

U.S. Military Forces in FY 2021

Air Force

Mark F. Cancian

Part of *U.S. Military Forces in FY2021*. The Air Force continues the development and procurement of next-generation aircraft to meet the demands of great power conflict. Fielding of new aircraft has been enough to arrest the increase in fleet age. However, the Air Force is not buying enough new aircraft to sustain its force structure, so it seeks to retire older aircraft.

KEY TAKEAWAYS

- Air Force military personnel levels, active and reserve component, increase slightly in FY 2021 and over the five-year period but remain essentially level. The largest increases are among civilians.
- Like the other services, the Air Force faces high day-to-day operational tempo while at the same time preparing to meet the demands of great power conflict.
- Aircraft inventories and fleet aging have stabilized in the near term.
- However, the Air Force is not buying enough new aircraft to maintain the inventory over the long term. Increasing procurement to the levels needed to sustain the inventory will require historically high costs.
- Instead, the Air Force plans to close this gap by retiring older aircraft and shrinking the force, possibly substantially. However, Congress has been reluctant to do this in the past.
- Given these circumstances, the Air Force is backing away from its 25 percent expansion goal to reach 386 operational squadrons.
- The FY 2021 budget procures no unmanned aircraft, so the unmanned fleet has plateaued at 6 percent of the force.
- Nuclear forces require a greater share of the Air Force budget as Reagan-era systems reach the end of their service lives, and as a result, nuclear modernization generates some opposition.
- The Space Force continues to take shape, so far entirely from Air Force elements.

End Strength in FY 2021

Table 1: Air Force End Strength – Active and Civilians

	Air Force Active		Civilian Full-time Equivalents
	Combat Coded Squadrons	Authorized End Strength	
FY 2020 Enacted	40	332,800	172,100
FY 2021 Request	40	333,700	174,600
Change	0	-100	+2,500

Note: Combat coded squadrons = fighter and bomber squadrons with a wartime mission; Air Force is moving toward a new sizing metric—operational squadrons—which includes fighters, bombers, airlift, intelligence/surveillance/reconnaissance (ISR), command and control (C2), special operations, space, cyber, missile, and personnel recovery squadrons. By that metric, there are currently 301 squadrons.

Source: Department of Defense, *United States Air Force Budget Overview Fiscal Year 2021* (Washington, DC, April 2020), 5, <https://www.saffm.hq.af.mil/Portals/84/documents/FY20/FY2020%20Air%20Force%20Budget%20Overview%20Book%20Final%20v3.pdf?ver=2019-03-13-082653-843>; Squadron and civilian data from Office of the Under Secretary of Defense (Comptroller), *Defense Budget Overview* (Washington, DC: April 2020), 2–8, A-4, 5, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021_Budget_Request_Overview_Book.pdf.

Table 2: Air Force End Strength – Reserve and Air National Guard

	Air Force Reserve		Air National Guard	
	Combat Coded Squadrons	Authorized End Strength	Combat Coded Squadrons	Authorized End Strength
FY 2020 Planned	3	70,000	21	107,100
FY 2021 Request	3	70,100	21	107,700
Change	0	+100	0	+600

Source: Department of Defense, *United States Air Force Budget Overview Fiscal Year 2021*, 5. Squadron data from Office of the Under Secretary of Defense (Comptroller), *Defense Budget Overview*, A-3.

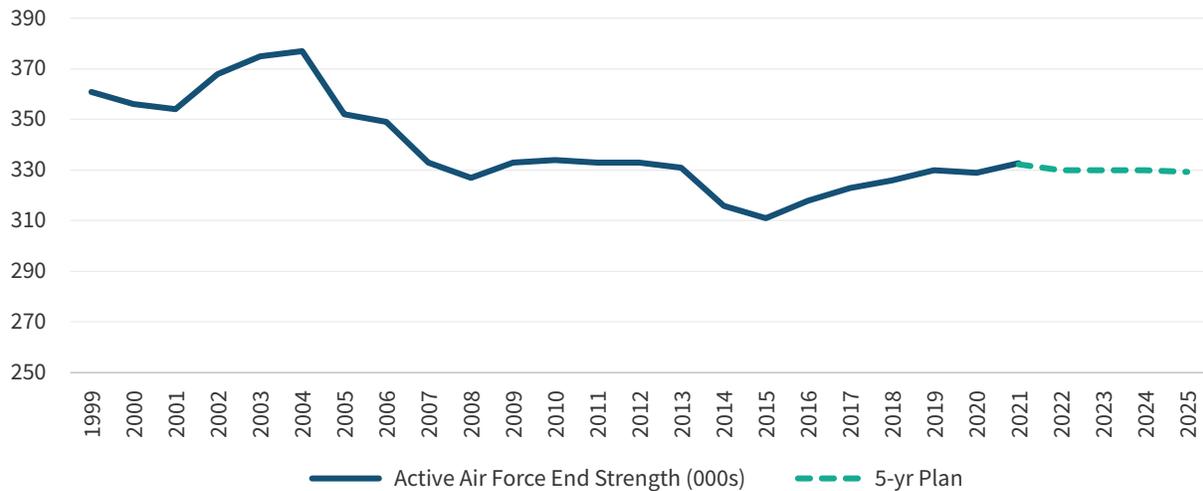
All three components maintain the same major elements of the force structure. Changes in personnel levels are small.

A bright spot is active/reserve relations. By working closely with its reserve components, and giving them at least a small end strength increase, the Air Force has avoided the internal conflicts that had marred earlier budgets and required a 2014 force structure commission to make peace.¹

Another bright spot is that the pandemic is solving the Air Force’s long-standing and, until recently, severe pilot shortage. With the commercial travel industry in deep recession, the airlines have stopped hiring, so pilots are staying in the service.

1. National Commission on the Structure of the Air Force, *Report to the President and Congress of the United States* (Washington, DC: January 2014), <https://policy.defense.gov/Portals/11/Documents/hdasa/AFForceStructureCommissionReport01302014.pdf>.

Chart 1: Air Force – Active End Strength, 1999–2021



Source: Office of the Under Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2021* (Washington, DC: April 2020), Table 7-5: Department of Defense Manpower, 260–262, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21_Green_Book.pdf.

As the chart above shows, end strength rose in the wake of the invasions of Afghanistan and Iraq. After 2004, however, the Air Force adopted a strategy of retiring older aircraft and reducing personnel to shift funds to modernization. Active-duty end strength fell from a high of 377,000 to a low of 316,000. Critics argued that this decrease had harmed readiness and gutted the pilot inventory.² Thus, the Air Force began increasing end strength in FY 2016.

Personnel levels will stay at about the FY 2021 level through FY 2025. This is likely a hedge against an uncertain budget future. The Air Force is reluctant to add personnel that it cannot sustain but is not at the point of major cuts either. However, the Air Force budget documents reveal no details.

Indeed, this lack of information permeates the Air Force FY 2021 budget documents. Although there is extensive data about the budget year, there is almost no description of what might happen in the future for personnel or force structure. This contrasts with previous years, where the budget documents had some explanation of what would happen during the five-year planning period. Further, the Air Force’s two major development programs, the B-21 bomber and the Next Generation Air Dominance aircraft, are classified programs about which little is known publicly.

