



# AIR DOMINANCE

THE KEY TO SUCCESS FOR THE JOINT FORCE IN  
THE 21<sup>ST</sup> CENTURY

• *F-22 RAPTOR*

• *F-35 LIGHTNING II*



## An Uncertain Future

- The United States of America faces an uncertain future, but there are some critical factors to consider:
  - Nuclear proliferation, rising near-peer competitors, resource competition, and continued asymmetric threats will lead to challenges in the global security environment.
  - It may be difficult politically to deploy ground troops in a large scale for decades into the future.
  - Power projection thorough air, space, and cyberspace will be increasingly important in providing for our national security.



## It Takes Air Force Power To Defend America

- The United States Air Force is a truly unique Service, maximizing speed, power, and vision to net global effects in the air, space, and cyber space.
  - Air Force aircraft can attain strategic effects by striking anywhere in the world at a moment's notice.
  - Air Force air, space, and cyber assets provide critical intelligence data for the joint force.
  - Air Force mobility assets allow our nation to rapidly respond to events around the world in peace or war.
  - Air Force air, space, and cyber assets enable command and control.
  - Air Force cyber command helps defend our nation's critical IT-related assets.





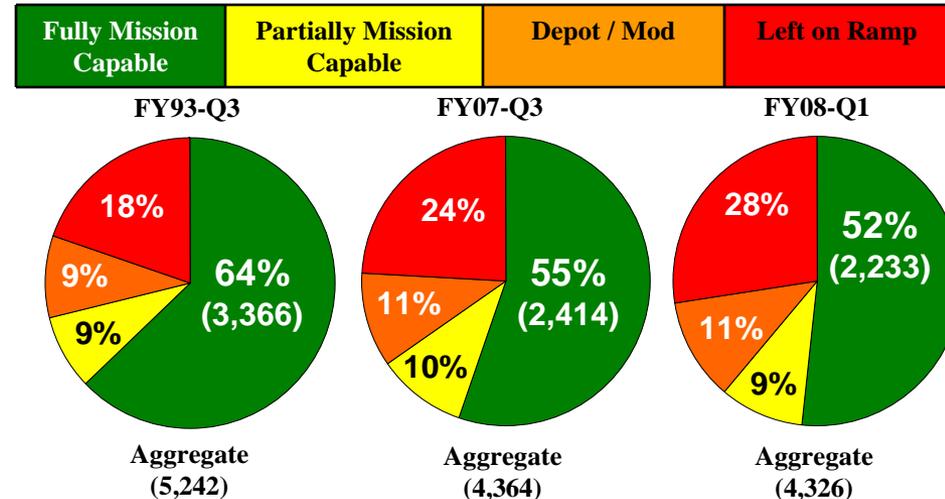
## The Opportunity Cost of an aging Fleet

• Air Force aircraft are increasingly expensive to maintain and less reliable to fly.

• Aircraft within the Air Force fleet average 25 years in age, with some dating back to the Eisenhower Administration.

• Currently only 52% of the fleet is fully mission capable.

• Since Desert Storm, the Air Force has been flying an average of 2.2M hours per year, but with an inventory that is 31% smaller and 42% older.



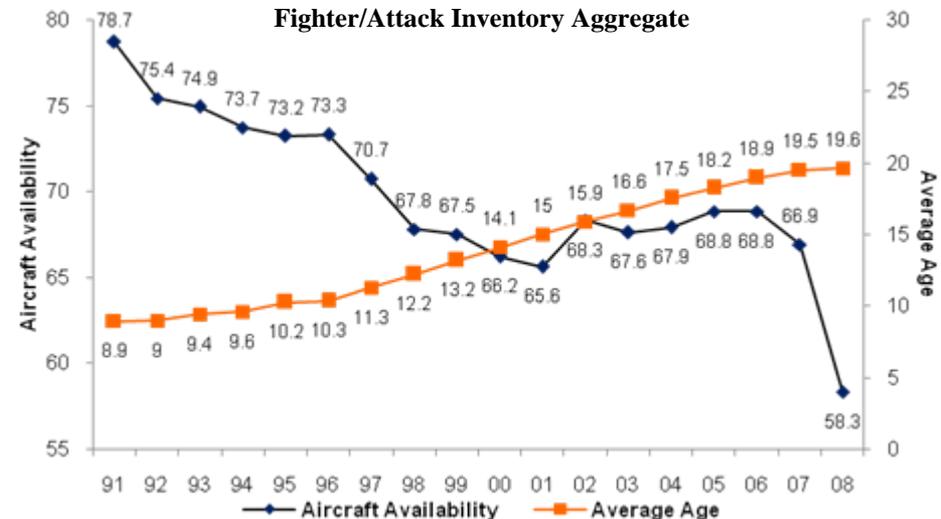
Fully Mission Capable rate dropped 12 points even though there were 900 fewer aircraft in the operational inventory

