DEPUTY SECRETARY OF DEFENSE
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WASHINGTON, DC 20301-1010

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SENATE ARMED SERVICES
COMMITTEE
18 APR 23 AM 9:55

The Honorable John McCain
Chairman
Committee on Armed Services
United States Senate
Washington, DC 20510

Dear Mr. Chairman: Sir,

As required by title 10, U.S.C., section 231a, I am forwarding the annual 30-Year Aircraft Investment plan and certification for the procurement of aircraft for the Department of Defense. The enclosed plan outlines the aviation inventory necessary to support the 2018 National Defense Strategy and the fiscal resources required to implement the plan. I certify that the budget for fiscal year 2019 and the future-years defense program for fiscal years 2019-2023 provide a sufficient level of funding to procure the aircraft specified by the plan on the schedule outlined therein.

I am sending identical letters to the other Congressional defense committees.

Enclosure:
As stated

cc:
The Honorable Jack Reed
Ranking Member

Annual Aviation
Inventory and Funding Plan

Fiscal Years (FY) 2019-2048

March 2018

Preparation of this study/report cost the
Department of Defense (DoD) a total of
Approximately $1,152,186 in Fiscal Year 2018.

Table of Contents

Annual Aviation Inventory and Funding Plan

Part I - Executive Summary

Introduction

Section 231a of title 10, United States Code, requires the Secretary of Defense to submit an annual, long-term aviation plan for fixed wing and rotary wing aircraft, to include unmanned systems, for all Services and for combatant commanders that have aircraft assigned to them. This report responds to that requirement.

Summary of the Annual Plan and Certification

This plan was developed based on the Fiscal Year (FY) 2019 President's Budget (PB) submission and is consistent with the 2018 National Defense Strategy, and the priorities laid out in the Secretary of Defense's FY 2019 budget guidance. It represents the Department's continued focus on national security challenges spanning the continuum of conflict with a plan that prioritizes countering regional threats in the Asia Pacific and European theaters, preserves readiness to counter near-term threats while modernizing the force, and balances investment in conventional capabilities with maintaining a credible nuclear deterrent.

The Department's FY 2019 budget request and the associated FY 2019-2023 Future Years Defense Program (FYDP) provide the requisite funding to implement the Aviation Inventory and Funding Plan through FY 2023 for all programs of record.

Annual Aviation Inventory and Funding Plan

Part II - FY 2018 Report

The report presents:

- A detailed aviation plan for the Departments of the Air Force, Navy, Army, and United States Special Operations Command for both fixed wing and rotary wing assets necessary to meet the national military strategy of the United States. The plan includes legacy aircraft, aircraft in procurement or development, and aircraft projected to begin development in the next few years.

- The total funding estimates for each inventory category includes the annual research and development (RDT&E), procurement, operation and maintenance (O&M), military personnel, and military construction (MILCON) funding necessary to achieve the planned aviation inventory and to operate, maintain, sustain, and support this aviation inventory.

Force Structure Requirements

The Department's FY 2019-2048 aviation plan provides the mix of capability and capacity to support the Joint Force in addressing the erosion of U.S. military advantage compared to China and Russia as well as the challenges posed by North Korea, Iran and terrorism.

The FY 2019-2048 aviation plan implements the 2018 National Defense strategy pillar of building a more lethal, agile, and ready force.

Aircraft Investment Plan

Force-Wide Perspective. The Department's aviation inventory, broken out by category, is shown in the table below for each fiscal year through FY 2028. Quantified long-term projections for aviation are considerably less accurate in the later years. Acknowledging this limitation, the report provides quantified estimates through only FY 2028 and then provides broad trends in narrative form for FY 2029-2048 for each of the aircraft categories. Inventory levels are subject to change in response to operational needs, industrial base considerations, and fiscal constraints.

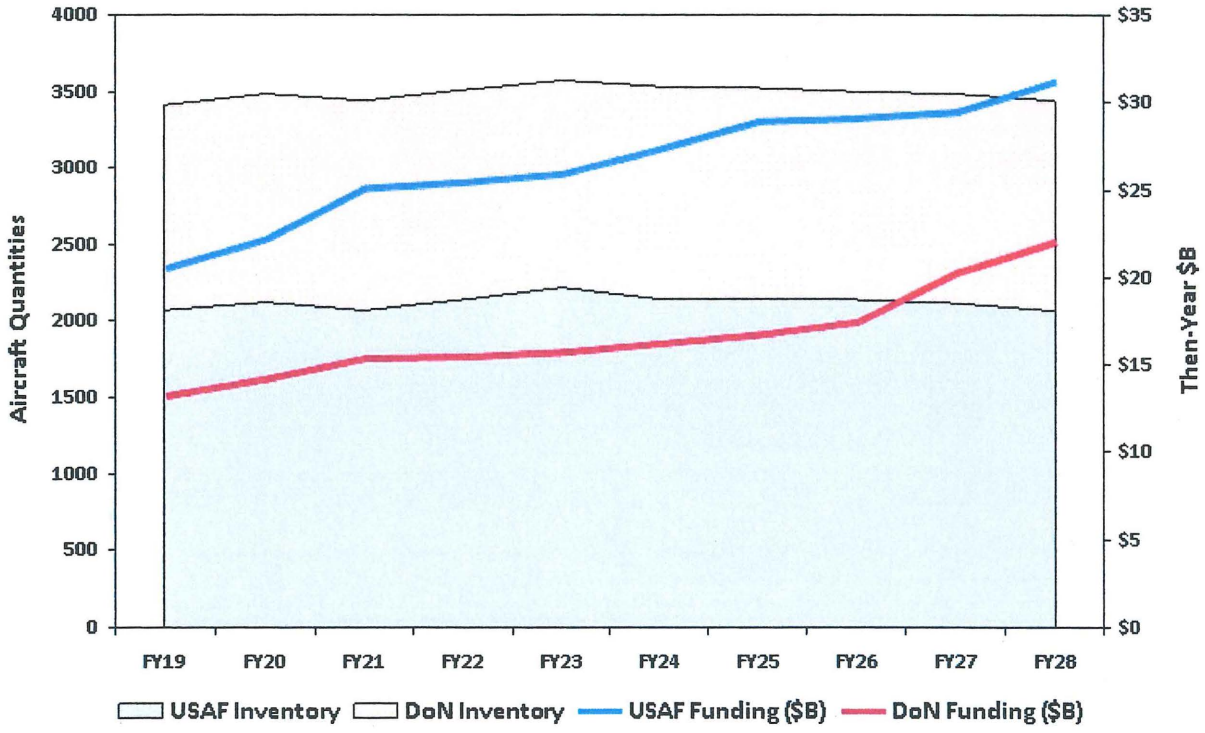
Aviation Inventory
FY2019 - 2028

Inventory	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Fighter/Attack	3413	3484	3439	3510	3571	3532	3523	3499	3484	3440
Attack Helicopter	923	911	918	924	956	949	934	919	887	876
Airlift/Cargo/Utility	4686	4745	4760	4703	4648	4490	4489	4514	4474	4438
Combat Search and Rescue	121	121	119	122	123	136	139	142	148	152
Air Refueling	558	554	550	549	551	558	570	576	584	589
Long Range Strike	157	157	157	157	157	158	157	157	157	157
Anti-Surface/Submarine	700	675	678	685	667	666	639	637	629	628
Trainers	2138	2078	2060	2040	2034	1990	1951	1906	1861	1830
ISR/Scout/C4	902	911	904	934	933	849	846	836	831	826
Special Operations Forces	477	488	497	506	518	502	502	502	502	502
Total	**14061**	**14100**	**14054**	**14095**	**14120**	**13811**	**13731**	**13669**	**13535**	**13413**

Fighter/Attack

The following table shows Fighter/Attack aviation assets consistently tracked by the Military Departments.

	Air Force	DoN
Fighter/Attack	A-10, F-117, F-15CD, F-15E, F-16CD, F-22, F-35 CTOL, F-X, F-Y, Light Attack Aircraft	ADV RPL, AV-8B, EA-18G, EA-6B, EA-NGAD, F-16A, F-16B, F-35B, F-35B RPL, F-35C, F-35C RPL, F-5E, F-5F, F-5N, FA-18A, FA-18B, FA-18C, FA-18D, FA-18E, FA-18F, NGAD



The chart above depicts annual Fighter/Attack inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force and DoN Fighter/Attack aircraft are outlined in the following paragraphs.

Department of the Air Force. Current and projected Air Force tactical aircraft (TACAIR) force structure will be challenged to meet all current Defense Planning Guidance (DPG) scenarios. TACAIR inventories have suffered from years of reduced and delayed procurement, such that the number of TACAIR reaching end of service life are outpacing programmed recapitalization

plans. The Air Force plans to mitigate these TACAIR challenges via multiple modernization plans, as well as through sustained F-35 and NGAD procurement, to recapitalize into advanced capabilities while maintaining the current floor of capacity.

In general, the fighter force structure must include a mix of legacy aircraft to maintain required capacity. The Air Force will continue to invest in sustainment and modernization of the F-22 (enhancing lethality, survivability and connectivity), the F-15C/E (enhancing radar, avionics processing, and select defensive systems), the F-16 (improving the radar, avionics processing capability, and defensive systems), and the A-10 fleet (maintaining sustainable combat-coded A-10 aircraft and ensuring the overall health and continued viability of the platform) until a time when recapitalization of select legacy aircraft is directed.

Specifically, the Air Force plans to procure 250 F-35As from FY 2018 to FY 2022. In the next 10 years, the Air Force will continue to modernize the F-22 to address advances in threat systems and technologies to ensure the F-22 remains fully effective against the most challenging air-to-air and surface-to-air threats. The F-15E is planned to be modernized and extended for maximum lifetime capability and capacity. Within the FYDP and beyond, F-35As will provide the USAF multi-role capability and capacity for contested and highly contested battlespaces. The Air Force procures a structural Service Life Extension Program to extend the life of the F-16 for capacity demands, while continuing to modernize until fifth generation recapitalization. Current plans include A-10 fleet restructure to six combat coded squadrons in FY21, but to retain those remaining squadrons until the recapitalization by F-35As in the early 2030s. Research and development efforts will focus on improvements to fifth generation aircraft and initial RDT&E for an advanced air superiority capability.

To meet the challenge of the new National Defense Strategy, the Air Force begins to invest in increased capabilities to deliver needed Joint Force effects in contested and highly contested environments resulting from globally-proliferating advanced threat capabilities. The Air Force began its Analysis of Alternatives (AoA) for Next Generation Air Dominance after achieving a Materiel Development Decision in January 2017. The AoA is currently evaluating potential solutions and is on track to complete in the summer of 2018. The Office of the Undersecretary of Defense for Acquisition and Sustainment, as well as the Office of Cost Assessment and Performance Evaluation, have directed the Navy and Air Force to conduct separate but related examinations of potential solutions for future air superiority.

Department of the Navy. The Navy requires a mix of 4th and 5th generation strike fighters to provide the complementary capacity and capability from our flight decks to meet threats through the 2030s. The DoN Strike Fighter Inventory Management (SFIM) strategy reflects ongoing challenges with end-of-life management of F/A-18A-D aircraft reaching the end of their service lives before sufficient F-35 aircraft are delivered. DoN's multi-faceted strategy to sustain and recapitalize the Navy and Marine Corps active and reserve strike fighter inventory is reliant on fully funding readiness sustainment accounts and managing strike fighter utilization and

procurement (F/A-18E/Fs and F-35B/Cs). FY 2019 PB increases investment in aviation sustainment efforts focused on increasing the expected service life of F/A-18A-F and accelerates the divestment from legacy F/A-18A-D for the Navy to improve overall readiness.

FY 2019 PB procures 24 F/A-18E/F aircraft in FY 2019 and a total of 110 F/A-18E/Fs over the FYDP. FY 2019 PB maintains FY 2018 F-35B procurement and increases F-35C procurement to 97 aircraft over the FYDP. DoN requires six operational F-35C squadrons by 2024. The FY 2019 PB F-35C procurement ramp achieves this capability and capacity goal. The combined mix of F-18E/F Block III and F-35B/C procurement in the FY 2019 FYDP provides the most affordable, relevant and complementary mix of Tactical Aviation (TACAIR) capabilities.

Procurement of additional F/A-18E/F aircraft in addition to F-35C procurement is due to five primary factors:

(1) Unexpected Consumption Rate: F/A-18 series aircraft were designed and delivered with a 6,000 flight hour service life. Heavy commitments around the world over the past decade consumed these flight hours much sooner than expected across the DoN force. Depot level flight hour extensions, Service Life Extension Program (SLEP) as well as new aircraft procurements have not kept up with the level of aircraft the Navy and the Marine Corps "consume" each year. DoN's current inventory deficit is approximately 34 aircraft and is projected to grow to 64 by 2020 as additional fleet aircraft reach the 6,000 hour service life limit. At current annual utilization rates, 6,000 hour service life limited aircraft will require DoN procurements of thirty-five (35) 8,000-hour aircraft, such as the F-35C, or twenty-nine (29) 9,000-hour aircraft, such as the F/A-18E/F, to recapitalize the force.