Operational Tempo: Gone as a Stated Concern

Like the other services, the Air Force notes how busy it is. In the annual posture statement, Secretary Barrett and General Goldfein stated that “over 28,000 Airmen deployed worldwide last year . . . flew more than 75,000 strike sorties, employed more than 11,000 weapons in Iraq, Syria, and Afghanistan, and conducted more than 27,000 airlift and refueling sorties across U.S. Central Command.”³

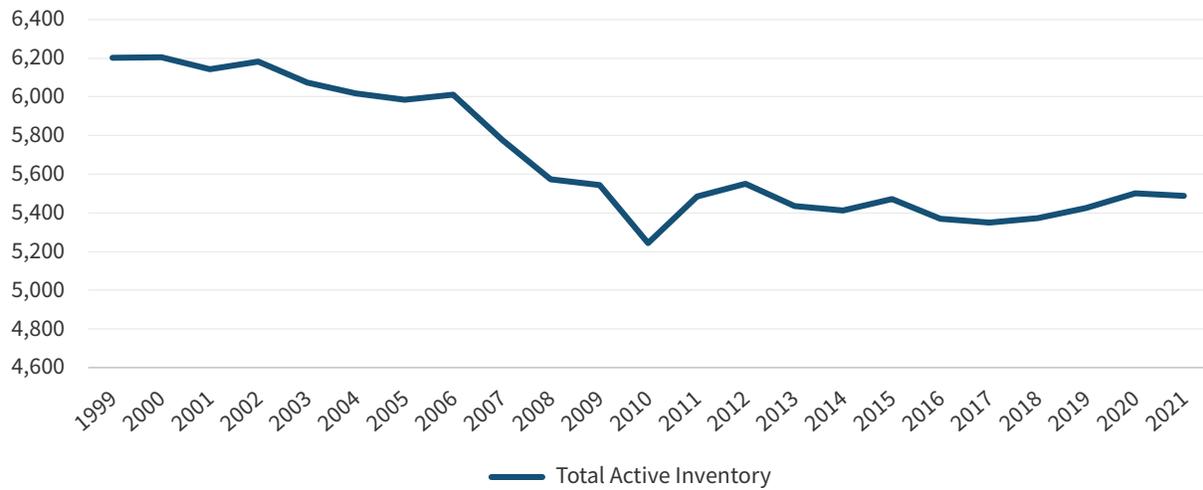
2. Mike Benitez, “Air Force in Crisis, Part II: How Did We Get Here?,” *War on the Rocks*, March 8, 2018, <https://warontherocks.com/2018/03/air-force-in-crisis-part-ii-how-did-we-get-here/>.

3. U.S. Air Force, *USAF Posture Statement Fiscal Year 2021* (Washington, DC: March 2020), https://www.armed-services.senate.gov/imo/media/doc/Barrett--Goldfein_03-03-20.pdf.

Despite the description of high activity, any mention of stress resulting from these operations is gone. RAND noted that “since the 1990s, the US military has operated at a tempo more akin to war than peace” and found that “prolonged operations are driving contemporary [Air Force] capacity shortfalls” and that these would continue in the four notional futures that RAND analyzed.⁴ Nevertheless, comparing the Air Force’s statement about operations this year with statements in previous years, the level seems to have gone down from the height of the bombing campaigns against ISIS in Syria/Iraq and against the Taliban in Afghanistan.

Force Structure in FY 2021 and Beyond

Chart 2: Air Force – Aircraft Inventory



Source: Department of Defense, *United States Air Force Budget Overview Fiscal Year 2021*, 6.

The Air Force has stabilized its force structure at about 5,500 aircraft, after a sharp decline from 2002 to 2009. The Air Force has maintained its inventories by allowing the average aircraft age to increase (to 29.2 years).⁵

This happened because the Air Force took a procurement holiday in the late-1990s and, for its numerous fighter/attack aircraft, planned to move directly to an all fifth-generation force fleet. This plan collapsed in the early-2000s when the F-22 buy was curtailed at 187 aircraft, and the F-35 program was delayed many years because of development problems.

Thus, Stephen Kosiak, a long-time budget commentator, has argued that these trends [shrinking inventories and aging fleets] arise from deliberate choices: “[H]istorical trends in the US military’s force structure and modernization plans are largely the result of policy and programmatic choices made by DOD and service leadership. Contrary to widely held belief . . . the size and shape of today’s forces are not simply a byproduct of budgetary or other pressures beyond DOD’s control.”⁶

4. Alan Vick, Paul Dreyer, and John Speed Myers, *Is the Air Force Flying Force Large Enough? Assessing Capacity Demands in for Alternative Futures* (Santa Monica, CA: RAND Corporation, 2018), https://www.rand.org/pubs/research_reports/RR2500.html.

5. Numbers measured by Total Active Inventory (TAI), that is, aircraft assigned to operating forces, as well as for test and maintenance. It includes primary, backup, and attrition reserve aircraft.

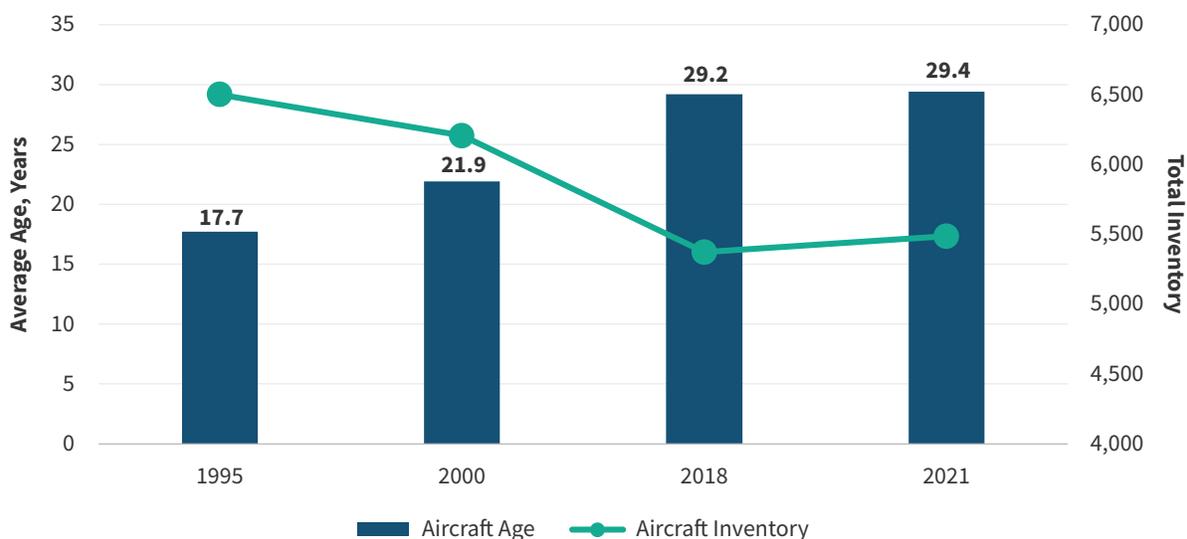
6. Steven M. Kosiak, *Is the US Military Getting Smaller and Older? And How Much Should We Care?* (Washington, DC: Center for a New American Strategy, June 2017), <https://s3.amazonaws.com/files.cnas.org/documents/CNASReport-SmallerOlderMilitary-Final.pdf>.

The good news is that fleet aging overall has nearly stopped as new aircraft enter the force. The bad news is that the procurement cost of just maintaining the current inventory will rise far above historical aircraft procurement budget levels through the 2030s.

The good news is that fleet aging overall has nearly stopped as new aircraft enter the force. The bad news is that the procurement cost of just maintaining the current inventory will rise far above historical aircraft procurement budget levels through the 2030s.

