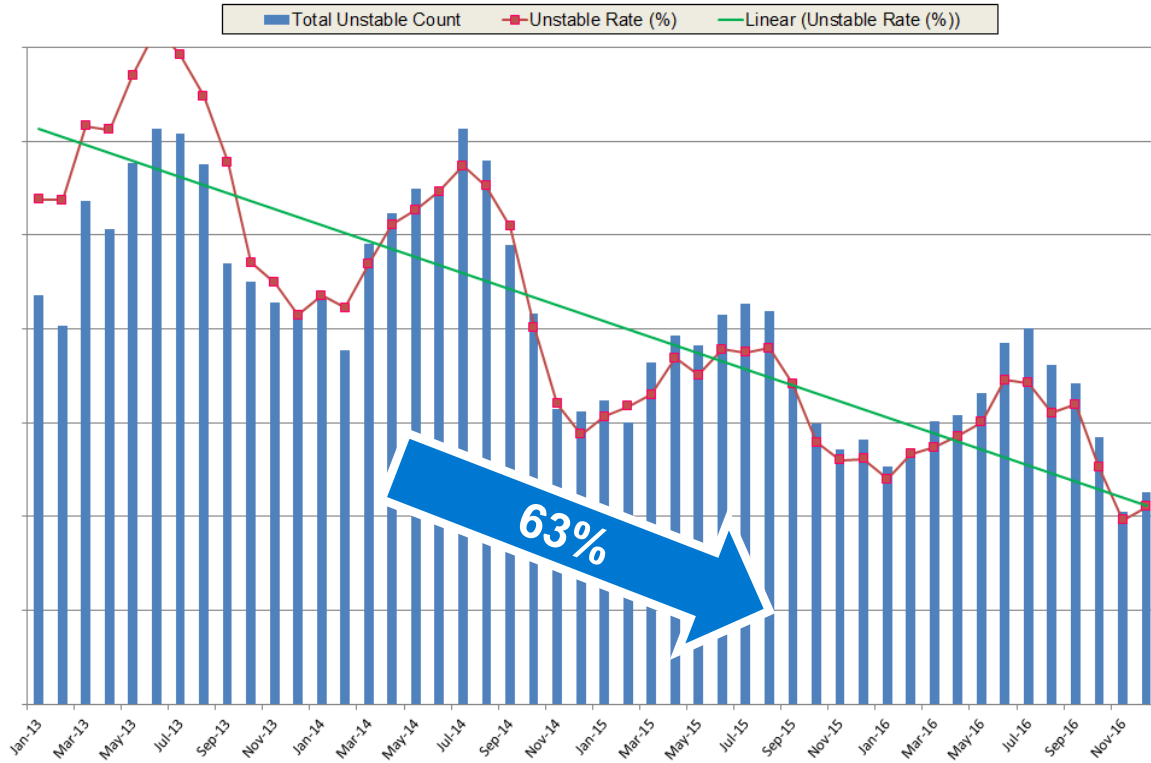
Final Flap Selection Altitude - HAT

Previous Ten Years



Bottom Line

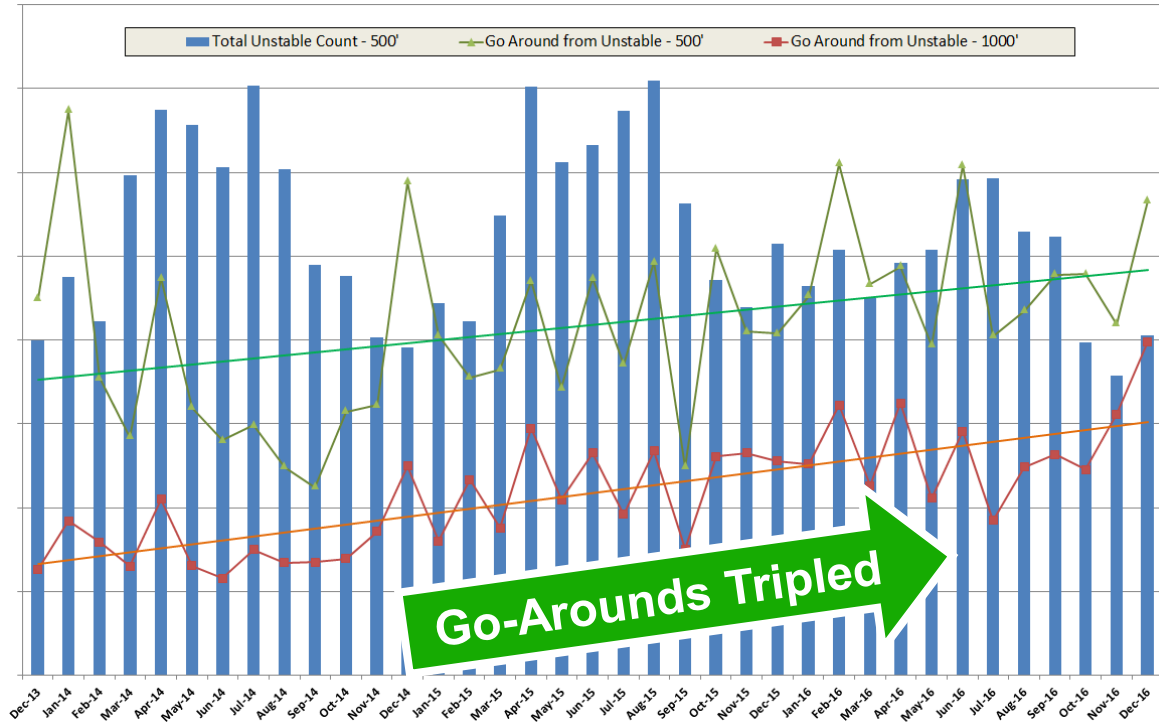
Our Efforts Continue to Pay Off



- It takes a relentless attack on all fronts to continue reducing unstable approaches
- The “Gatekeeper Effect” has been the most powerful
- Since we expanded the GK program in 2012 we have seen a **63% DECREASE** in unstable approaches

Bottom Line

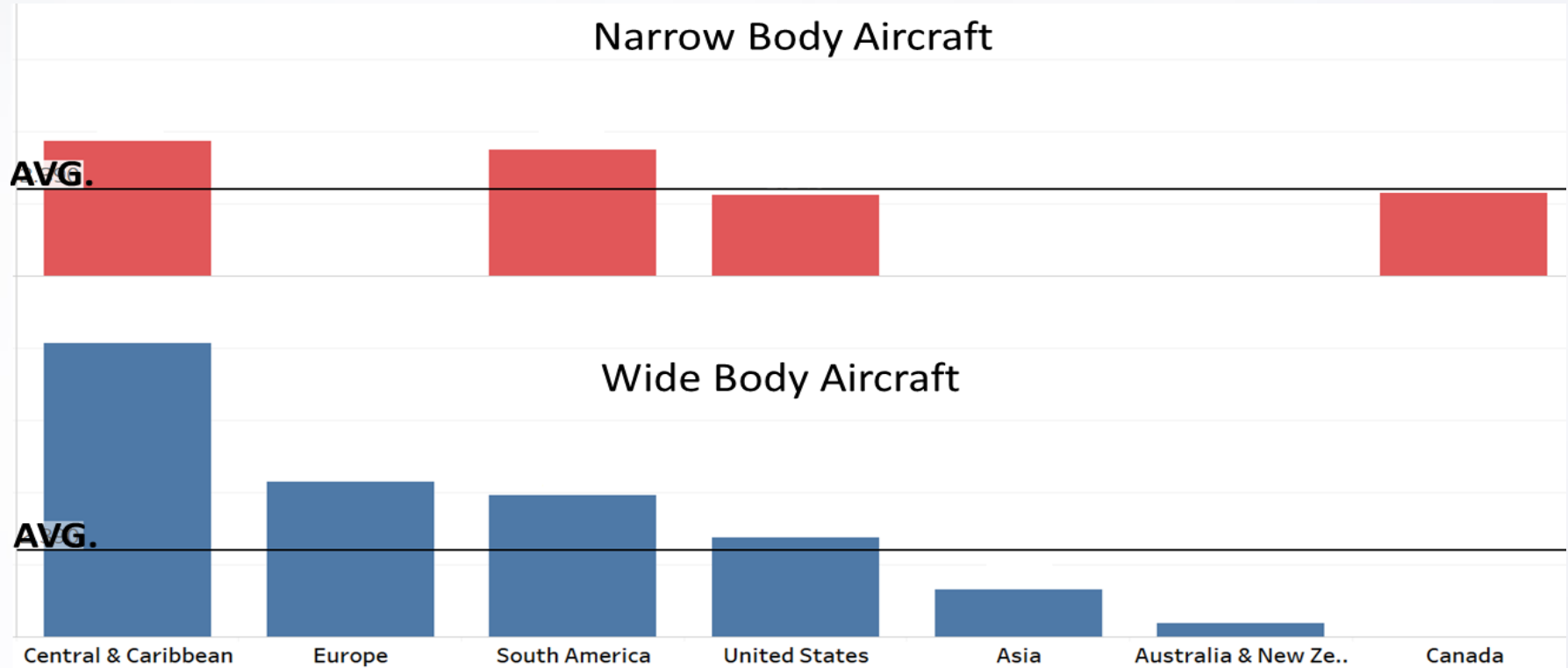
Our Efforts Continue to Pay Off



- It takes a relentless attack on all fronts to continue reducing unstable approaches
- The “Gatekeeper Effect” has been the most powerful
- Since we expanded the GK program in 2012 we have seen a **63% DECREASE** in unstable approaches
- Go-Around rate has more than tripled

In spite of bankruptcy, merger, and aggressive fleet renewal plan.

Unstable Approach Rates by Region



6/14/2017

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QUESTIONS?