(2) F/A-18E/F Service Life Modernization (SLM): The first aircraft in the F/A-18E/F fleet requiring SLM will reach airframe design limits (6,000 hours) in 2018. The Navy needs to extend the life of these aircraft to 9,000 hours to meet SFIM targets through 2035. As F/A-18E/F SLM begins, the Navy needs to plan for 15-20 percent of aircraft inventory (defined as "pipe" for planning considerations) to be in extended depot maintenance at any given time. Extension of F/A-18E/F aircraft life by 50 percent will reduce procurement requirements, but some early recapitalization investment is required to avoid significant SLM "gaps" on the flight line beginning in the early 2020s.

(3) F-35C delays: The Navy requires a block 3F-equipped F-35C aircraft to support Initial Operational Capability (IOC). Because of this unique service requirement, development delays and reduced procurement have delayed F-35C from adding strike/fighter capacity when planned. If F-35C had delivered on schedule, these aircraft would have provided the needed replacement SFIM "flight hours" for F/A-18A-F (approximately 35 replacement aircraft, as discussed above).

(4) Readiness: An expeditious and effective lever for the DoN to increase readiness while reducing sustainment costs is to accelerate divestment from legacy F/A-18A-D. Working together, the Navy and Marine Corps developed a DoN solution to efficiently and effectively

accelerate sundown of Navy legacy F/A-18A-Ds by no later than FY 2019. This is seven years ahead of previous projections.

(5) F/A-18E/F Procurement Capacity Available: Production capacity currently exists in the F/A-18E/F production line to meet strike fighter inventory shortfalls. The FY 2019 PB F/A-18E/F procurement plan complements planned F-35C deliveries as F-35C capabilities mature.

The preceding factors required DoN to plan for additional F/A-18A-F High Flight Hour (HFH) inspections, repairs and modifications to increase capability and extend service life beyond 6,000 flight hours. Lessons learned from legacy F/A-18 HFH inspections informed planning and execution of the FA-18E/F Service Life Assessment Program (SLAP) and appropriate funding of SLM, as highlighted in (2) above.

The F/A-18E/F Super Hornet remains the Navy's predominant strike fighter asset in the Carrier Strike Group (CSG) beyond 2030. The delivery of F/A-18E/Fs planned in FY 2019 thru FY 2023 will bring the Navy total inventory to 619 F/A-18E/Fs required to support a force structure of 32 operational squadrons in nine CVWs. Of the F/A-18E/F inventory, 128 are older Block I aircraft with limited capability. FY 2019 PB funds significant capability improvements that enhance the F/A-18E/F's lethality and survivability, including advanced weapons survivability and network targeting.

The EA-18G Growler will be Department of Defense's (DoD) only tactical Airborne Electronic Attack (AEA) platform by the end of this fiscal year. EA-18G deliveries will be completed by the end of FY-18 for a total of 160 aircraft. This force structure supports nine CVW squadrons with seven aircraft each, five expeditionary squadrons with six aircraft each and one reserve squadron with 5 aircraft. FY 2019 PB funds warfighting improvement investments that will increase Growler capability in complex emitter detection, identification, and adaptive countermeasures as well as passive precision targeting and connectivity. Future integration of the Next Generation Jammer will improve electronic attack capabilities to pace future threats with advanced capabilities.

The Marine Corps currently has one operational EA-6B squadron which will support joint AEA operational requirements through FY 2018. Marine Corps organic AEA capabilities include the Intrepid Tiger II EW pod and the EW capabilities inherent to F-35. The F-35 brings a powerful combination of EW, weapons, sensors, and reduced signature to the MAGTF. F-35 electronic warfare support capabilities include emitter geolocation, identification, and parametric data sharing via Link16. F-35 electronic attack is provided by the Multi-function Array.

With a rapidly evolving threat capability baseline, substantial force modernization is necessary to pace the threat in the 2024-2030 timeframe. Adequate procurement of F-35C Continuous Capability Development and Delivery (C2D2) is a critical component of DoN's ability to meet Defense Planning Guidance (DPG) objectives in the next decade. FY 2019 PB provides a balanced allocation of resources between aircraft procurement, current readiness, and future

capabilities, while ensuring adequate aircraft quantities to avoid transition delays. DoN remains committed to supporting a procurement ramp for F-35C to achieve a 340 aircraft requirement. DoN commitments must balance overall cost and force modernization requirements. DoN's objective is to attain a "2+2" mix of two F-35C squadrons and two F/A-18E/F Block III squadrons per CVW by the mid-2030s. DoN will continue to actively pursue F-35 affordability initiatives via Undersecretary of Defense for Acquisition and Sustainment (USD(A&S))/Program Executive Officer (Joint Strike Fighter) Will Cost/Should Cost strategies to reduce procurement unit costs.

The F-35B is the Marine Corps' expeditionary 5th generation Fighter/Attack (Strike Fighter) platform that will replace existing F/A-18, AV-8B and EA-6B aircraft. With its Short Take-Off/Vertical Landing (STOVL) capability, the F-35B provides basing flexibility (land- or sea-based) and additional aviation employment options for naval/joint force commanders. The F-35B achieved IOC in 2015 and the Marine Corps currently employs two operational squadrons. With a Program of Record (POR) of 353 aircraft, the Marine Corps will retire its legacy Fighter/Attack platforms by 2030 while maintaining its competitive edge through F-35B block upgrades and C2D2. In addition to the F-35B, The Marine Corps will procure four F-35C squadrons (67 aircraft) in support of land-based expeditionary operations/requirements and Tactical Aircraft Integration (TAI), deploying aboard Navy aircraft carriers (CVNs). The current POR accounts for 100 aircraft for inventory overhead (Backup Aircraft Inventory (BAI), Attrition Reserve (AR), Reconstitution Reserve (RR)) using a set of management efficiency planning assumptions and a reduced attrition rate planning factor. This is below the traditional DoN inventory overhead and requires validation as the F-35B program reaches Full Operational Capability (FOC). Addressing rising Operations and Support (O&S) costs for sustaining legacy aircraft through the F-35 transition, the DoN would benefit from adjusting/accelerating the procurement ramp, moving closer to the original equipment manufacturers (OEM) stated production capacity of 24 aircraft per year.

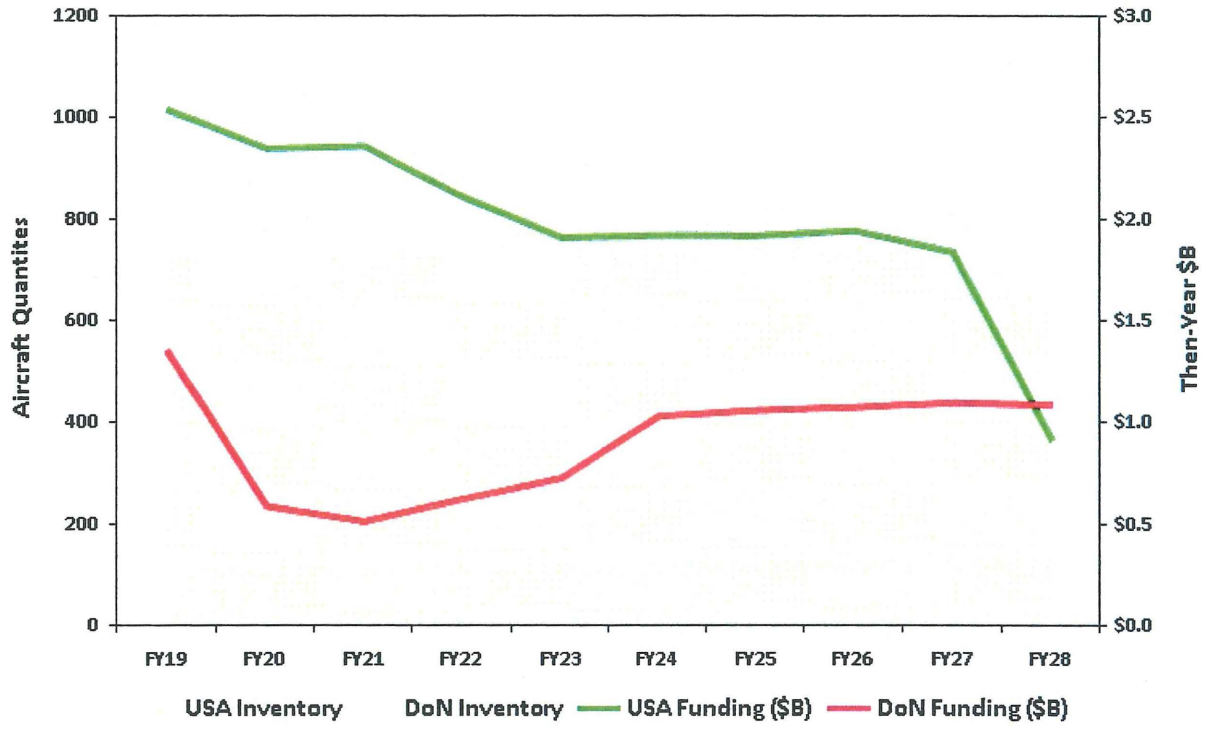
In the long term, the Navy will need to replace its F/A-18E/F and EA-18G fleet starting in the 2030s and is conducting an Analysis of Alternatives (AoA) to inform a decision. Concepts being studied will include mixes of manned and unmanned aircraft with advanced propulsion technologies, varying stealth characteristics, advanced standoff weapons, sensors, and networks. Collectively, this activity is referred to as the Navy's Next Generation Air Dominance (NGAD) initiative which achieved a Materiel Development Decision in January 2016. The Office of the Under Secretary of Defense for Acquisition and Sustainment USD(A&S), as well as the Office of Cost Assessment and Performance Evaluation, directed the Navy and the Air Force to conduct separate but coordinated examinations of material solution options. The Navy plans to complete a full assessment and provide materiel investment recommendations in Mid-2019.

Additionally, a Capability Based Assessment (CBA) was completed to inform the process of identifying a replacement for DoN Adversary aircraft, the F-5F/N Tiger II and the F-16A/B Fighting Falcon. Analyses continue to explore various operating concepts that include Live, Virtual and Constructive material solutions to recapitalize the capabilities inherent in the current platforms. This effort will describe air combat training requirements for Naval Aviators so that they can achieve operational goals, given training requirements of more capable and integrated systems, expected tactical situations and assessed threats.

Attack Helicopter

The following table shows the DoD Attack Helicopter aviation assets consistently tracked by the Military Departments.

Attack Helicopter	Army	DoN
	AH-64D, AH-64E	AH-1W, AH-1Z, FVL CS3



The chart above depicts annual Attack Helicopter inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Army and DoN Attack Helicopter aircraft are outlined in the following paragraphs.

Department of the Army. The Army is fielding the AH-64E which is a modernized variant of the AH-64D, Longbow Apache. The AH-64E will sustain the fleet for 25 or more additional years by providing aircraft with new airframes and updated technologies and performance enhancements that will increase the aircraft's overall capabilities. The Army's objective is to replace all AH-64D aircraft with modernized AH-64E aircraft and field them to units by the end of Fiscal Year (FY) 2029. The Apache will be teamed with the RQ-7B Shadow and MQ-1C Gray Eagle Unmanned Aerial Systems (UAS) via Manned Unmanned Teaming (MUMT). The Army continues to modernize the current Apache fleet incrementally. Ongoing investments into

the next generation of rotary wing capabilities will inform future decisions about the introduction of a future attack aircraft into the inventory.

Department of the Navy. The Marine Corps currently operates H-1 aircraft (UH-1Y, AH-1W, and AH-1Z) to fulfill its rotary-wing utility and attack requirements. The Marine Corps is near completion of the H-1 upgrade program. The UH-1N has been replaced by the UH-1Y. AH-1W aircraft continue to be replaced by the AH-1Z. The transition to AH-1Z is on schedule to complete in FY 2021.

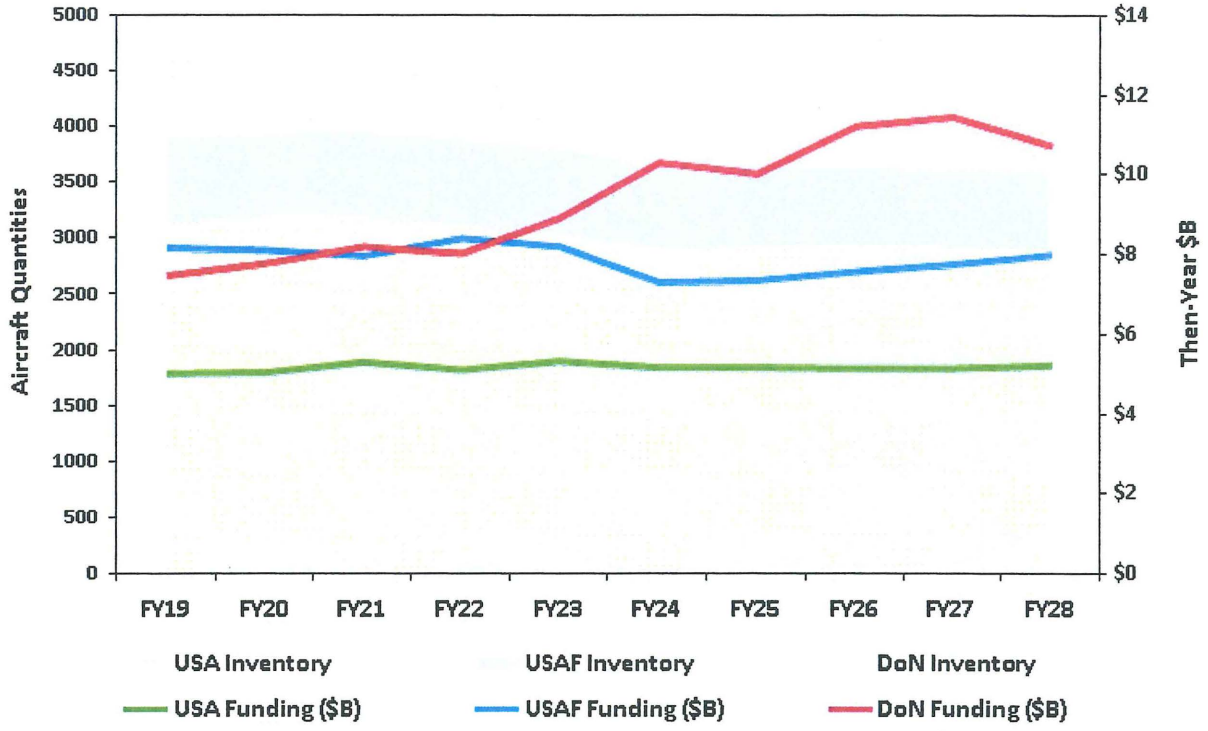
The H-1 upgrade program (UH-1Y/AH-1Z) was initiated to resolve existing safety deficiencies, significantly improve operational capabilities, and reduce life-cycle costs. With 85 percent major component commonality, H-1 program efficiencies enhance deployability and maintainability while reducing training requirements and logistical footprint. The FY 2016 budget funded the last lot of UH-1Y aircraft required to reach the inventory objective. The current budget request results in an overall procurement quantity which is 7 AH-1Zs below the Program of Record (POR) of 189 aircraft. Procuring less than the POR presents inventory management challenges, taking risk in Backup Aircraft Inventory (BAI) and eventually affecting Primary Mission Aircraft Inventory (PMAI) capacity.