Although the Navy and Army also face challenges with aircraft aging and maintaining their aircraft fleets, the Air Force is in far worse shape regarding aging and the slow acquisition of replacements.⁷

Chart 3: Air Force – Aircraft Average Age and Inventory



Source: Air Force Association, “USAF Almanac 2020,” *Air Force Magazine* 103, no. 6 (June 2020): 63, https://www.airforcemag.com/app/uploads/2020/06/June2020_Fullissue5.pdf; Air Force Association, “USAF Almanac 2001,” *Air Force Magazine* 84, no. 5 (May 2001): 55–58, http://www.airforcemag.com/MagazineArchive/Magazine%20Documents/2001/May%202001/0501facts_figs.pdf; and Air Force Association, “USAF Almanac 1996,” *Air Force Magazine* 79, no. 5 (May 1996): 56–60, http://www.airforcemag.com/MagazineArchive/Magazine%20Documents/1996/May%201996/0596facts_figures.pdf. 2000 and 1995 years calculated by averaging the average age of the active, reserve, and air national guard fleet aircraft.

7. Edward Keating, *The Cost of Replacing the Department of Defense’s Current Aviation Fleet* (Washington, DC: Congressional Budget Office, January 2020), <https://www.cbo.gov/system/files/2020-01/55950-CBO-DoD-aviation.pdf>; for analysis of the Air Force fleet specifically, see Edward Keating, David Arthur, and Adebayo Adejeji, *The Cost of Replacing Today’s Air Forces Fleet* (Washington, DC: Congressional Budget Office, December 2018), <https://www.cbo.gov/system/files/2018-12/54657-AirForceAviationFunding.pdf>.

Table 3: Air Force Aircraft Acquisition in FY 2021

F-35A	48
MC-130J	4
HH – 60W	19
KC – 46A	15
F – 15EX	12
MH-139	8
Total	106

Some fleets are in relatively good shape: the transport fleet (21 years, on average) because of acquiring C-17s and C-130s, the special operations fleet (12 years) because of its high priority, and the UAVs/RPVs (6 years) because of large wartime purchases. Other fleets are old: fighter/attack (29 years old), bomber (42 years), tanker (49 years), helicopter (32 years), and trainers (32 years).⁸ All the older fleets (except for some specialty aircraft) have programs in place for modernization, but the programs have been delayed, are expensive, and may take years to implement fully.

Unfortunately, the FY 2021 procurement level is far too low to sustain the Air Force’s current inventory. In FY 2021, the Air Force proposes to procure 106 aircraft.

Assuming a 30-year service life, this will sustain an inventory of 3,180 aircraft.

$$106 \text{ aircraft procured in FY 2021} \times 30\text{-year service life} = 3,180 \text{ total inventory}$$

The current inventory is 5,387. To sustain that inventory requires nearly doubling the number of aircraft acquired per year.

$$5,387 \text{ target inventory} \div 30\text{-year service life} = 180 \text{ aircraft acquired per year}$$

Even if aircraft service life were extended to 40 years, the Air Force would still need to buy substantially more aircraft.

$$5,387 \text{ target inventory} \div 40\text{-year service life} = 135 \text{ aircraft acquired per year}$$

Some fleets are in relatively good shape . . . other fleets are old. All the older fleets . . . have programs in place for modernization, but the programs have been delayed, are expensive, and may take years to implement fully.

The bottom line is that to sustain its current inventory, the Air Force will have to buy many more aircraft or less expensive aircraft. Alternatively, the Air Force will need to greatly reduce its aircraft inventory and sharply cut its force structure.

Divest to Invest

The Air Force has two reasons to reduce its aircraft inventory and associated force structure. First, as described above, is its inability to maintain the structure with the number of aircraft that it has been able to procure recently and in the foreseeable future. Second is its desire to make a wide variety of (expensive) investments in advanced systems, aircraft, weapons, sensors, and networks that would be suitable for conflict with a great power.

8. Fleet age numbers current as of September 30, 2019, from Air Force Association, “Air Force and Space Force Almanac 2020,” *Air Force Magazine* 103, no. 6 (June 2020), 63, <https://www.airforcemag.com/issue/2020-06/>.

General Charles Q. Brown, the new Air Force chief of staff, expressed this in his first communication to Air Force personnel: “Our airmen need us to integrate and accelerate the changes necessary to explore new operational concepts and bring more rapidly the capabilities that will help them in future fights.” Thus, he talks about “ruthless prioritization,” implying the elimination of many older systems.⁹ Air Force budget documents foreshadow a large future force structure cut: “The Air Force is planning for less legacy force capacity to begin investing additional manpower into capabilities for tomorrow’s high-intensity conflict against near-peer competitors.”¹⁰

General Charles Q. Brown, the new Air Force chief of staff . . . talks about “ruthless prioritization,” implying the elimination of many older systems.

For this reason, the Air Force has repeatedly proposed to retire aircraft. The proposed retirements for FY 2021 are modest (see Table 4). Congress, however, has often balked at retirements, noting that the Air Force says it is already too small for the tasks it has been given. When the Air Force proposed eliminating the A-10 fleet, for example, Congress opposed such an action, putting explicit prohibitions in the FY 2015 NDAA and proposed FY 2021 NDAA.¹¹

Table 4: Proposed Air Force Aircraft Retirements in FY 2021

KC-10	-16
KC 135	-7
B-1	-17
RQ-4	-24
A-10	-44

Source: Department of the Air Force, *Fiscal Year 2021 Budget Estimates, Operations and Maintenance*, 12.

A recent CSIS report laid out the savings that the Air Force might achieve by retiring certain aircraft fleets. The fleets most likely to be retired are the KC-10 tanker, the B-1 and B-2 bombers, the A-10 close air support aircraft, the E-8C surveillance aircraft, the U-2 spy plane, and the E-3 airborne warning and control plane. The report argued that the greatest savings arose when entire fleets were eliminated, thus eliminating the fixed costs of a training and maintenance infrastructure.

However, the report also noted that such retirements would leave gaps in Air Force capabilities. Retiring the B-2 bombers, for example, would leave the United States without a stealthy penetrating bomber until the B-21 was fielded in strength.¹²

These force structure trade-offs drive a series of strategic choices about airpower:

- **What kinds of conflicts should the Air Force prepare for: those against great powers or a spectrum of air environments, including those with less-demanding environments?** In lower threat air environments, such as North Korea, the Air Force can use legacy aircraft extensively. For conflicts

9. Charles Q. Brown, Jr., “Accelerate Change or Lose,” U.S. Air Force, August 2020, <https://www.airforcemag.com/app/uploads/2020/08/CSAF-22-Strategic-Approach-Accelerate-Change-or-Lose-31-Aug-2020.pdf>.

10. Department of the Air Force, *Fiscal Year FY 2021 Budget Estimates, Military Personnel Appropriation* (Washington, DC: February 2020), 6, https://www.saffm.hq.af.mil/Portals/84/documents/FY21/MILPER_/FY21%20Air%20Force%20Military%20Personnel_1.pdf?ver=2020-02-10-091310-847.

11. Carl Levin and Howard P. ‘Buck’ McKeon National Defense Authorization Act for Fiscal Year 2015, <https://www.congress.gov/bill/113th-congress/house-bill/3979>; Senate Armed Services Committee, National Defense Authorization Act for Fiscal Year 2021, <https://www.congress.gov/bill/116th-congress/senate-bill/4049>.

12. Todd Harrison, “How the Air Force Can Save \$30 Billion,” CSIS, November 12, 2019, <https://aerospace.csis.org/wp-content/uploads/2019/11/How-the-Air-Force-Can-Save-30-Billion.pdf>.

against great powers such as China and Russia, with their sophisticated air defenses, the Air Force would need to focus exclusively on advanced capabilities.