*The problem of aging equipment is most acute for the Air Force...the Service has been conducting combat operations in the Gulf for 17 years, patrolling the desert skies and now providing the wartime logistics lifeline to the battlefield. The same seventeen years have seen underinvestment in modernization and recapitalization...a financial burden that snowballs with every year.*



## The Opportunity Cost of an Aging Fleet: Fighters

- The Air Force is spending more money and maintenance man-hours on aircraft that are increasingly less able to fly and fight.
  - In 1991 the average age of the fighter fleet was 8.9 years old. Now, that number has risen to 19.6 years of age.
  - In 1991 the fighter fleet had an availability rate of 78.7%. Now, that number stands at 66.9%, and falls to 58.3% when the F-15A-D grounding is factored into the equation.
  - In-flight F-15 structural failures dramatically illustrate that aging airframes face numerous unknowns, despite years of careful maintenance.



***“The US Air Force is our primary national strategic force. Yet it is too small, has inadequate numbers of aging aircraft, has been marginalized in the current strategic debate...the next Administration must fix the...shortfalls or we will place the American people in enormous peril.”***

General Barry McCaffrey, US Army (Ret)



## The Challenge of Attaining Air Dominance

- Air dominance is a fundamental pre-condition for the success of US combat forces. However, the rapid proliferation of advanced integrated air defense systems and advanced fighter aircraft is threatening the US Air Force's ability to control the skies for the joint force.

- In Operation Desert Storm 37 US aircraft were shot down and a further 40 were damaged—air defense systems have improved dramatically since this conflict.

- In Operation Allied Force an F-117 and an F-16 were shot down over Kosovo by rudimentary surface-to-air-missiles (SAMs).

- In 2004 US Air Force F-15Cs were defeated repeatedly by Indian Air Force fighters during exercises known as Cope India 2004.

- Over thirty nations operate fighter aircraft that are at parity or exceed the capabilities of our F-15 and F-16 fleet.



***The familiar missions of deterring...and defeating aggression through large-scale power-projection operations have not diminished in importance. In fact, these missions are, in many ways, becoming more challenging.***

*A New Division of Labor—Meeting America's Security Challenges Beyond Iraq--RAND Corporation, 2007*

## The Challenge of Attaining Air Dominance

- We cannot assume that all future threat environments will be as permissive as Iraq and Afghanistan. Success in future operations will depend upon stealth, speed, precision, and integrated ISR.
  - This is not just about the Air Force—it is about netting strategic effects that win wars, enabling the joint force, and deterring our adversaries.
  - The weapons systems that we buy today will be in service for decades into the future. It is impossible to predict the full range of threats that we will face during the ensuing years, so properly balancing risk is essential.
  - Numerous lessons-learned throughout history have demonstrated that inadequately equipping our forces can have devastating consequences for our nation.





## The Challenge of Attaining Air Dominance

*Air dominance is not guaranteed:*

*The Su-27 is operated by Algeria, Belarus, China, Eritrea, Ethiopia, India, Indonesia, Kazakhstan, Malaysia, Mexico, Russia, Ukraine, Uzbekistan, Venezuela, and Vietnam.*

*MiG-29 operators include Algeria, Armenia, Azerbaijan, Bangladesh, Belarus, Bulgaria, Cuba, Eritrea, Hungary, India, Iran, Kazakhstan, Malaysia, Myanmar, North Korea, Peru, Poland, Russia, Serbia, Slovakia, Sudan, Syria, Turkmenistan, Ukraine, Uzbekistan, and Yemen.*

*5<sup>th</sup> generation fighters are currently being developed by Russia and China to challenge the F-22 and F-35.*





## The Way Forward

- It is no longer effective or efficient to operate legacy fighters that are costing more to maintain and are increasingly less combat capable.