In the 2035 timeframe, the Marine Corps is planning on replacing its UH-1Yand AH-1Z fleet as they begin to reach the end of their useful service life. HQMC began to analyze various alternatives in a multi-service effort with the Army, and SOCOM called Future Vertical Lift (FVL) Capabilities Set 3. FVL will replace the current rotorcraft technology with advanced designs, greatly increasing range, speed, advanced communications and electronic warfare capability necessary to meet both current and future operational demands. In addition to expanded interoperability, the joint nature of FVL leverages a similar commonality model used by the current UH-1Y and AH-1Z fleet, delivering logistical advantages without reducing warfighter capability. With aircraft and sub-system design beginning in approximately 2021, the Marine Corps' goal is to enhance the capability currently found in the UH-1Y and AH-1Z aircraft with the advanced speed and range of the MV-22.

Airlift/Cargo/Utility

The following table shows DoD Intertheater Lift/Intratheater Lift/Operational Support/Executive Lift/Utility aviation assets consistently tracked by the Military Departments. This category includes operational support airlift, tilt rotor assets, helicopters, and fixed wing airlift to include intra-theater and inter-theater airlift.

	Air Force	Army	DoN
Airlift/Cargo/Utility	C-12, C-12 Recap, C-130H, C-130J, C-17, C-20, C-21, C-21 Recap, C-32, C-32 Recap, C-37, C-37 Recap, C-40, C-40 Recap, C-5, MC-12, TH-1, TH-1 Recap, UH-1N NDO, UH-1N NDO Recap, UH-1N OSA/EA, UH-1N OSA/EA Recap, UH-60 NDO, UH-60 OSA/EA, VC-25, VC-25 Recap (PAR), WC-130H, WC-130J	C-12 (D,C,U,V,J,R), C-20, C-23 (A,B,C), C-26, C-31, C-37 (A,B), CE-182, CH-47D, CH-47F, EH/HH/UH-60A, FUA, HH/UH-60L, HH/UH-60M, HH/UH-60V, LUH-72, T-6, UC-35 (A,B), UV-18	C-12R RPL, C-37A, UC-12M, C-12R, C-26D, CH-53E, VH-3D, CMV-22B, C-40A RPL, C-37B, UH-60N, NVH-3A, CH-53K, UH-3D, HH-60H, U-6A, VH-60N, UC-35D, MV-22B RPL, UH-60A, UC-12B, HH-1N, UH-1Y, UV-18A, UC-35C, C-2A, OH-58C, UH-60L, C-130T, UC-12W, X-26A, C-38A, VH-92A, MV-22B, C-20G, C-40A, C-9B, UC-12F, C-26A, O-2A



The chart above depicts annual Airlift/Cargo/Utility inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force, Army, and DoN Airlift/Cargo/Utility aircraft are outlined in the following paragraphs.

Department of the Air Force. Through FY 2018, the Air Force will retain a fleet of 302 C-130 aircraft with a target of 300 in FY 2019; at this time there is no plan to purchase additional combat delivery C-130Js beyond the current program. The C-130 fleet is fully capable of meeting time-sensitive, mission-critical direct airlift support and Homeland Defense requirements. Additionally, to ensure compatibility with worldwide Communication, Navigation, Surveillance (CNS)/Air Traffic Management (ATM) standards and to maintain global access, the Air Force intends to modernize the C-130 fleet to ensure continued compliance with international airspace mandates, and to ensure the legacy C-130H fleet remains viable with a planned avionics suite upgrade.

Air Force inter-theater airlift, whether transporting humanitarian-relief supplies or wartime materiel, is unrivaled in its ability to project American forces and power around the world. In combination with commercial aircraft available for airlift missions, the Air Force's inter-theater airlift aircraft—the C-17 Globemaster III and C-5M Galaxy—form the foundation of the Nation's strategic mobility and global sustainment capabilities. The Air Force will retain a fleet of 275 strategic airlifters in accordance with the FY 2013 NDAA, while the Department reviews its future airlift requirements. Fleet sustainment upgrades remain the most cost-effective means of enabling these capabilities through FY 2040. Furthermore, the FY 2019 PB continues the

significant investment in communication & navigation system upgrades for the mobility air force fleets in order to maintain compliance with future airspace mandates and assure access to global airspace for the projection of USAF airpower.

The Air Force continues to fly the legacy UH-1N, supporting five Major Commands and operating agencies including nuclear security support missions for Air Force Global Strike Command and National Capital Region mission support. FY 2019 PB reflects the AF commitment to fund the UH-1N replacement, with the intent to put a non-developmental helicopter on contract in 2018, IAW NDAA language.

Finally, Operational Support Airlift/Executive Airlift (OSA/EA) deliver highly responsive and reliable executive airlift to senior U.S. civil and military officials and foreign dignitaries as well as high-priority cargo with time, place or mission sensitive requirements. Special communications equipment allows these passengers to conduct highly sensitive business enroute, even globally, without compromising their efficiency or effectiveness. Furthermore, consolidation of type aircraft may increase efficiencies in maintenance yielding cost savings across the FY 2019-2023 FYDP. To maintain support of the President into the future, the Air Force plans to begin recapitalizing the VC-25A with a modified 747-8 (VC-25B). Current plans support a schedule that would allow modification to begin in FY 2019 and an initial operational capability in FY 2024. The Air Force plans to begin recapitalizing the C-32A (Boeing 757-200) executive support aircraft in the 2024 timeframe with initial operational capability in 2028. An Analysis of Alternatives (AOA) will inform the C-32 Large Executive Aircraft Recapitalization (LEAR), and E-4B National Airborne Operations Center (NAOC) Recapitalization. Note that E-4B Recapitalization efforts will be conducted under the auspices of the Survivable Airborne Operations Center (SAOC).

Department of the Army. The bulk of Army Aviation assets reside in the Army's utility and cargo aviation fleets. The Army is fielding modernized variants of existing utility and cargo aircraft (UH-60M and CH-47F) that will sustain the fleet by introducing new or remanufactured airframes while increasing the aircraft's overall capabilities. These new and remanufactured aircraft should be viable for 20 or more additional years of service. Additionally, the Army will continue recapitalizing H-60 aircraft into the modernized UH-60V to provide 20 or more years of additional service. Through these modernization efforts, the Army will divest legacy aircraft (CH-47D and UH-60A variants), which have reached the end of their economic useful lives. The Army will deliver a portion of the legacy airframes to industry for remanufacture as a measure to offset new aircraft costs. Additionally, the Army is fielding a limited number of fixed wing support aircraft and is developing plans to replace the C-12 with a fixed wing utility aircraft beginning in FY 2018 as the C-12 is nearing the end of its economic useful life.

The Army's current modernization efforts are focused on sustaining and improving the current generation of aircraft through FY 2022 and beyond. Included in the Army's utility fleet modernization efforts is the development of the Improved Turbine Engine that is being designed to increase power, improve fuel efficiency and streamline maintenance operations. The objective is to begin installing the improved turbine engines in UH-60 aircraft in FY 2026.

In FY 2014, the Army began divesting its oldest UH-60A aircraft that safely exceeded their economic useful life and are not viable candidates for recapitalization into more capable variants. The lifespan of these aircraft has been further accelerated by high operational tempo over the past 15 years in combat and continuation of the ongoing overseas contingency operations. As a result, the Army foresees the following:

• UH/HH-60: The objective UH/HH-60 fleet will consist of 1,375 UH/HH-60M and 760 UH-60V Blackhawk helicopters, with all legacy UH-60A models divested. To meet this objective fleet, the Army will continue procuring new UH/HH-60M aircraft at or above the minimum economic order quantity. Beginning in FY 2018 and continuing through 2034, the Army will extend the life and modernize the analog H-60L aircraft into the digital H-60V aircraft. The V model conversion will address network interoperability, cockpit management/situational awareness, and obsolescence issues with the UH-60L. In FY 2026, the Army plans to begin replacing current engines with the improved turbine engine. The Army plans to maintain the objective fleet beyond FY 2050 via an M-model recapitalization program starting in FY 2032, as the 25 year life approaches. Investments into future rotary wing technologies will help inform the Army's plan for a future replacement rotary wing utility aircraft.

• CH-47: The objective H-47F/G fleet consists of 473 CH-47F and 69 MH-47G Chinook helicopters. Completion of the CH-47F procurement is planned for FY 2018. With no follow on Future Vertical Lift/Joint Multi-Role-Heavy variant in the Army's Aviation Modernization Plan, the Army is executing an original equipment manufacturer (OEM)/depot H-47F/G Block II upgrade/REMAN recapitalization program beginning in FY 2018 to extend the H-47F/G's service life beyond FY 2040.

• Utility/OSA Fixed Wing: Utility Fixed Wing consists of all Army Operational Support Airlift (OSA) aircraft as well as the Army's training fleet, research and development fleet and special mission aircraft. This fleet consists of older C-12 aircraft that require replacement between FY 2025-2027. The OSA fleet will downsize from 170 aircraft to 123 by FY 2018. The special mission aircraft and research and development fleet of aircraft will be validated and replaced on a one-for-one basis starting in FY 2022.

• UH-72A: The Army Acquisition Objective (AAO) for the UH-72A fleet consists of 462 UH-72A helicopters. This is the newest fleet and will be fully fielded by FY 2021. A replacement or upgraded capability may be procured beyond FY 2027 should operational or sustainability requirements dictate airframe sustainment and/or improvement.

Army continues to modernize the current Apache fleet incrementally. Army also has ongoing investments into the next generation of rotary wing capabilities in the form of Future Vertical Lift (FVL). The FVL program is currently in the Science and Technology phase demonstrating innovative vertical lift technologies to inform the replacement of the Army's UH-60 series aircraft and the Marine Corps UH-1Y and AH-1Z aircraft. FVL is focused on the development of agile, adaptable, vertical lift platforms that enable self-deployment and the delivery of tactical capabilities from operational and strategic distances. The FVL program is an Army lead, multi-service program that is expected to deliver its first aircraft to the Army in the late 2020's with the focus on the utility mission set for the Army.

Department of the Navy. The C-130T and C-40A aircraft provide Navy unique intra-theater logistics support. These aircraft respond to immediate demands for movement of essential fleet personnel and cargo to mobile sea-based forces worldwide. The Navy plans to procure 23 KC-130J aircraft to replace the legacy C-130T and KC-130T aircraft. The KC-130J is a multi-role platform capable of serving as an airlift asset while providing additional aerial refueling capability to the fleet. In this report, all KC-130J inventory numbers are included in the aerial refueling category.

The Navy currently operates 15 C-40A aircraft and will complete procurement of two C-40A aircraft in FY19 achieving the DoN POR of 17. The U.S. Marine Corps has divested from the C-9B and plans to procure two C-40A aircraft in FY19, completing the DoN POR of 19 aircraft.

To maintain Rotary aviation support for Special Operations Forces (SOF), the Navy will transition the remaining HH-60H squadron to the MH-60S by the end of 2019.

The Marine Corps is 80 percent complete with the MV-22 transition. With a POR of 360 aircraft, the Marine Corps will employ 18 Active Component (AC) squadrons and 2 Reserve Component (RC) squadrons to meet the DoN's expeditionary assault support requirements. Recently, HQMC Aviation assessed the addition of the last two AC squadrons created risk due to the lack of attrition reserves. Further study is required to determine if additional aircraft are necessary to sustain the Marine Corps' MV-22 fleet in the future.

The C-2A Greyhound fleet, which provides long-range aerial logistical support to CSGs, will reach the end of its service life in 2024 with current sustainment investment. The Navy will replace the C-2A with an extended range variant of the MV-22B Osprey (CMV-22B) to support the Carrier Onboard Delivery (COD) mission.