- **How can airpower achieve the greatest effects?** Will the greatest effects come from attacks close to friendly front lines—that is, through close air support and battlefield interdiction? The ground forces are strong advocates here, arguing that these effects are immediate and tangible.¹³ Airpower advocates argue that the greatest effect comes from the deep attack of strategic targets. The Air Force has historically leaned toward the latter for a variety of organizational and doctrinal reasons.¹⁴
- **What is the value of stealth in modern air warfare?** Stealth—needed to penetrate heavily defended airspaces—is expensive to develop, procure, and sustain.¹⁵ Further, there is an operational penalty. Proponents argue that the cost and performance trade-offs are worthwhile because of rising air threats.¹⁶ Opponents argue that only a small part of the fleet needs to be stealthy, while the rest can be non-stealthy.¹⁷

The answers to these questions go far beyond this report, but the questions show that there are difficult strategic decisions behind inventory numbers.

The Air Force Expansion Proposal: Fading Away

Not surprisingly, given the Air Force’s difficulty in maintaining the current fleet size, its proposal for expansion is fading away.

Not surprisingly, given the Air Force’s difficulty in maintaining the current fleet size, its proposal for expansion is fading away.

In 2018, then-Secretary of the Air Force Heather Wilson proposed a 25 percent increase in force structure, describing it as “the Air Force we need” (see Chart 5).¹⁸ This would increase the Air Force from 312 operational squadrons to 386. Much of the growth would be in enabling capabilities such as tankers,

13. Scott Beauchamp, “An Infantryman’s Defense of the A-10,” Task and Purpose, February 29, 2016, <http://taskandpurpose.com/infantrymans-defense-10>.

14. The literature on close air support versus strategic attack is extensive. For a recent example, see Phil Haun and Colin Johnson, “Breaker of Armies: Airpower in the Easter Offensive and the Myth of Linebacker One and Two in the Vietnam War,” *International Security* 40, no. 3 (Winter 2015/16): 139–78, https://www.mitpressjournals.org/doi/abs/10.1162/ISEC_a_00226?journalCode=isec.

15. Technically not “stealth” but “low observability” since nothing is actually invisible. The additional cost of stealth is difficult to estimate since aircraft are bought in different quantities, have different characteristics beyond stealth, and costs can include different elements (such as development). One data point is from the Navy, which is buying both fourth generation F-18E/Fs and fifth generation F-35s. The average recurring procurement cost of F-35B/Cs over the life of the program is about 30 percent more than an F-18 in FY 2020. Adding non-recurring costs for manufacturing and development would greatly increase the cost differential.

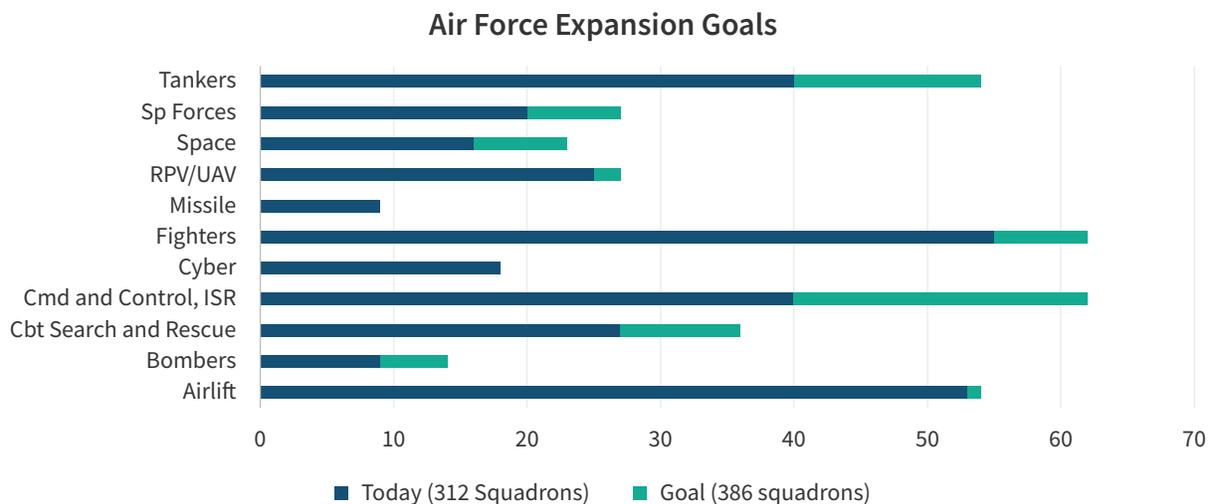
16. For example, Jeff Harrigian and Max Morosko, “Fifth Generation Air Combat: Maintaining the Joint Force Edge,” Mitchell Institute for Aerospace Studies, The Mitchell Forum, no. 6, July 2016, http://docs.wixstatic.com/ugd/a2dd91_bd906e69631146079c4d082d0eda1d68.pdf; and Loren Thompson, “Trump Defense Team inherits Bad Ideas About Air Power from The Obama Years,” *Forbes*, February 2, 2017, <https://www.forbes.com/sites/lorenthompson/2017/02/01/trump-defense-team-inherits-bad-ideas-about-air-power-from-the-obama-years>.

17. For example, Mike Pietrucha, “The U.S. Air Force and Stealth: Stuck on Denial Part I,” *War on the Rocks*, March 24, 2016, <http://warontherocks.com/2016/03/stuck-on-denial-part-i-the-u-s-air-force-and-stealth/>; and Mike Benitez, “Stealth Is King, the World Is Flat,” *War on the Rocks*, May 19, 2016, <https://warontherocks.com/2016/05/stealth-is-king-the-world-is-flat/>.

18. Chuck Broadway, “SecAF Wilson provides Air Force update,” U.S. Air Force, September 17, 2018, <https://www.af.mil/News/Article-Display/Article/1635645/secaf-wilson-provides-air-force-update/> (full speech linked here: <https://spacepolicyonline.com/wp-content/uploads/2018/09/SECAF-AFA-Speech-FInal-Sep-17-2018-AF-We-Need.pdf>).

special forces, space, and especially command and control (C2) and intelligence, surveillance, and reconnaissance (ISR), which provide the precision targeting that long-range munitions require.

Chart 4: Air Force Expansion by Mission Category



Source: Air Force, *Restoring Readiness: FY2020 Posture* (Washington, DC: April 2019), https://www.af.mil/Portals/1/documents/5/FY20_Posture_Statement.pdf?ver=2019-04-04-092535-083×tamp=1554384341518.

In 2019 and 2020, the Air Force reaffirmed this goal. General Goldfein discussed it explicitly and at length in his FY 2020 posture statement. It disappeared from the FY 2021 posture statement.¹⁹ This was unsurprising since the Air Force has taken no steps to reach this expansion goal, unlike the Navy and its 355-ship goal. When General Charles Brown, the new Air Force chief of staff, was asked about it, he said that 386 squadrons were indeed what the Air Force needed to execute the strategy, but the goal had been a resource unconstrained answer to a congressional question. Instead, he talked about achieving the required “capability,” not necessarily the numbers.²⁰

All of this might be written off as another exercise in fiscally unconstrained planning, but the tension between the expansion goal and the Air Force’s desire to shrink to save money for modernization will provide a lever for those in Congress and elsewhere who are reluctant to retire older aircraft.

The State of the Fleets

In general, the Air Force has programs in place to modernize the individual fleets, but this modernization has been delayed and will take time, and as a result, today’s aging fleets will be around for a long while. Nevertheless, each fleet faces its own circumstances and therefore deserves individual consideration.

The Bomber Force

The bomber force consists of B-52s, B-1s, and B-2s. The long-range plan is for the B-21 Raider to replace the B-1s and B-2s. The B-52s will continue in service at least into the 2040s and maybe beyond. The last B-52 pilot has probably not yet been born.

19. U.S. Air Force, *USAF Posture Statement Fiscal Year 2021*.

20. “Ep. 76: Air Force Chief of Staff Gen. Charles Q. Brown, Jr.,” Defense One podcast, September 24, 2020, <https://www.defenseone.com/ideas/2020/09/ep-76-air-force-chief-staff-gen-charles-q-brown-jr/168745/>.