- Acquire 381 F-22s to deter potential adversaries, guarantee access into any hostile region, support the joint force with both air-to-air and air-to-ground capabilities, and utilize integrated ISR sensors.

- Procure 1,763 F-35s to maintain access, provide a persistent force in both the air-to-air and air-to-ground mission, and serve as a common operational link with our allies.



## Why the F-22 Raptor?

- The F-22 will ensure air dominance in the dynamic threat environment of today and tomorrow:
  - Stealth, supercruise, maneuverability afford access anytime, anywhere.
  - Dominant air-to-air capability and suppression of enemy air defenses protects the joint force.
  - Unmatched precision global strike capability nets strategic and decisive results.
  - Integrated avionics and sensor fusion allows pilots to think strategically in battle.
  - ISR and EW capabilities provides critical support for the entire joint force.
  - Efficiencies are gained through a reduced deployment footprint and through improved reliability and maintainability.



### Air-Defense Threats Limit Access

| CAPABILITY               | Legacy SAMS | Current SAMS |
|--------------------------|-------------|--------------|
| Simultaneous Engagements | 1           | 6            |
| Engagement Ranges (nm)   | 10-25       | 50-100       |
| Mobility                 | Limited     | Excellent    |
| Manpower                 | Intensive   | Automation   |



## Why The F-35 Lightning II?

- Aging F-16s and A-10s are increasingly vulnerable to improved enemy defense networks
- These aircraft are also experiencing structural and maintenance-related challenges.
  - F-35 enables the Air Force to acquire a sophisticated replacement, employing select features from the F-22.
  - F-22 and F-35 work as a team, with the Raptor “kicking down the enemy’s door” for the Lightning II and other aircraft to undertake their respective missions.
  - The F-22s and F-35s are not interchangeable. The Raptor has nearly 3 times the kill ratio of the F-35 due to its increased speed, maneuverability, and air-to-air weapons carriage.



## These Aircraft are not Interchangeable

- F-22 affords a critical edge in high-threat environments that is essential to guarantee access and net strategic effects. The F-35, while highly effective, was never designed to include many of these capabilities.

- F-22 controls more than twice the battle space of the F-35.
- F-22 carries twice as many air-to-air missiles as the F-35.
- F-22 tactically employs at nearly twice the altitude and at 50% greater airspeed than the F-35.
  - Gives air-to-air missiles a 40% greater employment range and increased lethality.
  - Increases air-to-ground weapons employment range.
- Only the F-22 features vectored thrust, giving it twice the maneuverability of an F-35. The F-22 can turn at twice the rate of an F-35.
- F-22 AESA radar more capable, containing more T/R elements than F-35 radar.



## F-22/ F-35 Compl ementary Mission Domains

### Air-to-Air

|                      |                                             |                                                                                                                                                                                                   |
|----------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>F-22</b>          | -Obtain Access<br>-Counter advanced threats |                                                                                                                                                                                                   |
|                      | -Attack high threat targets                 | <div style="background-color: #003366; color: white; text-align: center; vertical-align: middle;"><b>F-35</b></div> -Maintain Access<br>-Common Air-to-Air and precise Air-to-Ground capabilities |
| <b>Air-to-Ground</b> |                                             | <div style="background-color: #003366; color: white; text-align: center; vertical-align: middle;"><b>F-35</b></div> -Persistent Force<br>-More flexibility for Air-to-Ground missions             |