The CMV-22B Osprey will recapitalize the C-2A Greyhound fleet as the Navy's long-range aerial logistical support and Carrier Onboard Delivery (COD) capability. The C-2 fleet will be retired in the early 2020's and the initial deployment CMV-22B is scheduled for F 2021. The CMV-22B's increased range, payload at maximum range, and reliability provide an

improvement in sea based aerial logistics. The Navy's procurement objective is 44 CMV-22B aircraft to fully replace the required warfighting logistics capability and capacity. FY 2018 PB supported procurement of 31 CMV-22B. FY 2019 PB investments procure 37 CMV-22B in the FYDP, for a total of 43 CMV-22B aircraft. Adding to the criticality of the COD mission to sustaining CVW combat effectiveness is the F-35C's critical dependency on the CMV-22B for CVW deployments. CMV-22B is the primary transport for the F-35C heavy engine components. The Vertical Onboard Delivery (VOD) and Vertical Replenishment (VERTREP) capability of the tilt-rotor CMV-22B's provides an opportunity to evolve the Aerial Logistics Concept of Operations from the CVN centric "hub and spoke" model to a more flexible sea based support concept.

The CH-53E is the DoD's only ship-board compatible heavy-lift helicopter. The Marine Corps has been operating the CH-53E since the early-1980s and plans to replace it with the upgraded and more capable CH-53K. The new CH-53K heavy-lift capabilities exceed all other DoD rotary wing-platforms. Maintainability and reliability enhancements of the CH-53K will significantly decrease operating costs and greatly improve aircraft efficiency and operational effectiveness. The CH-53K is scheduled to achieve IOC in 2019 when it will begin incrementally replacing aging CH-53Es. The current CH-53K POR is 200 aircraft, 20 short of the requirement set in the Capabilities Production Document (CPD). Procuring less than the CPD requirement will present inventory management challenges, similar to those currently experienced in the CH-53E, taking risk in Backup Aircraft Authorization (BAA) and eventually reducing Primary Mission Aircraft Authorization (PMAA) due to lack of capacity in Attrition Reserve (AR)/Reconstitution Reserve (RR).

The sundown of the MH-53E and transition of the legacy MCM mission is dependent upon the Littoral Combat Ship (LCS) MCM Mission package attaining an equivalent capability and capacity. FY 2019 PB funds required sustainment for all 29 Navy MH-53Es through the FYDP.

VH-92A aircraft currently under development will replace the 40-year old VH-3D and the 25-year old VH-60N helicopters. The replacement Presidential Helicopter will provide a hardened, mobile command and control transportation capability necessary to meet current and future presidential transport mission requirements and provide transport of foreign Heads of State and dignitaries. The VH-92A aircraft will begin operating in 2020.

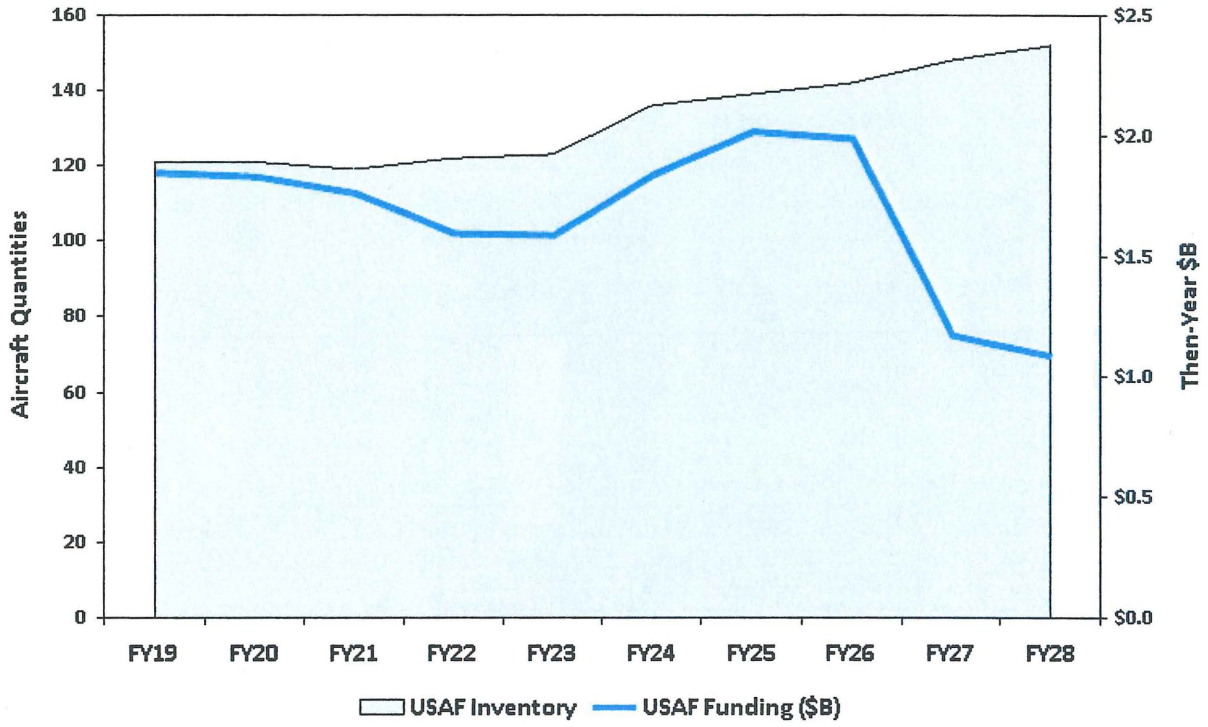
The MV-22B Osprey is the Marine Corps' medium-lift assault support aircraft. The tilt-rotor capability provides a game-changing advantage to warfighters through its unparalleled range, speed and payload. Since the MV-22B's first deployment in 2007, it has been a workhorse for the deployed Marine Air-Ground Task Force (MAGTF) and a high demand Joint Force enabler. The current MV-22 fleet consists of 77 hardware and software configurations that challenge aircraft maintainers and degrade squadron readiness. The Common Configuration, Readiness and Modernization (CC-RAM) initiative is a plan to consolidate and reduce the MV-22 fleet into approximately 25 configurations by converting older Block B aircraft to the current production

configuration. Converting early Block C aircraft to the current production configuration will further reduce the number of distinct configurations down to 5. This will improve reliability, decrease maintenance man-hours per flight hour and reduce operating costs.

Combat Search and Rescue

The following table shows the DoD combat search and rescue aviation assets consistently tracked by the Military Departments.

Combat Search and Rescue	Air Force
	HC-130P/N/J, HH-60, HH-60 Recap (CRH)



The chart above depicts annual Combat Search and Rescue inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force Combat Search and Rescue aircraft are outlined in the following paragraphs.

Department of the Air Force. The Air Force is recapitalizing its Combat Rescue Helicopter (CRH) with 112 new HH-60W helicopters, training systems, and product support elements. Program buy should complete by FY 2026, with deliveries complete by FY 2028. The Air Force also continued its progress towards recapitalizing HC-130P/N aircraft through the C-130 recapitalization program; HC-130 recapitalization is projected to complete by FY 2024.

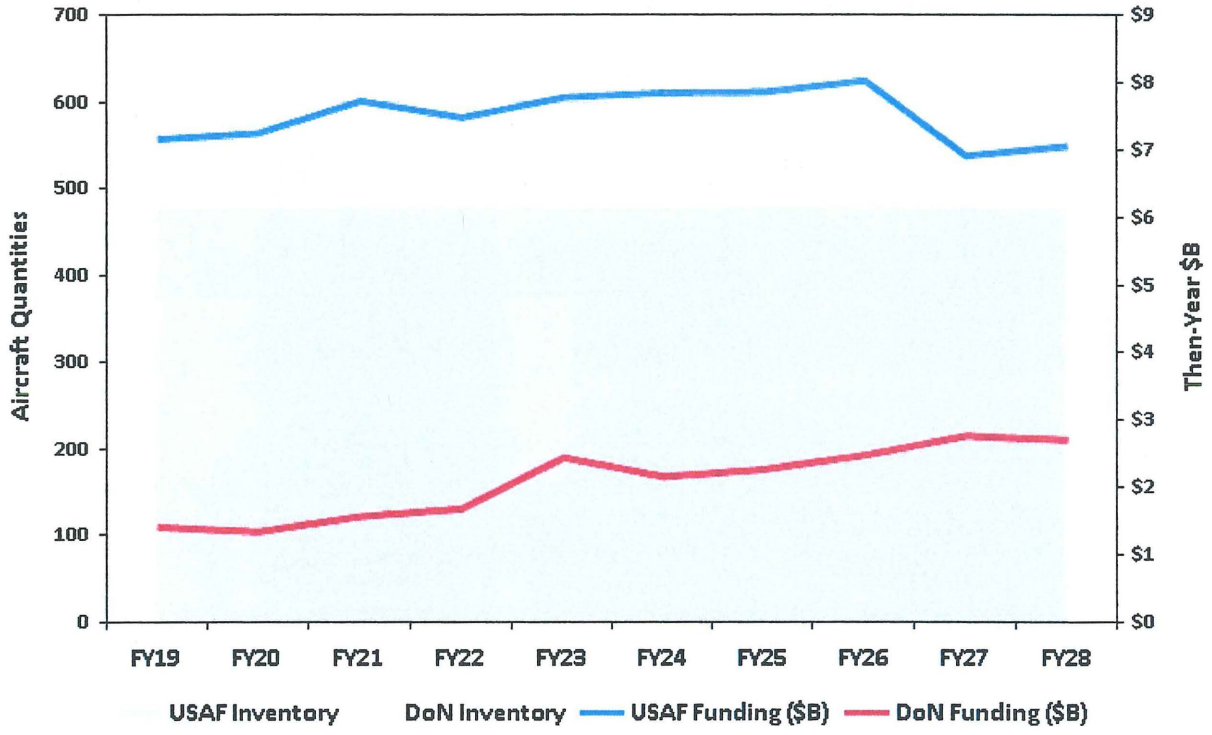
The Air Force continues procurement for the Civil Air Patrol to maintain its fleet of 550 aircraft. The Civil Air Patrol conducts 90 percent of the continental U.S. inland search and rescue missions on behalf of the Air Force to minimize stateside demands. This enables the Air Force

CSAR forces to meet the Department of Defense Directive 5100.01 requirement to conduct global personnel recovery operations.

Air Refueling

The following table shows the DoD Air Refueling aviation assets consistently tracked by the Military Departments.

	Air Force	DoN
Air Refueling	KC-10, KC-135, KC-46A, KC-Y, KC-Z	KC-130J, KC-130J RPL, KC-130R, KC-130T, MQ-25



The chart above depicts annual Air Refueling inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force and DoN Air Refueling aircraft are outlined in the following paragraphs.

Department of the Air Force. The Air Force remains committed to recapitalizing its legacy tanker fleet of aircraft to meet projected air refueling requirements by growing the tanker fleet from 455 aircraft to 479 aircraft. The procurement of 179 KC-46s by 2027 will help the Air Force get to 479, but additional acquisition plans to recapitalize the fleet beyond FY 2027 are necessary. The KC-46 will provide greater capability and operational flexibility than the legacy tanker fleet. In addition to being net ready, the KC-46 provides survivability measures including defensive systems and night vision operational capability, allowing for increased interoperability

in tanker management over the battlespace. Despite these improvements, the Air Force will need more than just 179 KC-46 tankers to replace the capacity of the remaining legacy tanker fleet. With KC-Y acquisition planned to begin in FY 2028, the procurement of more new tankers beyond FY 2027 will be necessary to fully recapitalize the Air Force's aging 1950's era tanker fleet. In the interim, the Air Force will continue to fund system upgrades for the KC-135 fleet that are necessary to keep it viable through its planned life cycle and eventual recapitalization. Finally, the KC-10 fleet begins to retire in FY 2019 and is planned to be completely retired by FY 2024. The 59 KC-10 aircraft will be replaced at their existing bases by the new KC-46A.

Department of the Navy. The Navy and Marine Corps will continue procuring the KC-130J to replace the KC-130T in order to fulfill the DoN POR of 104 aircraft in the active and reserve components. The Marine Corps will continue procuring the KC-130J to replace its aging KC-130T fleet. The KC-130 also continues to be used for forward-based tactical transport while also providing responsive global transport to enable the rapid build of combat power, fuel or resupply. Additionally, enhancement of the Harvest HAWK (Hercules Airborne Weapons Kit) provides flexible and sustained Multi-sensor Imagery Reconnaissance (MIR) capability and air delivered munitions to ground combat elements. The Marine Corps is over 65% through transition, having received 53 of the 79 airframes in the POR. While already complete in the active component (PMAI), delivering the remaining 26 airframes is imperative to resourcing the reserves and ensuring adequate overall inventory (BAI).

The Navy is fully committed to developing and fielding MQ-25 as a "first of a kind" carrier based unmanned system. MQ-25 capabilities are essential to the CVW multi-mission concept of the future. MQ-25 tanking capability will significantly extend the effective range, reach, and lethality of the CVW, address the future CVW tanker gap, and preserve FA-18E/F Fatigue Life Expectancy which will help mitigate the naval strike fighter shortfall. MQ-25 also provides secondary capabilities that fulfill a portion of the current persistent, organic ISR capability gap of the CVW.