Since no new aircraft are being produced, the bomber force continues to age (currently 43 years on average), though various upgrade programs keep the aircraft flying and operationally relevant, for example, new engines for the B-52s and a new defensive system for the B-2s. The Air Force would like to divest some of the B-1s early but has run into congressional opposition.

The B-21 Raider program continues in development, with budget demands seeming to stabilize: \$2.9 billion in FY 2020 and \$2.8 billion in FY 2021 and remaining at that level through FY 2025. Because the B-21 has a mid-2020s fielding date (“Initial Operating Capability”), the legacy B-52s, B-1s, and B-2s will comprise the bomber force for many years to come. Details are uncertain, however, because the B-21 remains a classified program.

The Fighter Force

The fighter/attack force has been the central element of the Air Force since the end of the bomber era in the early-1960s. It therefore requires detailed examination.

The average age of the fighter/attack force has increased from 8 years at the end of the Cold War in 1991 to 26 years today, while numbers have decreased from 4,000 in 1991 to 1,981 (total) today. Kosiak’s observation is applicable here. Both fleet aging and reduced numbers result from an Air Force decision to cease production of fourth-generation aircraft (F-15s and F-16s) in the 1990s and instead wait for production of the fifth-generation (F-22s and F-35s). This was the opposite of the Navy’s decision to continue production of the F-18. Unfortunately, production of the F-22 was curtailed at 187 aircraft during the budget drawdown in the late-2000s, and the F-35 was delayed many years from its original schedule.

F-35s: The Air Force again requests 48 aircraft in FY 2021, about the same as for the last four years, although Congress routinely increases the buy (to 62 in FY 2020) out of a concern that the aircraft are being fielded too slowly. According to the procurement budget documents, 48 will be the long-term procurement level, rather than the 60 aircraft per year that the Air Force had intended.²¹

After several years of making good progress in maturing technologies, the aircraft are operational, but the program has still not achieved the planned levels of reliability and capability. The FY 2019 annual report of the director of Operational Test and Evaluation (DOT&E) (the latest available of such reports) noted: “The Joint Strike Fighter (JSF) program continues to carry 873 unresolved deficiencies . . . Although the program is working to fix deficiencies, new discoveries are still being made, resulting in only a minor decrease in the overall number of deficiencies.” Reliability and maintainability metrics remain below goals. Operational testing continues.²²

Fielding of new F-35s is beginning to ease the aging of the fleet (as will production of F-15EXs). Nevertheless, at 48 aircraft per year, it would take another 28 years to reach the F-35 inventory objective of 1,763—or through FY 2049. Even at 60 aircraft per year, the Air Force goal, it would take 22 years—or through FY 2043. The average age of the fighter/attack fleet will therefore remain high for a long time, perhaps indefinitely.

21. Department of Defense, *FY 2021 Budget Justification Book: Aircraft Procurement, Air Force* (Washington, DC: February 2020), 1-1, https://www.saffm.hq.af.mil/Portals/84/documents/FY21/PROCUREMENT_/FY21%20Air%20Force%20Aircraft%20Procurement%20Vol%20I_1.pdf?ver=2020-02-10-145310-973.

22. Director of Operational Test and Evaluation, *FY 2019 Annual Report* (Washington, DC: Department of Defense, January 2020), 19-32, <https://www.dote.osd.mil/Portals/97/pub/reports/FY2019/dod/2019f35jsf.pdf?ver=2020-01-30-115432-173>.

F-15EX: A major change in the FY 2020 budget was that the Air Force proposed buying a new version of the F-15E dual-role aircraft, the F-15EX. Although the procurement cost is only about 10 percent lower than the F-35s currently (in part a result of the F-35s higher production rate), the sustainment cost of an F-15EX is projected to be about 40 percent lower; therefore, the fleet will be more sustainable. Further, the time needed for units to transition from legacy aircraft to the F-15EX is much shorter than the two years needed for the more complicated transition to the F-35A. Thus, the Air Force will have more squadrons available for operations.

The proposal has been controversial, with many airpower advocates criticizing any procurement of fourth-generation aircraft as a step backward. However, Congress has gone along with the plan.²³

Numerically, this is a minor shift since the Air Force proposes to buy only 12 F-15EXs in FY 2021 and 144 in total.²⁴ During the five-year period, the Air Force will buy 3.5 times as many F-35s. Nevertheless, it is a major shift in acquisition strategy and opens the possibility for a larger shift in the future.

A-10s: The Air Force has surrendered to the will of Congress (and to real-world operations) by re-winging the A-10 fleet and extending fleet life into the late-2030s rather than retiring the fleet in the near term.²⁵

F-15s and F-16s: Although the Air Force plans to retire large numbers of older F-15s and F-16s, the slow rate of acquiring new aircraft requires sustaining some of these fleets for many years. F-16s still provide 40 percent of the Air Force fighter fleet. In FY 2021, the Air Force proposes \$616 million for F-16 modifications and upgrades, particularly for advanced radars. For the F-15, it proposes to spend \$349 million for a variety of upgrades, particularly for an improved radar. Spending will continue at these levels throughout the five-year period.

OA-X: This off-the-shelf light-attack aircraft (called “OA-X”) has disappeared as an Air Force program. The concept was that such an aircraft would be better suited for missions in low-threat environments because it would be less expensive to operate, reduce wear on high-end aircraft, and have more focused training. After conducting several tests and experiments, the Air Force terminated notions of an acquisition program. The posture statement says the Air Force will continue involvement to help coalition partners. SOCOM will continue the program under “armed overwatch.”²⁶

Next Generation Air Dominance (NGAD): Coming up over the horizon is NGAD, the next-generation fighter/attack program for both the Navy and Air Force. Funding in the FY 2020 budget reaches \$1 billion. The program received a lot of attention recently when the Air Force reported that a “full-scale flight demonstrator” flew. This indicated that the program might be further along than had been thought. However, the Congressional Research Service pointed out that this was not a “prototype,” which would indicate a mature program ready for production.²⁷

The Air Force’s stated intention is to field new aircraft faster, emphasizing continuous development, a shorter service life, and rapid fielding of new capabilities. If successful, this would break with half a

23. John Tirpak, “F-15EX: Careful What You Don’t Ask for,” *Air Force Magazine*, April 2019, <http://www.airforcemag.com/MagazineArchive/Pages/2019/April%202019/F-15EX-Careful-What-You-Dont-Ask-For.aspx>.

24. DOD, *FY 2021 Budget Justification Book: Aircraft Procurement*, 1-17.

25. Stephen Losey, “A-10 re-winging completed, will keep Warthog in the air until late 2030s,” *Air Force Times*, August 13, 2019, <https://www.airforcetimes.com/news/your-air-force/2019/08/13/a-10-re-winging-completed-will-keep-warthog-in-the-air-until-late-2030s/>.

26. Air Force, *Air Force Posture Statement*, 12; Courtney Albon, “GAO Dismisses Light Attack Aircraft Protest as USAF Opts Not to Proceed with the Program,” *Inside Defense*, February 14, 2020, <https://insidedefense.com/daily-news/gao-dismisses-light-attack-aircraft-protest-usaf-opts-not-proceed-program>.

27. Jeremiah Gertler, “Next Generation Air Dominance Program: An Introduction,” Congressional Research Service, October 5, 2020, <https://www.everycrsreport.com/reports/IF11659.html>.

century of practice. However, because of the secrecy surrounding the program, little is known. The budget justification books show research, development, testing, and evaluation (RDT&E) rising to \$2.7 billion in FY 2025 but no procurement in the five-year plan (at least in the published documents).²⁸

How this program shakes out will profoundly affect the shape of the future Air Force and, indeed, may determine whether manned aircraft are a dying capability or whether they have decades of continuing relevance.