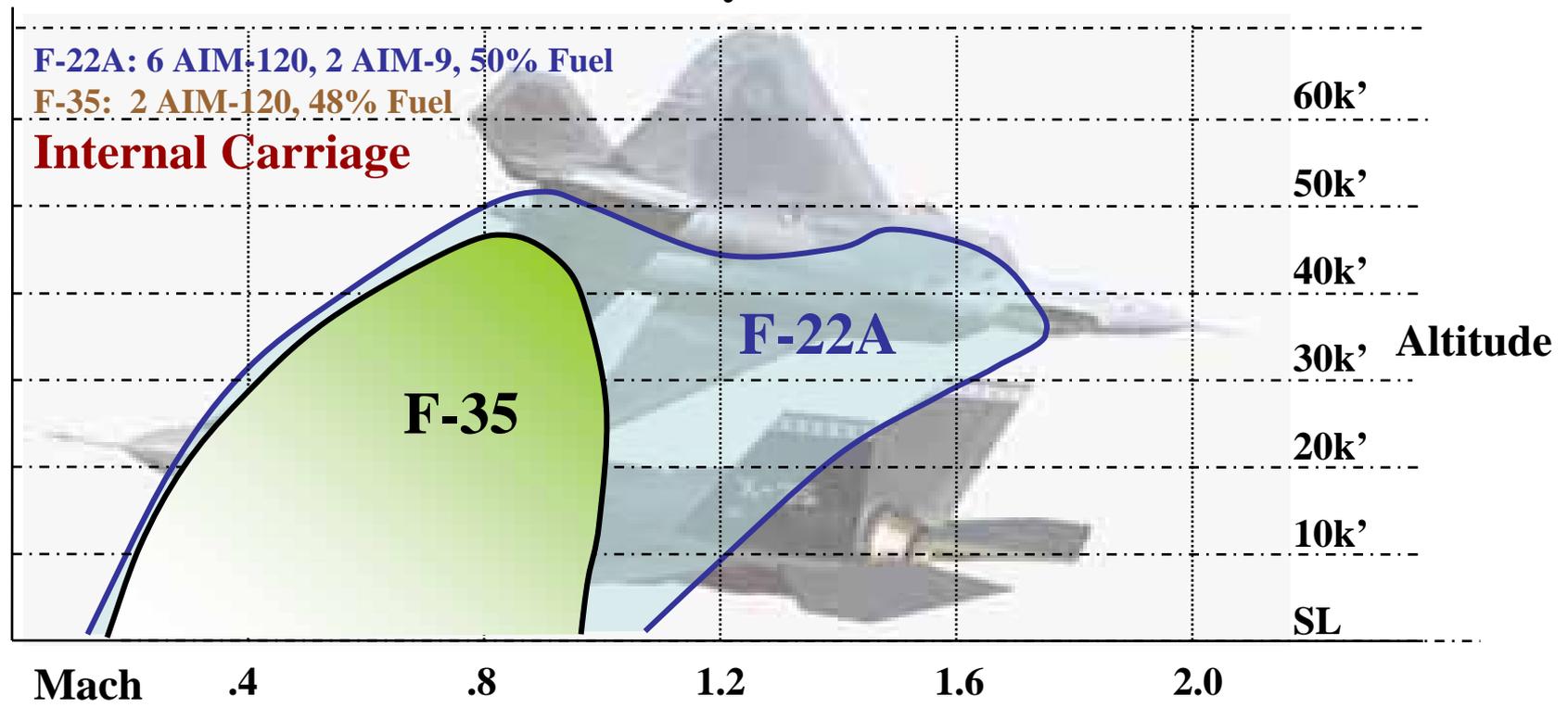


- F-22**
- *Optimized for Air Dominance*
  - *Capable to attack*
  - *High threat targets*
  - *Uncompromised performance*
- F-35**
- *Optimized for Global Persistent Attack*
  - *Lower cost / large quantities*



## F-22/ F-35 Flight Envelope Comparison

### Military Power



*There is no single greater priority for the coming 10 years for the USAF than funding, deploying, and maintaining 350+ F-22 Raptors to ensure air-to-air total dominance of battlefield air space in future contested areas.*

General Barry McCaffrey, US Army (Ret)



## Value of F-22 & F-35 Against Time-Sensitive Targets—Mobile SAMs, TBMs, CMs\*

*Potential target coverage within 10 minutes of initial detection*

**70,000 square miles**



150 nm

**F-22 with JDAM  
Stealth + Hi Alt + Mach 1.5+  
Advanced Sensors**

*Supercruise expands potential kill zones; half as many F-22s needed as F-35 to cover same area*