SECNAV Instruction 5000.42 provides Accelerated Acquisition (AA) authorizations which enable rapid development, demonstration and fielding of capability to the fleet. The Chief of Naval Operations and the Assistant Secretary of the Navy for Research, Development, and Acquisition designated the MQ-25 as an AA program on 24 March, 2017 and empowered the Program Executive Officer, Unmanned Aviation and Strike Weapons (PEO (U&W)), to identify and address systematic issues associated with the Acquisition Process to accelerate IOC when compared to a traditional program.

Additionally, MQ-25 is the first program designated by the Deputy Secretary of Defense as a Key Performance Parameter (KPP) Reduction Pilot Program per the National Defense Authorization Act (NDAA) FY17 Conference Report, Section 854. This designation reduces rigid, non-essential KPPs to facilitate DoN requirements ownership and oversight to manage

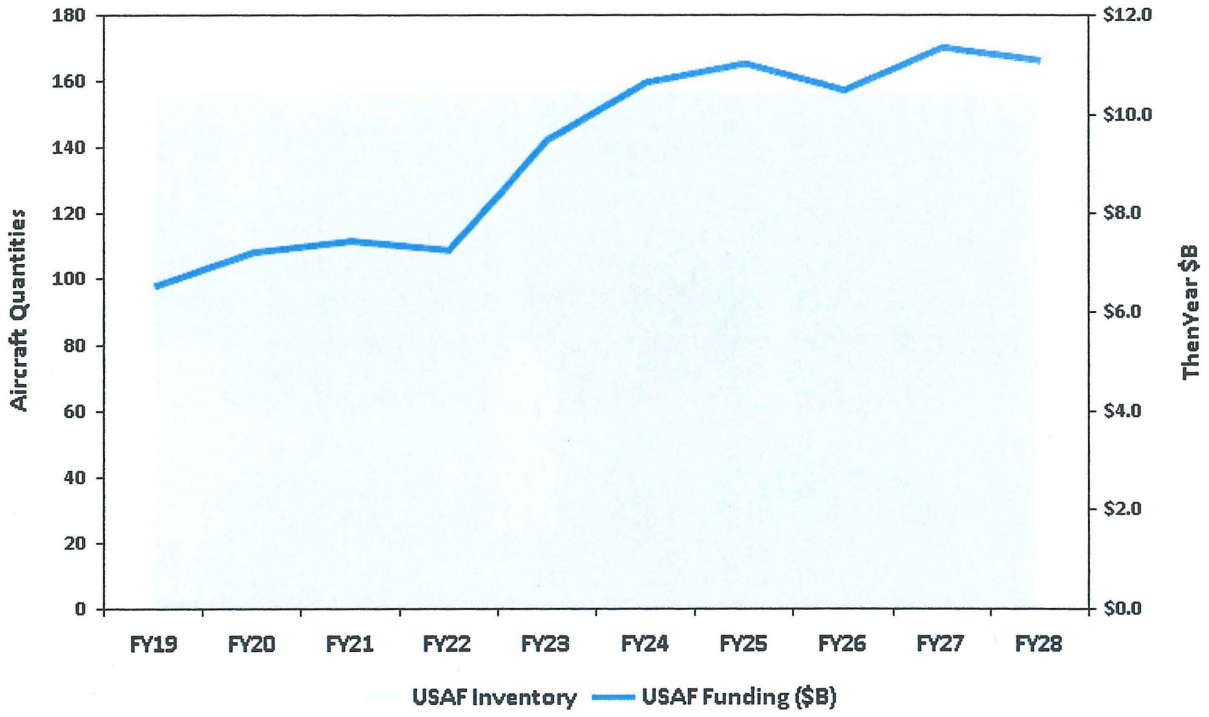
cost, schedule and performance throughout the acquisition process. The DoN is using all authorities to accelerate MQ-25 acquisition to deliver this capability to the Fleet.

Although the FA-18E/F performs a critical organic tanking mission for CVWs, it is categorized as a fighter aircraft and included in those inventory numbers.

Long Range Strike

The following table shows the DoD Long-Range Strike/Bomber aviation assets 2018consistently tracked by the Military Departments.

Long Range Strike	Air Force
	B-1, B-2, B-52, LRS-B



The chart above depicts annual Long Range Strike inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force Long Range Strike aircraft are outlined in the following paragraphs.

Department of the Air Force. Long-range strike aircraft recapitalization will be achieved through the continued funding of the B-21. The strategy to develop and field the B-21 includes minimizing new development, reducing risk through use of mature technologies and existing systems, as well as making informed trades to meet the unit cost target. This cost target has informed the design effort and helps ensure sufficient production and a sustainable inventory over the long-term. Furthermore, the Air Force and DoD have streamlined requirements and acquisition oversight to ensure timely decisions are made in the fielding of this critically

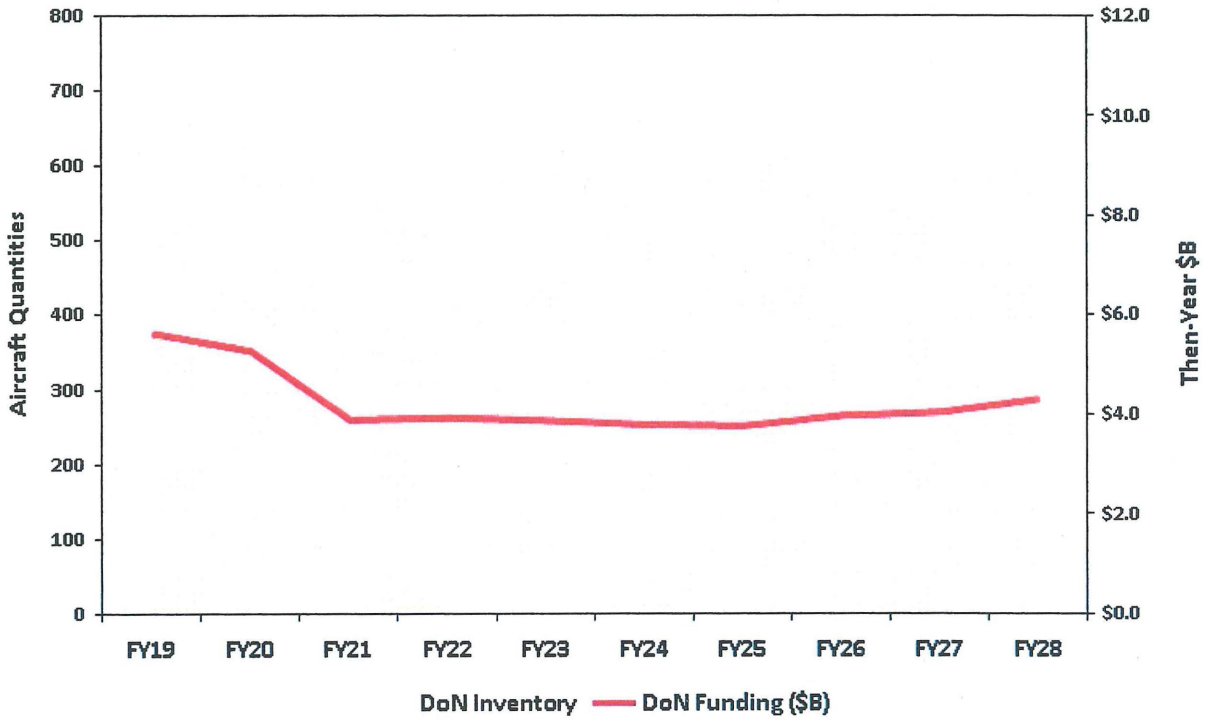
important new weapon system. For security classification reasons, this report includes estimated annual funding for the B-21 in the years beyond the FY 2019 PB FYDP.

The bomber force structure includes a mix of legacy aircraft to maintain required capacity. The Air Force will continue to invest in sustainment and modernization of the B-2 (enhancing its weapons employment flexibility and survivability) the B-52 (replacing its engines, radar, survivable communications systems, improving avionics processing capability, connectivity and weapons compatibility) and the B-1 fleet (maintaining combat-coded B-1 aircraft and ensuring the overall health and continued viability of the platform) until a time when retirement of certain legacy aircraft is directed.

Anti-Surface/Submarine Warfare

The following table shows the DoD Anti-Surface/Submarine Warfare aviation assets consistently tracked by the Military Departments.

Anti-Surface/Submarine Warfare	DoN
	MH-53E, MH-60R, MH-60R RPL, MH-60S, MH-60S RPL, NSH-60F, P-3C, P-8A, P-8A RPL



The chart above depicts annual Anti-Surface/Submarine Warfare inventory and funding projections over FY 2019-2028 broken out by military department. Details on the DoN Anti-Surface/Submarine Warfare aircraft are outlined in the following paragraphs.

Department of the Navy. Maritime Domain Awareness (MDA) is a lynchpin to effective Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASuW). MDA is improved through advancements in communications, automation and sensor capabilities onboard unmanned aircraft such as the MQ-4C Triton and MQ-8C Fire Scout (described in the ISR/Scout/C4 section). The resulting integrated warfighting construct, or teaming of manned and unmanned aircraft, accelerates sensor-to-shooter effects chains, expands the area of influence of the Fleet and optimizes warfighting resources for persistent operations. Current teamed operations form a

critical link in the Navy's high velocity learning culture to accelerate adaptation of new technologies and warfighting techniques. Future teaming concepts expand options for alternative fleet designs and increase operational flexibility to strengthen naval power at and from the sea.

The P-8A Poseidon continues to replace the P-3C maritime patrol aircraft, first introduced in 1962. With its proven propulsion system and avionics, modern sensors and robust communication suite, the P-8A provides broad area ASW, ASuW and ISR capabilities to keep pace with emerging threats. The P-8A features an open architecture sensor and communications suite built to facilitate the insertion of state-of-the-art ASW sensors, net-ready technologies and the latest in ASW and ASUW joint weapons throughout its service life. P-8A tailors integration of its on-board mission suite with unmanned aircraft vehicles and satellite based systems and sensors to assure Maritime Domain Awareness (MDA). P-8A is based on an evolutionary acquisition approach with three increments. Increment 1 is being delivered today and replaces the aging P-3C fleet with a modern platform and similar ASW mission system capability. Increment 2, fielded as a series of three Engineering Change Proposals provides a broad area ASW capability, plus a high altitude ASW weapon capabilities. Increment 3 is expected in FY 2024 and will deliver an enhanced broad area ASW capability that includes network enabled ASuW weapon capabilities, ASW sensor and targeting enhancements and improved communications capabilities.

The 2008 inventory objective remains at 117 aircraft. However, with procurement of the P-8A aircraft drawing to a close, the Navy is examining the warfighting requirements to ensure sufficient aircraft are available and warfighting risks are minimized. Given recent Defense Planning Guidance and a significantly changed geopolitical landscape since 2008, current analysis indicates additional aircraft may be required.

The MH-60R and MH-60S multi-mission combat helicopters perform offensive and defensive sea control missions in support of CSGs and disaggregated warships. The two variants share 85 percent commonality which facilitates efficient maintenance and logistics support. The MH-60S conducts ASuW, Combat Search and Rescue, SOF support, airborne mine countermeasures and combat logistics. The addition of fixed forward firing weapons systems have enhanced MH-60S lethality and increased effectiveness in defense of high value units. The MH-60R is the only organic air ASW asset within the CSG, and its sensor suite and defensive ASW capabilities make it a key asset to the Strike Group Commander and to disaggregated commanders in Distributed Maritime Operations (DMO) constructs.

There is currently excess capacity of MH-60R due to the reduction in LCS procurement and corresponding delay in deliveries. The MH-60R capacity within the FY 2019 PB SBP is insufficient to meet the requirement by the mid-2030s. To alleviate that shortfall, procuring additional MH-60Rs now might seem expedient. However, it would result in a costly aircraft surplus over the next 12-15 years, and those airframes would not remain viable through the peak-demand period (2048-2052). It is far more prudent to make modest investments now in the next

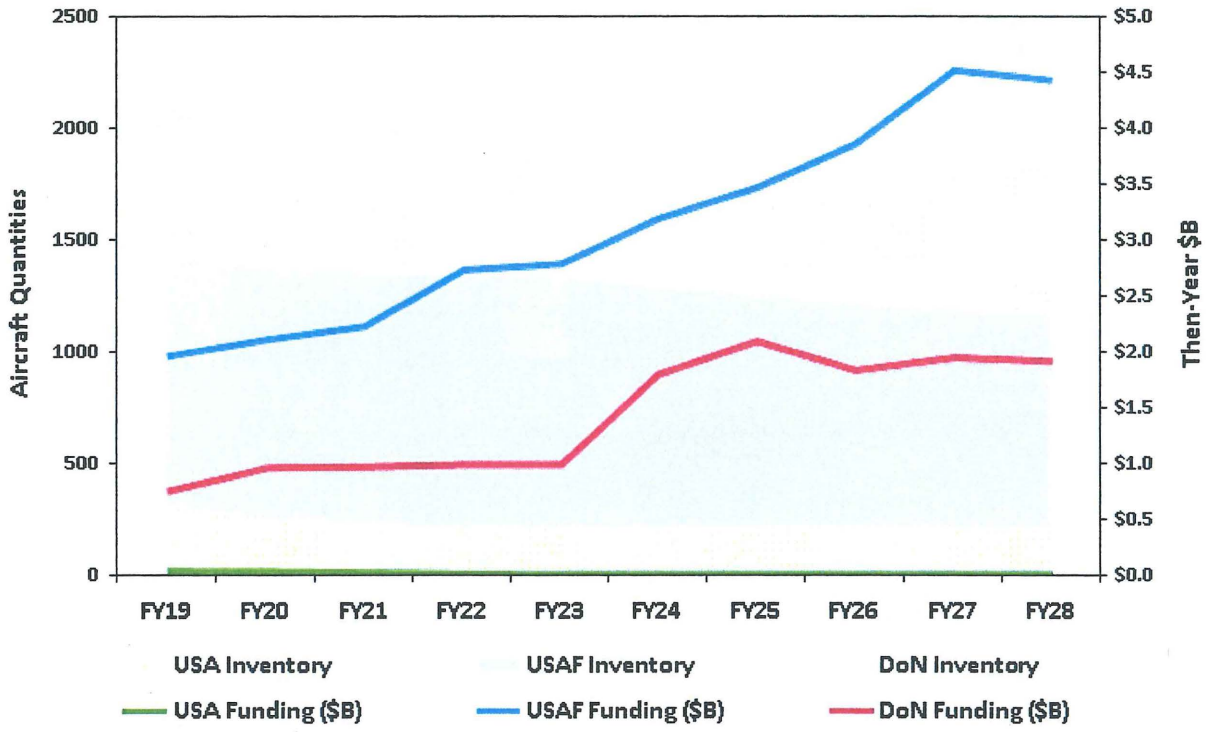
generation of vertical lift and to target production for the early 2030s. This approach delivers the right capability at the right time, and it—combined with a modest SLEP of existing MH-60R airframes—would be more than sufficient to meet the operational demands of a 355-ship Navy into the 2050s.