NGAD will raise a key question: what does “legacy” mean when talking about weapon systems? As discussed in the overview chapter of this military forces report, the military services define legacy as old systems in the inventory.²⁹ They would retire older systems and buy similar but more capable systems. Strategists, on the other hand, see legacy platforms as those that use old technologies and outdated operational concepts. They would cut manned aircraft, aircraft carriers, and armored vehicles, substituting smaller unmanned and distributed systems.

Strategists will therefore likely question NGAD, arguing that developing another expensive manned aircraft is looking toward the past and not the future.

Strategists will likely question NGAD, arguing that developing another expensive manned aircraft is looking toward the past and not the future.

Perhaps for this reason, the Navy chief of naval operations has indicated some softness in support when discussing NGAD: “We’re making tough decisions on where the next dollar goes. I can’t be buying stuff just to buy it.”³⁰

The Tanker Force: Still Struggling with the KC-46

The KC-46 will replace the Air Force’s aging tanker force, the current KC-135 and KC-10 tankers having an average age of 58 and 35 years, respectively. The program was thought to be low risk since the airframe is a variant of Boeing’s widely used 767.

However, the program has been troubled from the beginning, with first delivery not occurring until January 2019, three years late, and continues to experience technical problems and production delays.³¹ Boeing, the contractor, continues to execute the fixed price contract that it greatly underbid and on which the company is taking large losses (over \$4 billion so far).³² That underbidding strategy appears to have paid off, however, as the Air Force has announced that it would not recompet the contract after the current buy but would procure more KC-46s.

28. Valerie Insinna, “The U.S. Air Force Has Built and Flown a Mysterious Full-Scale Prototype of Its Future Fighter Jet,” Defense News, September 15, 2020, <https://www.defensenews.com/breaking-news/2020/09/15/the-us-air-force-has-built-and-flown-a-mysterious-full-scale-prototype-of-its-future-fighter-jet/>.

29. Mark Cancian, *Military Forces in FY 2021: The Budget and Strategy Overview – Four Challenges and a Wild Card* (Washington, DC: CSIS, October 2020), <https://www.csis.org/analysis/military-forces-fy-2021-budget-and-strategy-overview-four-challenges-and-wild-card>.

30. Mallory Shelbourne, “CNO Gilday: Navy Must Move Faster on Next Generation Air Dominance Program,” USNI News, October 13, 2020, <https://news.usni.org/2020/10/13/cno-gilday-navy-must-move-faster-on-next-generation-air-dominance-program>.

31. Valerie Insinna, “The Air Force Is KC 46 Tanker Has Another Serious Technical Deficiency, and Boeing Is Stuck Paying for It,” Defense News, March 30, 2020, <https://www.defensenews.com/air/2020/03/31/the-air-forces-kc-46-tanker-has-another-serious-technical-deficiency-and-boeing-is-stuck-paying-for-it/>.

32. Courtney Albon, “Lord: Boeing’s Fixed Price KC – 46 Contract the Root Cause of Programs Deficiencies,” Inside Defense, October 1, 2020, <https://insidedefense.com/daily-news/lord-boeings-fixed-price-kc-46-contract-root-cause-programs-deficiencies>.

The bottom line is that the KC-46 program is still not quite ready, and the current tanker fleet of KC-10s and KC-135s will be around for a lot longer.

Tactical Mobility

This large fleet consists mainly of C-130s, initially fielded in 1956 and now on the “J” model. (“Tactical mobility” also includes a few specialty aircraft, mainly small VIP passenger aircraft.) The C-130 production line is operating smoothly, and the “J” model, after some initial problems, has settled down. The inventory is large: about 310 C-130s for tactical mobility and another hundred or so aircraft in specialty roles.

The most recent mobility requirements study affirmed a fleet requirement of 300, about where the fleet is now.³³ The problem is that the Air Force is not buying enough new aircraft to maintain its large inventory. The FY 2021 budget buys only four aircraft, and those are specialty models for special operations. The Air Force posture statement says, “we are looking closely at the right mix between modernized and legacy tactical airlift platforms.”³⁴ The intention is likely to retire many of the older C-130H models and reduce the size of the fleet, despite the recent requirements study.

The challenge in cutting the fleet is that large numbers of these aircraft reside in the reserve components, and members of Congress are loath to lose flying squadrons in their districts.

Strategic Mobility

This fleet consists of C-17s, upgraded C-5s (which were originally built in the 1970s and 1980s), and KC-10s (also classed as refuelers because they have dual missions). No production lines are currently operating, the last C-17 having been delivered in 2013. However, the fleet is relatively healthy because of the large investments made in the 2000s.

The most recent strategic mobility study, *Mobility Capabilities and Requirements Study 2018*, completed in February 2019, found that the fleets were sized adequately.³⁵ A relatively young fleet that is properly sized would seemingly indicate a lot of stability.

However, the *National Defense Strategy’s* focus on great power conflict raised the possibility of wartime attrition being a consideration for sizing the strategic airlift and sealift fleets, something that previous studies had not considered. Russia and China can threaten sea and air lines of communication in a way that regional threats, such as Iran or North Korea, cannot. Many outside analyses had pointed to this new threat. That would drive inventory requirements higher.³⁶

Congress directed that the Department of Defense (DOD) revise the *Mobility Capabilities and Requirements Study* to consider the new strategic environment. Delivery of the expanded study has been delayed until at least spring 2021. In the meantime, Air Force Air Mobility Command has identified survivability as an issue and is looking at various aircraft self-protection upgrades in response to the new challenge.³⁷

33. “Mobility Capabilities and Requirements Study (MCRS) 2018,” United States Transportation Command, February 2019, <http://www.airforcemag.com/DocumentFile/Documents/2019/MobilityCapabilitiesRequirementsStudy2018.pdf>.

34. Air Force, *Air Force Posture Statement for FY 2021*, 6.

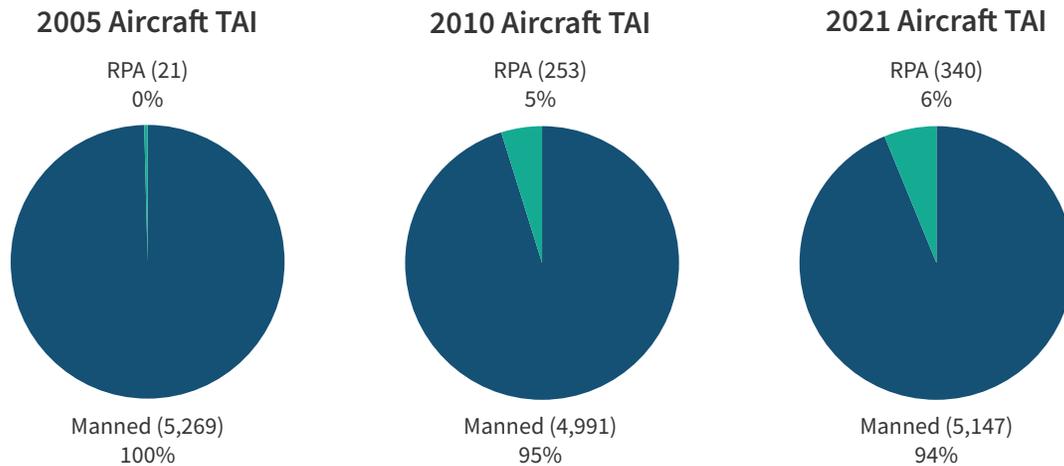
35. “Mobility Capabilities and Requirements Study (MCRS) 2018,” United States Transportation Command.