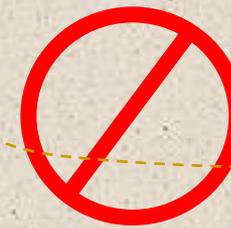
**31,000 square miles**



100 nm

**F-35 with JDAM  
Stealth + Mach 1.0+  
Adv Sen**

**Advanced SAM Coverage: HQ-9, SA-20**



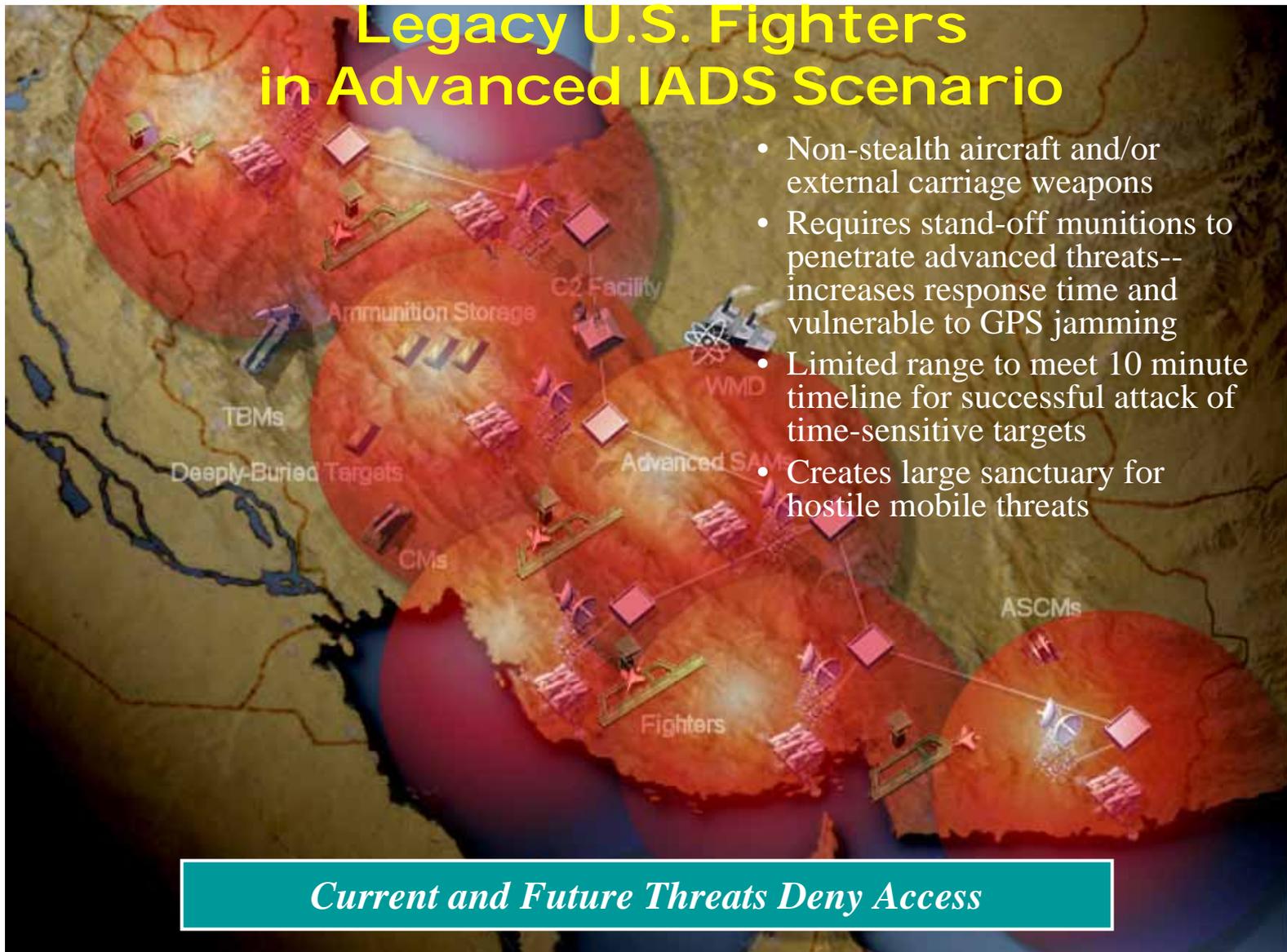
**F-15, F-16, F-18:  
Not survivable**

\*SAM—Surface to Air Missile  
TBM—Theater Ballistic Cruise Missile  
CM—Cruise Missile



## Legacy U.S. Fighters in Advanced IADS Scenario

- Non-stealth aircraft and/or external carriage weapons
- Requires stand-off munitions to penetrate advanced threats-- increases response time and vulnerable to GPS jamming
- Limited range to meet 10 minute timeline for successful attack of time-sensitive targets
- Creates large sanctuary for hostile mobile threats



*Current and Future Threats Deny Access*



# Air Force Association

...THE FORCE BEHIND THE FORCE



## Stealth and Maneuverability

- Stealth with internal carriage weapons enables attack in the vast majority of hostile territory.
- Advanced SAMs still a threat in certain zones.