Capability requirements for rotary-wing follow-on aircraft are continuously evaluated along with that of the Navy's Future Surface Combatant. The next generation air vehicle—previously referred to as MH-XX—is now referred to as "Future Vertical Lift (Maritime Strike)," and this maritime-specific capability set will leverage Army, Navy, and Marine Corps synergies as the services work together to recapitalize their inventories. Future Vertical Lift (Maritime Strike) will pursue a "Family of Systems" (FOS) approach, including both manned and unmanned systems that captures the equities of the various Navy stakeholders.

Trainers

The following table shows the DoD trainer aviation assets consistently tracked by the Military Departments.

	Air Force	Army	DoN
Trainers	T-1, T-1 Recap, T-38, T-38 Aggressor F/O, T-6, T-6 Recap, T-X, TH-60	LUH-72, OH-58 A/C, TH-67	T-34C, T-38C, T-39D, T-44C, T-44C RPL, T-45A, T-45C, T-45C RPL, T-6A, T-6AB RPL, T-6B, TAV-8B, TC-12B, TE-2C, TH-57B, TH-57C, TH-57C RPL, TH-67A, UH-72A



The chart above depicts annual Trainers inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force, Army, and DoN Trainers aircraft are outlined in the following paragraphs.

Department of the Air Force. Currently, the T-6A forms the backbone of the Air Force primary flight training program and will remain so through the FY 2040 timeframe. Additionally, the T-1A fleet provides advanced flight training for multi-engine/multi-crew tankers and mobility aircraft. The TH-1H fleet trains all Air Force rotary wing pilots. The T-38C is a proven, but

aging, advanced combat trainer aircraft originally developed as a trainer for second generation fighters. The T-38C faces increasing sustainment costs and is limited in its ability to fulfill training requirements for current fourth generation fighters and for fifth generation fighters such as the F-22 and F-35. To bridge these capability gaps the Air Force has defined requirements for a replacement program, the T-X, and contract award is scheduled to occur by summer 2018. Initial operational capability for the T-X is planned for FY 2024, with a total procurement of 350 aircraft through the mid-2030s.

Department of the Army. As a major effort of the Aviation Restructure Initiative, the Army is replacing its current training helicopter fleet (TH-67 and OH-58A/C) with the Light Utility Helicopter, UH-72A. Consequently, newly assessed aviators will begin training on dual engine aircraft. This will facilitate a more effective transition to training in an advanced aircraft upon a student's graduation from initial rotary wing training.

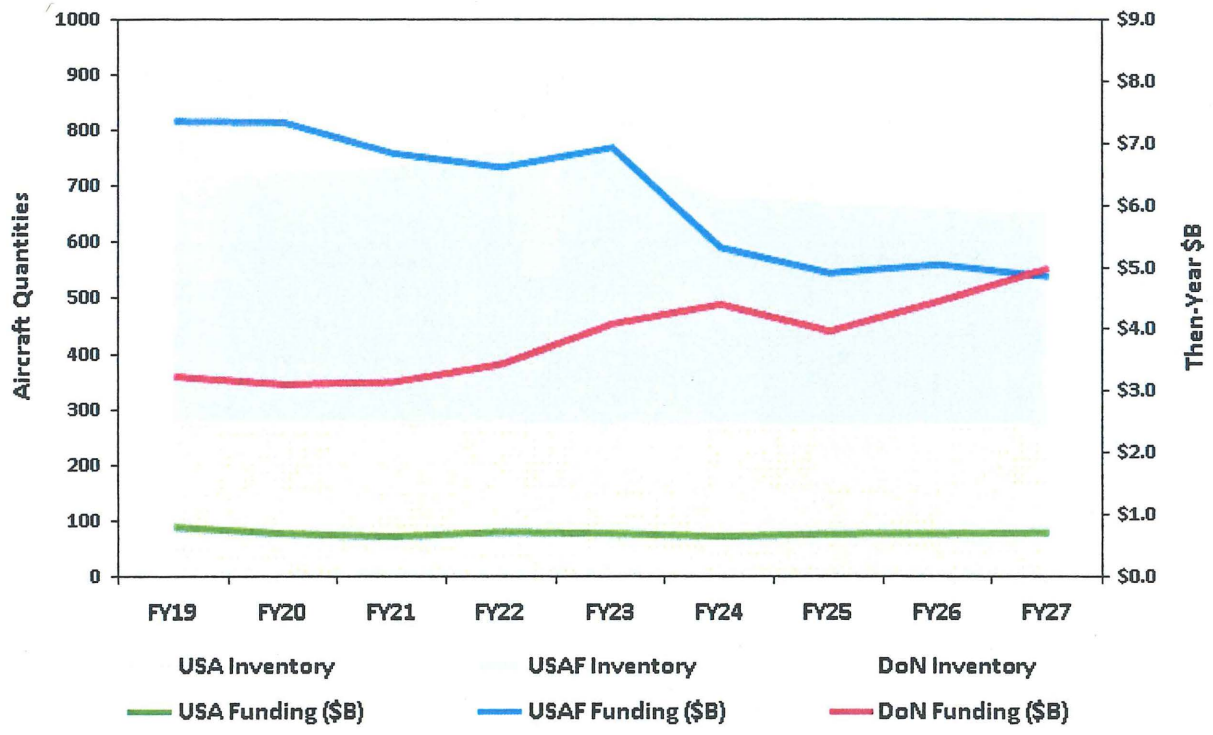
Department of the Navy. The Navy has completed the transition to the T-6B Texan II Joint Primary Trainer. The T-45C Goshawk is the advanced strike trainer for carrier based pilots and naval flight officers. The T-45C will require a SLEP program to extend the airframe and aircraft systems until 2035, and a replacement will need to be identified in the 2020s to meet the projected retirement in 2035. The TH-57B/C continues to be used as the sole aircraft for both the advanced rotary and intermediate tilt-rotor pipelines and is reaching the end of its service life. A replacement system for the TH-57B/C is under development. Called the Advanced Helicopter Training System (AHTS), it will consist of a family of systems including a commercial off the shelf (COTS) helicopter and modern ground based training system (GBTS). Both the aircraft and GBTS will leverage commercial best practices to deliver a system that provides better system availability at reduced cost. Procurement funding for AHTS will begin in 2020, anticipating full divestment of the TH-57 no later than 2023. The Navy retired the TC-12B Huron multi-engine trainer in 2017 and now utilizes the T-44C Pegasus as its sole multi-engine trainer for intermediate E-2/C-2, advanced maritime, and tilt-rotor pilot training. Planning has begun for a COTS replacement for the T-44C that could begin procurement in the mid-2020s, mirroring the AHTS acquisition strategy.

A Capability Based Assessment (CBA of Naval Aviation Undergraduate Training – CNAUT) for aviation undergraduate flight training completed in 2015 informed recapitalization strategies for all platforms to include live, virtual and constructive training alternatives. CNAUT conducted a gap analysis and mapped skills required for undergraduate training development required for fleet aviators in the 2020s. Additional analysis identified gaps in the use of data links, increased flight station automation, and fundamentals for skills that have rapid decay. Long term recapitalization of trainers will further examine the skills required for human-machine teamed flight, increased automation, and fundamentals required for a 2040's Naval Aviator.

ISR/Scout/C4

The following table shows DoD ISR / Scout / C4 aviation assets consistently tracked by the Military Departments.

	Air Force	Army	DoN
ISR/Scout/C4	E-3, E-3 Recap (ABMS), E-4, E-4 Recap, E-8, E-8 Recap, EC-130 CCall, EC-X, MQ-1, MQ-9, MQ-X, OC-135B, RC-135, RC-135 Recap, RC-26, RQ-170, RQ-4, U-2, WC-135	B-315 (EMARSS), MQ-1C, ODIN (MARSS), OH-58D, RC-12, RC-7 (EO5C, TO5C, E05), RO-6A (ARL-E)	E-2C, E-2D, E-2D RPL, E-6B, E-6B RPL, EP-3E, MQ-4C, MQ-4C RPL, MQ-8B, MQ-8C, MQ-XX MUX, RC-12M, RQ-4A



The chart above depicts annual ISR/Scout/C4 inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force, Army, and DoN ISR/Scout/C4 aircraft are outlined in the following paragraphs.

Department of the Air Force. The Air Force continues to balance capability and capacity to support joint demand for intelligence, surveillance, and reconnaissance (ISR). The RQ-4 Global

Hawk Block 30 and U-2 provide high altitude ISR to the warfighter during peacetime, contingencies, and war. The Air Force retains the U-2 through the 2019 FYDP. The Air Force continues to develop and manage its remotely piloted aircraft (RPA) crews and fleet to balance capability and capacity to support Combatant Command (CCMD) demands now and into the future. The Air Force will complete divestment of the MQ-1 in 2018 as part of a transition to an all MQ-9 medium altitude RPA fleet. The 2019 PB maintains sufficient inventory to support 60 sorties/combat lines per day of MQ-1/9 capacity. The Air Force began early Joint Capabilities Integration and Development work to develop an Analysis of Alternatives for the next generation ISR-Strike, to begin the effort of adapting the current ISR inventory to the competitive environment outlined in the new National Defense Strategy.

The Air Force is revolutionizing support to the Battle Management Command and Control (BMC2) and Ground Moving Target Indicator (GMTI) mission areas due to evolving threats, emerging technologies and new guidance for the future force. The aging E-8C Joint Surveillance Target Attack Radar System (JSTARS) aircraft supports both of these missions. The Air Force intended to replace the JSTARS fleet with a recapitalized aircraft that would only provide a marginal increase in capability. So, to ensure support to the BMC2 mission in highly contested environments, the Air Force developed an incremental approach to achieve an Advanced Battle Management System (ABMS) for use in future highly contested environments. This solution leverages existing and emerging sensor technologies, while investing in new systems that will create agile, resilient communication architecture to integrate and fuse information from all domains and multiple sensors in the long term. In the near term, the Air Force retained BMC2 capacity by buying back the seven E-3B/C Airborne Warning and Control System (AWACS) aircraft planned for retirement. These aircraft will also be converted to the E-3G configuration with advanced mission computing and avionics. In the mid-term, the E-3 will integrate feeds from sensors, including GMTI feeds, at multiple security levels. Across the Future Years Defense Plan (FYDP), the Air Force will also modernize the E-8C computing capacity, friendly force tracking system and install a 360 degree camera onboard JSTARS for sensitive global missions while awaiting the result of follow-on service life component reviews. As the E-8C JSTARS fleet transitions in the future, the incremental plan incorporates advances in sensors across domains to mitigate capacity loss to the GMTI mission. Revolutionizing support to the BMC2 and GMTI missions today will provide the joint force the ability to better maintain awareness and make faster, smarter decisions to give us the winning edge against the enemy.

FY 2019 PB is funding the modernization of mission communications on the E-4 National Airborne Operations Center, as well as initiating AoA actions for the eventual replacement of the E-4. This year's aviation plan reflects Compass Call fleet's recapitalization (i.e. cross-deck) investment from the EC-130H airframe to the EC-37B airframe in the near and mid-term. FY 2019 PB is funding the recapitalization of the OC-135B, ensuring US ability to exercise Open Skies Treaty rights, as well as providing funds to recapitalize the WC-135.

Department of the Army. As part of the Army Aviation Restructure Initiative, the Army began divesting the aged fleet of OH-58D Scout helicopters in FY 2014 The following tables list DoD ISR / Scout / C4 aviation assets and the 2017 current inventory by category for all active manned and unmanned aircraft consistently tracked by the Military Departments.