36. Sydney Freedberg, Jr., “U.S. Needs More Tankers, Transports Since Russia and China Can Shoot Them Down,” *Breaking Defense*, September 21, 2017, <https://breakingdefense.com/2017/09/more-tankers-transport-needed-since-russia-china-can-shoot-them-down-everhart>.

37. Sydney Freedberg, “Tankers, Transports Need Real-Time Threat Data to Survive: AMC,” *Breaking Defense*, September 14, 2020, <https://breakingdefense.com/2020/09/tankers-transport-need-real-time-threat-data-to-survive-amc/>.

Remotely Piloted Aircraft (RPA)

Chart 5: RPA versus Manned Aircraft, 2005, 2010, 2021



Source: Department of Defense, *United States Air Force Budget Overview Fiscal Year 2020*, 38; Air Force Association, “USAF Almanac 2011,” *Air Force Magazine* 94, no. 5 (May 2011): 48, http://www.airforcemag.com/MagazineArchive/Magazine%20Documents/2011/May%202011/0511facts_figs.pdf; Air Force Association, “USAF Almanac 2006,” *Air Force Magazine* 89, no. 6 (May 2006): 63, http://www.airforcemag.com/MagazineArchive/Magazine%20Documents/2011/May%202011/0511facts_figs.pdf; Air Force Almanac, Aircraft Total Active Inventory, 2019, 2010, 2005; 2020 numbers taken from the *Air Force FY2020 Budget Overview*, Appendix, Air Force Total Aircraft inventory.

For the Air Force, this revolution is over. Whereas the Navy’s efforts to integrate unmanned systems into its aviation fleet are still controversial, slow, and limited, as described in this project’s corresponding chapter on the Navy, the Air Force’s incorporation of unmanned aircraft into its force structure—after strong resistance during the 1990s and early-2000s—has become routine.³⁸

However, the Air Force has stalled in its effort to bring more remotely piloted aircraft (RPAs) into the force. The RPA proportion of the force has leveled off at 5 to 7 percent for 10 years, and current procurement plans show no change in the future. The FY 2020 budget procures no RPAs, and there are none in the five-year plan. The Air Force is moving to retire the RQ-4 Global Hawk fleet in favor of the manned E-11. By contrast, the FY 2021 budget procures 106 manned aircraft.³⁹

The Air Force’s incorporation of unmanned aircraft into its force structure . . . has become routine. However, the Air Force has stalled in its effort to bring more RPAs into the force.

38. The Air Force is emphatic that these are aircraft and not “unmanned” but instead “remotely piloted.” Hence, the Air Force uses the term “Remotely Piloted Aircraft.” There are cultural reasons for this distinction, the Air Force being run by pilots. However, there is also a substantive argument in that, although there are no humans in the aircraft itself, there is a large ground-based support structure to launch, fly, and recover the aircraft.

39. Department of the Air Force, *Air Force Justification Book Volume 1 of 2, Aircraft Procurement* (Washington, DC: February 2020), x-xiii, https://www.saffm.hq.af.mil/Portals/84/documents/FY21/PROCUREMENT_/FY21%20Air%20Force%20Aircraft%20Procurement%20Vol%20I_1.pdf?ver=2020-02-10-145310-973.

The Air Force is experimenting with “loyal wingman” RPAs under the umbrella of “Skyborg.” The “Low-Cost Attributable Unmanned Aerial Vehicles” program explores low cost, autonomous, and attributable systems, thus allowing the Air Force to operate within an adversary’s defensive zone. The program has produced the XQ-58A Valkyrie as a demonstrator aircraft. The Air Force is emphatic that these complement, rather than replace, manned aircraft. A study by the Air Force Association’s Mitchell Institute reinforced this point: “[drones] are complementary, force multiplying capabilities, not replacements for fifth-generation stealth aircraft.”⁴⁰

These RPA initiatives might change the inventory balance in the future. However, none of these RPA programs are yet an official “program of record.”

A major issue is whether to buy RPAs for permissive or non-permissive environments.⁴¹ MQ-9 Reapers can only operate in permissive environments. That has been fine for the kinds of conflicts the United States has fought recently. However, in a conflict with a high-end adversary such as Russia or China, these aircraft would be vulnerable because of their slow speed, high visibility, and lack of defensive systems. The issue was illustrated dramatically in July 2019 when the Iranians shot down a Navy RQ-4.

The question, then, is twofold. First, are there concepts of operation that would enable current UAVs to contribute to a high-end warfighting campaign? Second, should the Air Force develop and procure stealthy and likely largely autonomous UAVs to operate inside these challenging air defense environments? One stealthy unmanned aircraft, the RQ-170 Sentinel, an Air Force/CIA collaboration, is known to exist because one was shot down over Iran in 2011 and exhibited to the public. A possible RQ-180, an unmanned long-range reconnaissance system, is also rumored to be flying and possibly operating.⁴²

The Curse of Short Range

A recent concern is that the Air Force tactical aviation fleet is too short ranged for great power conflicts. Combat ranges of current aircraft run from about 550 to 750 miles. NGAD might have a range of up to 1,000 miles, but the program is mostly conceptual at this point.

The problem is that demands on the fleet have changed. During the Cold War, short range was not a problem because the forward fighter bases in NATO were close to the front line. It was not a problem after the Cold War because adversaries did not have strong anti-air capabilities, and as a result, U.S. tactical aircraft could refuel as often as they needed.

However, in potential conflicts with China and Russia, operational range matters. The Pacific is vast. Although Kadena Air Force base on Okinawa is close enough to Taiwan (400 miles), it is 1,400 miles from the South China Sea, where such a conflict would likely take place. Anderson Air Force base on Guam is 1,400 miles from the South China Sea and 1,700 miles from Taiwan.

U.S. bases in Europe, even forward bases in Eastern Europe, are still far from potential battlefields. RAF Lakenheath, for example, is nearly 1,000 miles from the Baltic states, and Spangdahlem AFB in Germany is

40. Mark Gunzinger and Lucas Autenreid, “Understanding the Promise of Skyborg and Low Cost Attributable Unmanned Aerial Vehicles,” Mitchell Institute, October 1, 2020, <https://www.mitchellaerospacepower.org/single-post/understanding-the-promise-of-skyborg-and-low-cost-attributable-unmanned-aerial-vehicles>.

41. Mark Pomerleau, “Can the MQ-9 Reaper operate in contested environments?,” C4ISRnet, October 4, 2016, <http://www.c4isrnet.com/unmanned/uas/2016/10/04/can-the-mq-9-reaper-operate-in-contested-environments>.

42. Guy Norris, “USAF Unit Moves Reveal Clues to RQ-180 Ops Debut,” *Aviation Week and Space Technology*, October 24, 2019, https://www.defense-aerospace.com/articles-view/release/3/206919/-rq_180-stealthy-isr-drone-already-in-service%3A-report.html.

850 miles. Further, airbases are again vulnerable, so U.S. aircraft may need to be based further away from their targets, and adversary air defenses may make aerial tanking risky.

As a result, many analyses recommend actions to increase standoff range and reduce vulnerability, including an emphasis on bombers because of their long range; the curtailment of F-35 procurements because of their short range; the dispersion of basing; and the development of long-range strike, especially unmanned systems. For example, in a congressionally-directed study, the Center for Strategic and Budgetary Assessments (CSBA) recommended, “the Air Force should rebalance its combat forces in favor of long-range, penetrating bombers.” CSBA also recommended developing a new, long-range fighter/attack aircraft (“penetrating counter-air”) to substitute for some F-35 inventory.⁴³ Similarly, in another congressionally-directed study, the MITRE Corporation recommended: “an increase in available long-range aircraft and bases [to] strengthen the conventional deterrence posture of U.S. forces.”⁴⁴

The Navy suffers from the same range limitation but has the advantage of being able to move its airfields (aircraft carriers) around, so this affects the Air Force more intensely.⁴⁵

Nuclear Enterprise

After decades of stability and low visibility, the nuclear force is getting attention again as the cost of modernization programs makes them more visible, and controversial.