*Stealth and Maneuverability Improve Access*



# Air Force Association

...THE FORCE BEHIND THE FORCE



## Stealth, Supercruise, Altitude and Maneuverability

- Full- Aspect Stealth with internal carriage weapons enables attack throughout hostile territory
- *Supercruise expands potential kill zones; half as many F-22s needed as F-35 to cover same area*
- Mitigates impact of “unknown” threats
- Eliminates sanctuary for enemy mobile threats

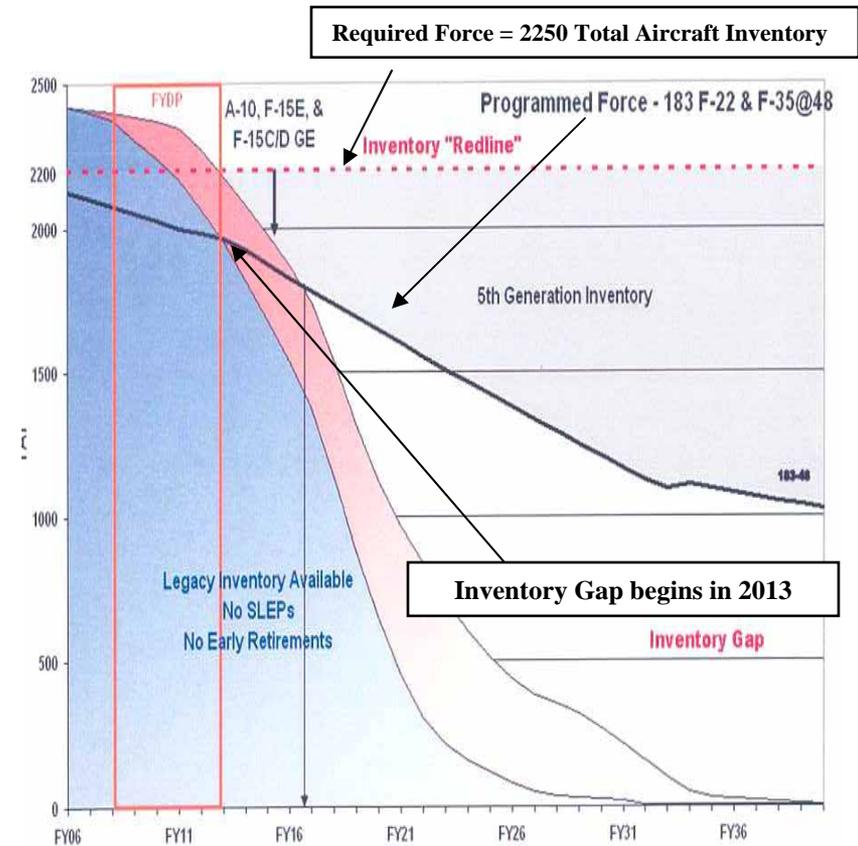


*Stealth, Supercruise, Altitude and Maneuverability  
= Battlespace Dominance*



## Opportunity Cost of Not Recapitalizing the Fighter Fleet

- Failing to procure the stated requirement for F-22 (381) and F-35 (1,763) ensures that the nation must accept a higher level of risk in the future.
  - Advanced weaponry will continue to proliferate around the world that will radically diminish the combat effectiveness of legacy aircraft.
  - Maintenance costs for aging aircraft will increase, while the fleet's availability will decrease.
  - Aircraft structural elements will eventually fail over time--fatigue life cannot be ignored in the demanding environment of fighter aviation.
  - Procuring an inadequate number of F-22s and F-35s will create low density—high demand assets that will reach the end of their respective service lives sooner.





## Required Course of Action for National Military Strategy

- Procure 381 F-22 Raptors
  - Air Superiority
  - Destruction of Enemy Air Defenses
  - Time Sensitive Targets
  - Intelligence, Surveillance, and Reconnaissance
- Procure 1,763 J-35 Lightning IIs
  - Interdiction
  - Destruction of Enemy Air Defenses
  - Close Air Support
  - Intelligence, Surveillance, and Reconnaissance

*The F-22 and F-35 are not only required for the Air Force, they are critical for the integrity and capability of the total force for decades to come.*