Adopting the AH-64E and RQ-7 team as the Army's aerial scout capability leverages existing systems and provides a solution to the Army's requirement for an aerial scout platform since the OH-58D Kiowa Warriors were retired from active service. The Army has a UAS fleet that is comprised of small (Raven and Puma), medium (Shadow), and large (Gray Eagle) aircraft. All UAS are existing programs of record and are under active acquisition programs to meet fleet size objectives over the next five years. The Gray Eagle UAS is being fielded to divisions and the National Training Center to provide direct support capabilities to deployed divisions and the National Training Center. The Army will assign two Gray Eagle UAS companies to Intelligence and Security Command (INSCOM) and field two Gray Eagle companies to support Army Special Operations Command (USASOC). Gray Eagle fielding will be complete by the end of FY 2021. Long-term, the following changes are planned for the Army's reconnaissance aviation fleet:

• Military Intelligence (MI) Fixed Wing. The current MI Fixed Wing fleet consist of the following medium altitude Aerial Intelligence, Surveillance, and Reconnaissance (A-ISR) platforms: RC-12X Guardrail Common Sensor (GRCS), DHC-8 (RO-6A) Airborne Reconnaissance Low - Enhanced (ARL-E), and Enhanced Medium Altitude Reconnaissance Surveillance System (EMARSS) programs of record (POR) and various Quick Reaction Capabilities (QRCs). These medium altitude A-ISR POR and QRC aircraft are globally allocable by the Joint Staff and currently operate in all Geographic Combatant Command AORs, including support to Operation Freedom Sentinel and Operation Inherent Resolve. The Army's A-ISR 2020 strategy is to modernize a modest number of POR platforms, incorporating the most valued, OCO-procured QRCs, transitioning them into the ARL- E and EMARSS programs of record. Once fully executed, the Army's A-ISR Fixed Wing fleet will consist of 52 aircraft (14 RC-12X GRCS, 8 ARL-E (plus one A-Kitted trainer), 24 EMARSS, and 5x C-12 training aircraft). The Army's long-term strategy includes: fewer airframes with modernized and relevant capabilities, leveraging OCO investments to retain best of breed sensors, platform commonality where possible, DCGS-A integration, and Processing, Exploitation, and Dissemination (PED) in reach, conducted by INSCOM at the PED Center in Ft. Gordon, GA.

• MQ-1C (Gray Eagle): Gray Eagle is a dedicated, assured, multi-mission UAS fielded to all 10 Army divisions to support the commander's combat operations. The USASOC Gray Eagle units and Aerial Exploitation Battalion (AEB) Gray Eagle units are self-contained Intelligence, Surveillance and Reconnaissance (ISR) capabilities that are globally deployable forces and contribute to the Department of Defense global ISR mission. USASOC and AEB units field the Improved Gray Eagle which provides increased range, payload, and station time. AEB Gray Eagle units are teamed with organic Processing, Exploitation and Dissemination. An objective

fleet requirement change from 167 aircraft to 204 aircraft was approved on 4 May 2017. The Army intends to procure all required aircraft and associated ground support equipment.

Department of the Navy. The Chief of Naval Operations and the Commandant of the Marine Corps have established guiding principles for ISR that focus on payloads, every platform being a networked sensor, and development of unmanned platforms including electronic warfare capabilities. The Navy is developing a "System of Systems" construct to recapitalize airborne Intelligence, Surveillance, Reconnaissance and Targeting (ISR&T) capabilities currently resident in the EP-3 and Special Projects Aircraft (SPA) by the end of the decade. The focus is on developing common, scalable sensor payloads that can be delivered by a wide range of manned and unmanned programs including MQ-4C Multi-INT, MQ-8, MQ-25, E-2C/D, H-60 and P-8A. Level of effort and capacity required for each program will be determined by adversary threat posture and warfighter requirements. These programs of record will be able to leverage common sensor developments to avoid expensive "one off' solutions, thereby reducing DoN's integration and interoperability costs. In order to facilitate a smooth transition, squadron operators and acquisition team members in the EP-3 and SPA communities with Multi-INT expertise will be leveraged to continue sensor development and operational employment of these capabilities.

The Navy achieved Milestone C and began low rate initial production of the MQ-4C Triton to provide persistent maritime ISR to the fleet and Combatant Commanders (COCOMs) to enhance situational awareness and shorten the sensor-to-shooter kill chain, providing intelligence preparation of the environment and a persistent source of information to maintain the common operational and tactical picture of the maritime battle space. The MQ-4C Triton remains integral to the Navy's maritime ISR&T transition plan. It will receive upgraded electronics intelligence capabilities and add signals intelligence capabilities for fielding in 2020.

The MQ-8 Fire Scout program went through a Nunn-McCurdy Breach due to the expanded capabilities and reduced quantities required by the MQ-8C endurance upgrade air vehicle. The program was certified as essential to national security and radar and weapons capabilities were included in the POR. The MQ-8C will support ISR and Over the Horizon targeting requirements for Littoral Combat Ship (LCS) as well as any suitably equipped air-capable ship. MQ-8C maritime radar integration began in FY 2017 following the FY 2016 selection of the Leonardo Osprey 30 AESA radar. Additionally, MQ-8C is planned for a 4th quarter FY 2018 IOC. MQ-8B is currently deployed aboard USS Coronado in the PACOM AOR. Fire Scout data integration into the LCS's Computing Environment continue and is expected to be complete with the fleet introduction of Increment Three in FY 2018. There are no planned MQ-8C procurements in FY 2018 PB.

The Marine Corps has begun its transition out of the expeditionary RQ-7B Shadow UAS just as it brings the shipboard-capable RQ-21A Blackjack online. The RQ-21A continues to meet the Marine Corps' Group 3 requirement while offering a long-endurance, expeditionary, multi-mission platform that successfully completed several operational deployments aboard Marine

Expeditionary Units (MEU). In addition to having a ship-board Group 3 ISR capability, the Marine Corps is working towards meeting a Group 5 requirement capable of responding to rapidly changing threats with modular, scalable sensors and payloads, in a sea-base capable platform. This platform, the MAGTF Expeditionary UAS (MUX), will be network-enabled, digitally interoperable, and built to execute responsive, persistent, lethal and adaptive full-spectrum operations. The JROC-approved MUX ICD will inform a system that provides the MAGTF with an advanced multi-mission platform. The Marine Corps is exploring means to accelerate the program in order to begin fielding MUX as early as 2025.

The E-2D Advanced Hawkeye achieved IOC in October 2014 and will replace the E-2C with the last squadron transition by 2027. Incorporating electronic scanning advanced space time adaptive processing, the E-2D APY-9 radar is a two-generation leap in detection and tracking capability over the E-2C. Improved detection and tracking allows E-2D to operate forward in any environment, including littorals, and provide enhanced situational awareness, expanded reach and improved effectiveness across the kill chain. The E-2D is a critical enabler of the CSG air warfare and surface warfare missions, including power projection, theater air and missile defense (TAMD) and cruise missile defense (CMD) in an anti-access/area denial (A2AD) environment. It is a core pillar of Naval Integrated Fire Control – Counter Air (NIFC-CA), including the AEGIS to SM-6 From-the-Sea and F/A-18 to AIM-120 From-the-Air kill chains. Increased capacity of E-2D capabilities significantly increases effectiveness of the entire CSG. Planned critical capability upgrades include:

- Air-to-air refueling funded within FY 2018 PB and reaching IOC in 2020.

- Counter Electronic Attack capability improves E-2D target detection and tracking in dense Electronic Attack (EA) environments and enables detection of certain types of jamming in 2022.

- Integration of Tactical Targeting Networking Technology (TTNT), a high-speed, high-capacity, low-latency, Internet Protocol (IP) capable waveform network. The TTNT waveform provides U.S. Forces the capability to share crucial information to support the goal of locating, identifying, targeting and attacking targets anywhere at any time, beginning in 2022.

- Data Fusion is planned in 2022.

- Sensor Netting is planned in 2022.

Follow on efforts from the 2016 Force Structure Assessment continue to review the optimal force structure to include options for six aircraft per squadron.

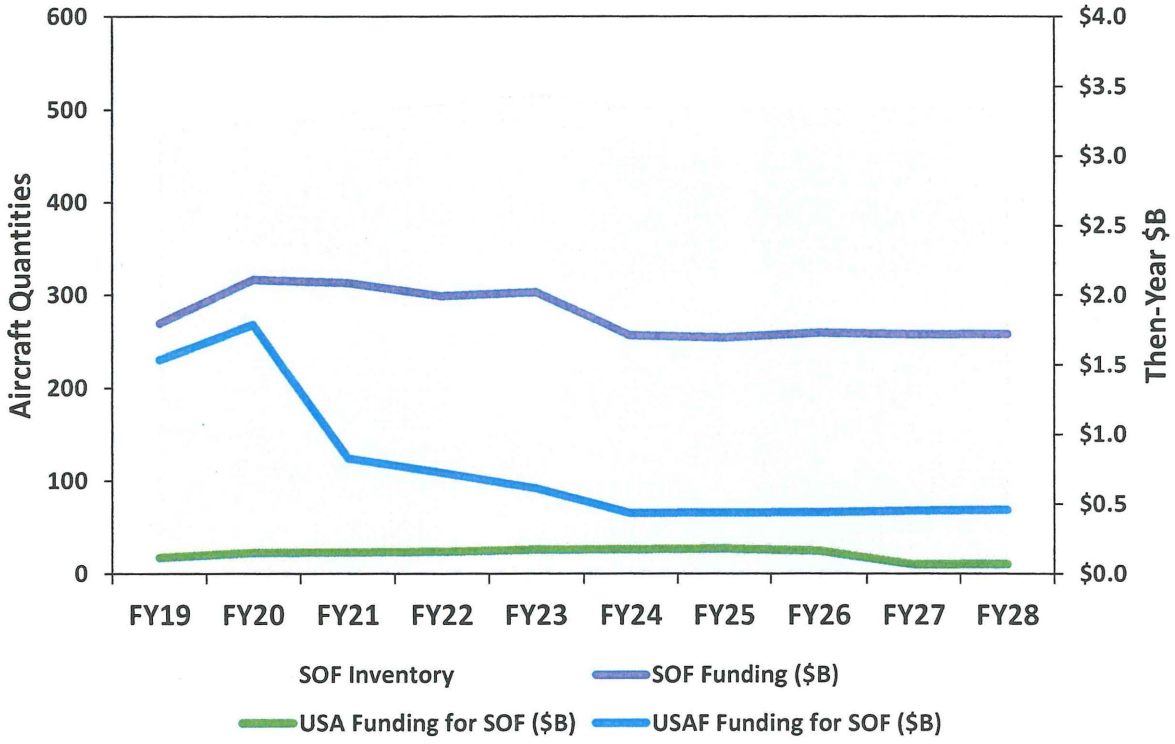
The E-6B Mercury derived from the Boeing 707 aircraft supports a flexible nuclear deterrent posture. Programmed mission system upgrades ensure the fleet remains on the cutting edge of full-spectrum communications and supports Nuclear Command, Control and Communications. The E-6Bs are expected to reach their 45,000 hour service life by January 2040. A replacement

aircraft will be identified to meet anticipated requirements within the 30 years encompassed by this report. The Navy is currently engaged with the Air Force E-4B and C-32A aircraft programs within the Survivable Airborne Operations Center Analysis of Alternatives (AoA). This joint AoA will be utilized to identify a material solution and inventory requirement for recapitalization of the E-6B Mercury airframe. Final inventory objective is projected to be greater than the current allowance of 16 aircraft, depending on mission reallocation options that will be validated during the AoA.

Special Operations Forces

The following table shows DoD Special Operations Forces aviation assets consistently tracked by the Military Departments.

	SOCOM
Special Operations Forces	AC-130, EC/C-130, C-32, C-146, C-145, MC-130, AC/MC-130 Future Replacement, C-27J, C-145A, C-146A, , CV-22B, MC-12, MQ-1C, MQ-9A, PC-12, U-28A, MH-47G, MH-60M/L, AH/MH-6



The chart above depicts annual Special Operations Forces inventory and funding projections over FY 2019-2028 broken out by military department. Details on the Air Force, Army, and SOCOM Special Operations Forces aircraft are outlined in the following paragraphs.

Department of the Air Force. Air Force Special Operations is on track to replace the legacy AC-130 gunship fleet with 37 AC-130Js anticipating completion by FY 2025. The Air Force also continues MC-130J acquisition to recapitalize the legacy MC-130 with 57 MC-130J aircraft by FY 2026. This combination satisfies the USSOCOM requirement of 94 C-130 special mission aircraft. The Air Force also continued its progress towards recapitalizing HC-130P/N aircraft

through the C-130 recapitalization program: HC-130 recapitalization is projected to complete by FY 2024.

Department of the Army. The inventory of SOF rotary wing aircraft will remain constant throughout this reporting period. The SOF rotary wing aviation platforms include 69 MH-47G, 76 MH-60M and 54A/MH-6M. Modernization efforts will be focused on countering obsolescence, and improving survivability and sustainability to extend the fleet's service life. U.S. SOCOM is integrating with the Army H-47F Block II upgrade/REMAN recapitalization program beginning in FY 2018 to extend the MH-47G's service life beyond FY 2040. This MH-47 G RENEW program will replace 61 legacy model aircraft by FY 2027. The A/MH-6 aircraft will continue a block upgrade to aircraft systems and components, to be complete by 2022. USSOCOM S&T/RDT&E efforts will continue to correspond with the Joint force in developing Future Vertical Lift variants with the potential to begin replacing the SOF rotary wing fleet in 2035 and beyond.

Budget Certification

This report certifies that both the budget for fiscal year 2019 and the FYDP for FY 2019-2023 provide a sufficient level of funding needed to implement the aviation investment plan through FY 2023 for all programs of record.