The ICBM force has leveled off at the New START limit of 400. The nuclear bomber force (B-2s and B-52s) holds steady at 96 (total active inventory, or TAI). DOD’s *Nuclear Posture Review* (NPR), published in February 2018, laid out the direction of the nuclear enterprise. The NPR affirmed the need for the nuclear triad to deter nuclear and non-nuclear aggression and assure allies and partners.

After decades of stability and low visibility, the nuclear force is getting attention again as the cost of modernization programs makes them more visible, and controversial.

Further, the NPR highlighted “the increasing need for this diversity and flexibility” as “one of the primary reasons why sustaining and replacing the nuclear triad and non-strategic nuclear capabilities, and modernizing NC3, is necessary now.”⁴⁶

However, after nearly three decades of low public visibility and relatively low cost, the nuclear enterprise is getting more attention because the systems acquired during the Reagan buildup of the 1980s are now reaching the end of their service lives and must be replaced. That brings opposition from arms-control

43. Gunzinger et al., *An Air Force for An Era of Great Power Competition* (Washington, DC: CSBA, March 2019), xi, <https://csbaonline.org/research/publications/an-air-force-for-an-era-of-great-power-competition>.

44. MITRE Corporation, *US Air Force Aircraft Inventory Study: Unclassified Report* (McLean, VA: 2019), <http://www.airforcemag.com/DocumentFile/Documents/2019/MITRE-USAF-Aircraft-Inventory-Study.pdf>; This is the unclassified version of a longer classified report on the Air Force aircraft force structure, directed by Congress; see also Rebecca Grant, “Air Force, Don’t Cut a Single Bomber,” *Breaking Defense*, April 30, 2020, <https://breakingdefense.com/author/rebeccagrants/>.

45. See Jerry Hendricks, *Retreat from Range: The Rise and Fall of Carrier Aviation* (Washington, DC: Center for a New American Security, October 2015), <https://www.cnas.org/publications/reports/retreat-from-range-the-rise-and-fall-of-carrier-aviation>.

46. DOD, *Nuclear Posture Review* (Washington, DC: February 2018), <https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>.

advocates. Further, a Democratic administration will certainly revise nuclear weapons policy. It will want to reduce the number of nuclear weapons and the cost of modernization programs. For example, the Biden campaign website endorses arms-control and “the need to reduce the role of nuclear weapons.”

Table 5 shows the most controversial nuclear modernization programs.

Table 5: Nuclear Modernization Programs (\$ millions)

Program	FY 2020 enacted	FY 2021 proposed	Comment
Ground-Based Strategic Deterrent (GBSD)	414.4	570.4	GBSD has been controversial among arms-control advocates and some budget hawks who see it as unnecessary and would reduce the nuclear forces to a “dyad” or even a “monad.”
Long-Range Standoff (LRSO) weapon	664.9	712.5	LRSO, a nuclear-armed cruise missile, has been controversial because bombers already have one nuclear munition, the B61 bomb.
B61 tail kit program	233.8	108.4	Designed to increase the accuracy of the B61 nuclear bomb, the program faces some opposition because of concerns that it makes nuclear warfighting more viable.

Note: The DOE NNSA budget provides funding for an Analysis of Alternatives to develop a low yield SLCM called for in the 2018 NPR.

Source: Office of the Under Secretary of Defense (Comptroller), *Program Acquisition Cost by Weapon System* (Washington, DC: Department of Defense, February 2020), https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021_Weapons.pdf.

These programs—with the B-21 bomber and the Columbia-class submarine—contribute to the nuclear modernization bow wave that the DOD faces in the 2020s and 2030s and which will require the DOD to either trim programs or increase the proportion of the budget allocated to nuclear forces.⁴⁷

One piece of good news: in response to scandals several years back and several outside reviews, the Air Force (and the Navy) implemented a wide variety of actions to improve the standards and quality of their nuclear enterprise, both personnel and operations. The absence of any recent incidents indicates success. Here, no news is good news.

Creation of the Space Force

The Space Force is now a reality as the fifth DOD military service (the sixth U.S. military service, including the Coast Guard). Over the course of the year, the Air Force and DOD published a series of documents developing the organization and structure of the Space Force. About 6,000 personnel have been transferred to this new service, all from the Air Force. A later chapter on the Space Force will describe these actions in more detail.

So far, the split has been amicable. The Air Force has supported the establishment of the new service and facilitated its stand up. There has been none of the acrimony that is seen in most divorces. Nevertheless, major elements of the division of personnel, facilities, and organizations are still unresolved. Particularly

47. Todd Harrison and Evan Montgomery, *The Cost of U.S. Nuclear Forces: From BCA to Bow Wave and Beyond* (Washington, DC: Center for Strategic and Budgetary Assessments, 2015), <http://csbaonline.org/search/?x=0&y=0&q=harrison>.

sensitive will be the requirement that the creation of the Space Force entail no increase in the number of DOD personnel; every Space Force billet created will come out of the Air Force total.

Munitions as an Element of Strategy: Volume for a Long War

All the services are buying more munitions because many analyses show that U.S. forces would expend large amounts of munitions in a great power conflict. Thus, the Air Force budget procures a lot of munitions. This year the Air Force’s strategy seems to have changed, maintaining production of long-range and air-to-air munitions but cutting air-to-ground munitions. This likely reflects the winding down of the air war in the Middle East and a judgment that great power conflict, particularly in the Western Pacific, would be less about ground operations and more about air and maritime operations.

Table 6: Major Munitions Procurement Quantities

	Program	FY 2020 Enacted	FY 2021 President’s Budget
Short-range air-to-ground	JDAM	25,000	10,000
	Small Diameter Bombs (SDB-I and II)	8,253	3,600
	Hellfire Missile	3,859	2,497
Air-to-air and long-range air-to-ground	Joint Air-to-Surface Standoff Missile (JASSM)	390	400
	AIM-9X Sidewinder	355	331
	AIM120D Advanced Medium-Range Air-to-Air Missiles (AMRAAM).	220	414
	Long-range anti-ship missile (LRASM)	0	5

Source: John Pletcher, “Air Force FY 2021 Budget Briefing,” (presentation, Air Force, Washington, DC, slide 13).

Procurement of munitions may not hold up if budgets decline. The downside of munitions acquisition is that they are sterile; once procured, they go on the shelf to be used in case of conflict. If no conflict requires their use, then the services must pay to dispose of the munitions at the end of their useful life. Because munitions are not visible, they may not contribute significantly to deterrence. For this reason, many U.S. allies and partners do not have large munitions stocks despite the wartime requirement.

By contrast, aircraft, ships, and vehicles get used every day; their visibility creates a perception of U.S. capability in potential adversaries and thus adds to deterrence. As a result, there is always pressure to buy platforms rather than munitions.

Mark F. Cancian (Colonel, USMCR, ret.) is a senior adviser with the International Security Program at the Center for Strategic and International Studies in Washington, D.C.

This report is made possible by general support to CSIS. No direct sponsorship contributed to this report.

This report is produced by the Center for Strategic and International Studies (CSIS), a private, tax-exempt institution focusing on international public policy issues. Its research is nonpartisan and nonproprietary. CSIS does not take specific policy positions. Accordingly, all views, positions, and conclusions expressed in this publication should be understood to be solely those of the author(s).

© 2020 by the Center for Strategic and International Studies. All rights reserved.