Sufficiency of Forces Assessment

The FY 2019-2048 aviation plan meets the national security requirements of the United States for fiscal year 2019 and the FYDP for FY's 2019-2023.

Appendix I - Inactive Aircraft

Data for inactive aircraft is available for the Army and Air Force as indicated below. The Army and Air Force do not have available data to further break-down the number of inactive aircraft into the categories listed in the statute. The Navy does not track aircraft once they are stricken from the active inventory.

Air Force Inactive Aviation Inventory

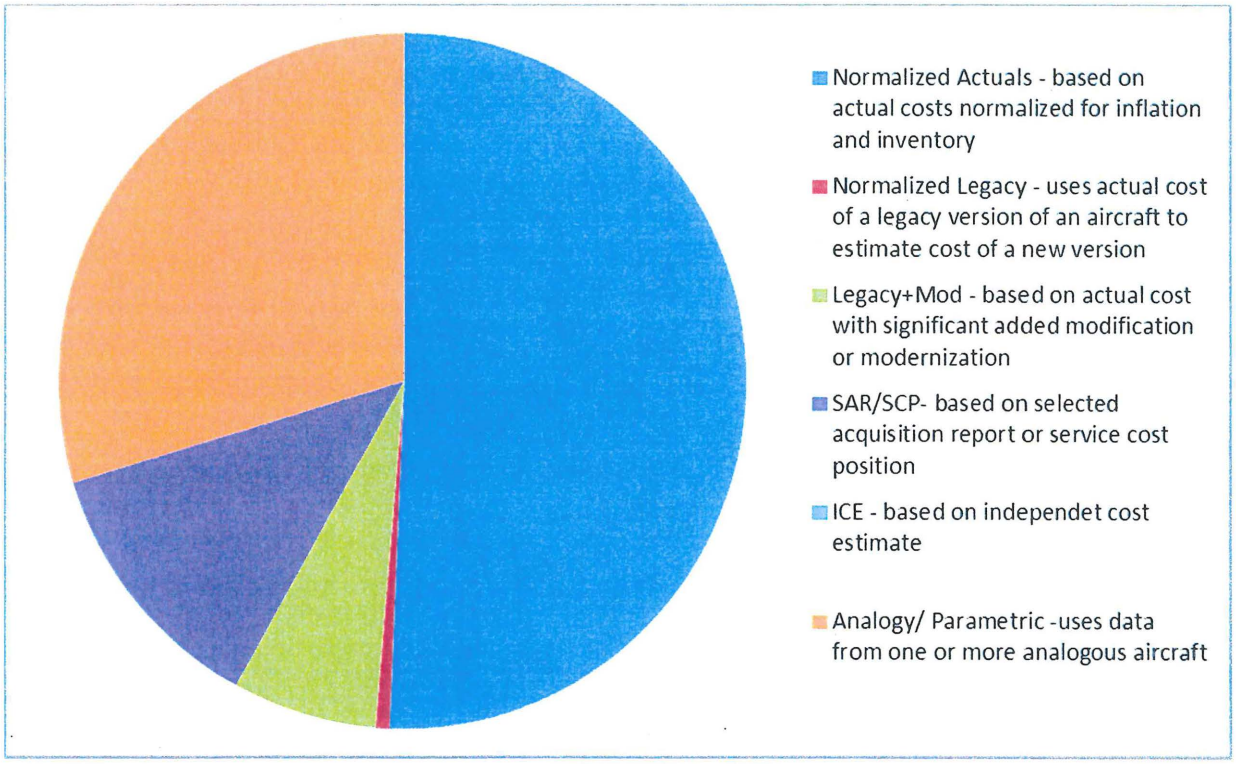
Inactive Inventory	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Fighter/Attack	514	514	514	514	514	637	715	786	862	962
Airlift/Cargo/Utility	199	199	199	199	199	258	284	296	308	320
Combat Search and Rescue	20	20	20	20	20	20	28	37	46	54
Air Refueling	178	186	201	207	219	240	255	270	285	295
Long Range Strike	131	131	131	131	131	135	135	137	140	144
Trainers	160	160	160	160	160	214	262	316	369	423
ISR/Scout/C4	20	21	22	25	29	108	113	118	118	118
Special Operations Forces	37	37	37	37	37	38	38	38	38	38
Total	**1259**	**1268**	**1284**	**1293**	**1309**	**1650**	**1830**	**1998**	**2166**	**2354**

Army Inactive Aviation Inventory

Inactive Inventory	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Attack Helicopter	56	66	65	54	6	29	18	45	0	0
Airlift/Cargo/Utility	30	30	30	30	30	30	30	30	30	30
Trainers	0	0	0	0	0	0	0	0	0	0
ISR/Scout/C4	0	0	0	0	0	0	0	0	0	0
Total	**86**	**96**	**95**	**84**	**36**	**59**	**48**	**75**	**30**	**30**

Appendix II – Sources of Cost/Funding Information

The budget certification above is based on a number of cost sources, including SARXXX data when applicable, identified in the chart below. Most of the aircraft types dealt with in this report have entered service, and many types are out of production. For these types of aircraft, the funding data is based on actual experience with procuring and operating the aircraft. For types of aircraft that are in development or low-rate initial production, the funding information comes from a CAPE independent cost estimate (ICE) or the Service Cost Position (SCP). Because each aircraft category contains multiple aircraft, it is not possible to accurately articulate whether the data comes from the SCP, the ICE, or both. For programs that do not yet have an ICE or SCP, the funding information is based on historical analogy with similar programs (e.g., future fighters with F-22 and F-35, future bombers with the B-2).



CAPE prepares an ICE for aviation programs at major milestones, in response to Nunn-McCurdy breaches, and when requested to do so by the Under Secretary of Defense for Acquisition,

Technology, and Logistics. For most programs, the latest SCP is newer than the CAPE ICE and incorporates the ICE plus developments that occurred after the ICE was prepared. The CAPE ICE almost always differs from the last SCP conducted before the ICE by more than 0.5 percent.

The table below lists programs currently having both an up-to-date SCP and an up-to-date CAPE ICE and shows the percentage difference between these positions. These are the only cases where the difference between the ICE and the SCP is relevant to the funding data presented in this report. For all other aircraft types, the funding data used in this report is based on historical procurement/sustainment costs, an SCP that is much newer than the ICE, an SCP that has not yet been followed by an ICE, or analogies with other programs. In each case of relevance to the funding data in this report, the CAPE ICE projects greater costs than the SCP. Each program ICE explains, in detail, the reasons for differences from the SCP. A shorter and simplified explanation for the differences appears below the table.

Program	Delta
KC-46 tanker	2%
F-35 Joint Strike Fighter	5%
P-8A Poseidon	2%
AH-64 Apache Block 3A	1%
AH-64 Apache Block 3B	4%
E-2D Advanced Hawkeye	6%
MQ-1C Gray Eagle	6%
F-22A Modernization	8%
Combat Rescue Helicopter	3%
Delta = (ICE – SCP)/SCP	

KC-46 Tanker. The CAPE and SCP cost estimates for the KC-46 are about two percent different in total. The difference is primarily driven by procurement. Procurement differences can be attributed to expectations of the concession rates that can be achieved when procuring the commercial ("green") aircraft to be modified. Differences can also be attributed to the estimated costs of procuring and installing mission systems on this "green" aircraft.

F-35 Joint Strike Fighter. The difference between the CAPE ICE and SCP cost estimates reflected in the above table and summarized in the following is documented in CAPE ICE memo, dated March 9, 2012, which was accomplished to support Milestone B certification.) The difference between the CAPE and SCP cost estimates for the F-35 was primarily attributed to the areas of procurement (two percent), MILCON (86 percent), and O&S (six percent). The largest difference between CAPE and SCP estimates of procurement costs was attributable to the assumed future levels of commonality between F-35 variants. The CAPE estimate reflected less commonality among the three F-35 variants than the SCP estimate and, as a result, the CAPE estimates of variant unit costs were higher because of the inherent procurement inefficiencies associated with reduced commonality. The SCP estimate for MILCON used previously-generated, narrowly defined service estimates that did not include all MILCON efforts required to support the entire F-35 fleet. The CAPE estimate was based on the facilities and infrastructure required for the joint training center planned for Elgin Air Force Base, and service-specific requirements for the Air Force, the Marine Corps, and the Navy. The SCP estimate for all variants reflected the manning structure outlined in the Manpower Estimate Report (MER). The CAPE estimate adjusted CTOL mission personnel to better reflect the actual staffing levels of the F-16 and F-22, which are on average more senior in grade than those in the MER. Also, the CAPE estimate of unit-level consumption costs was higher than the SCP, primarily because the CAPE estimate used an F-22 analogy for government-provided consumables while the SCP used legacy Navy data. The CAPE estimate also applied cost growth to both the air vehicle and engine, while the SCP applied cost growth only to the air vehicle. Subsequent to Milestone B and the March 9, 2012 ICE summarized in the preceding, portions of both the ICE and SCP have been updated and the relative percentage differences between the ICE and SCP have evolved as a result. This will continue as the program progresses. The next formal update to the ICE for all facets of the program will be in support of Milestone C (Full Rate Production) and the percentages in the above table will be updated at that time to reflect the latest comprehensive comparison to the SCP.

P-8A Poseidon. The CAPE and SCP cost estimates for the P-8A are nearly identical, with small differences in procurement (two percent) and O&S (two percent). The CAPE estimate for procurement is higher primarily due to differences in assumed cost escalation for both the base aircraft and P-8A- unique modifications over time. For the base aircraft, the SCP uses a contractor proposed Producer Price Index (PPI) while CAPE uses slightly higher escalation factors based on the historical difference between the aircraft procurement budget escalation indices and the aircraft PPI for the past ten years. For the P-8A-unique modifications, the SCP assumes a contractor estimated level of reasonable changes, while CAPE assumes that modifications costs will grow over time, due to more typical engineering changes in early production. For O&S the largest difference in the estimates is in unit personnel, where CAPE assumes manning numbers as identified in the MER while the SCP adjusts the enlisted military personnel numbers down to reflect predicted authorizations.

AH-64 Apache Block 3A/3B. The differences between the CAPE and SCP cost estimates for the Apache Block 3A and Block 3B programs are primarily attributed to RDT&E for Block 3A (11 percent) and procurement for Block 3A and 3B (11 percent and seven percent respectively). The difference in RDT&E is driven primarily by software development activities. The CAPE cost estimates for these activities were developed by first estimating the cost of the remaining development based on Phase 1 software productivity, and then constraining program execution over time to the currently available software engineering staff. In contrast, the SCP did not constrain program execution to the available software development staff, so the RDT&E effort requires more resources up front than the CAPE estimate and finishes earlier. This approach would require the contractor to temporarily increase its software engineering staff; an action CAPE maintains is counterproductive and inefficient. The CAPE estimates for both Block 3A and 3B procurement are moderately higher than the SCP due to differing assumptions for labor and material learning curves, material escalation rates, and the production break impact resulting from the transition from the Apache Block 2 production line to the new Block 3 line.

E-2D Advanced Hawkeye (AHE). The difference between the CAPE and SCP cost estimates for the E-2D is primarily attributed to the area of O&S (six percent), with the estimates for development and procurement being nearly identical, within one percent for both. The CAPE O&S estimate is higher due to the estimate of resources required for software support. CAPE forecasts that 100 full-time equivalent (FTE) employees are required to support the software maintenance activity, while the Navy assumed 65 FTE employees, based on historical maintenance activity for the E-2C. CAPE forecasts the need for additional employees due to the increase in size and complexity of E-2D software.

MQ-1C Gray Eagle Unmanned Aircraft System (UAS). The difference between the CAPE and SCP cost estimates for the MQ-1C is primarily attributed to the area of O&S (six percent), with the estimates for development and procurement being within one percent and two percent, respectively. The CAPE O&S estimate is higher due to assumptions about cost growth above inflation for contractor and material costs. The CAPE estimate is based on negotiated Forward Pricing Rate Agreements for contract labor resulting in higher labor costs relative to the SCP.

F-22A Modernization Increment 3.2B. The difference between the CAPE and SCP cost estimates for the F-22A modernization is primarily attributed to the area of O&S (7.9 percent), with the estimates for development and procurement being within two percent and four percent, respectively. The CAPE O&S estimate is higher, because it includes operation and sustainment of the entire fleet of F-22A aircraft, while the SCP includes only the marginal O&S costs of Increment 3.2B, not the full F-22A fleet O&S costs.

Combat Rescue Helicopter. The difference (three percent) between the CAPE and SCP cost estimates for life-cycle costs of the Combat Rescue Helicopter is primarily attributed to the areas

of EMD (-8 percent), procurement (-7 percent), and O&S (six percent). A major reason the SCP estimate for EMD is higher than the ICE is that the SCP includes an additional allowance for engineering change orders in the EMD phase, while the CAPE estimate assumes these resources are already reflected in actual historical EMD cost information. The CAPE procurement estimate is lower than the SCP with the SCP risk adjustment accounting for most of the difference. The difference between the CAPE and SCP for O&S costs is mainly attributed to higher CAPE estimates for unit-level manpower, depot-level repairables, and consumable parts, which are consistent with historical experience.

Confidence Levels. CAPE cost estimates are built upon a product-oriented work breakdown structure, based on historical actual cost information to the maximum extent possible, and most importantly, based on conservative assumptions that are consistent with actual demonstrated contractor and government performance for a series of acquisition programs in which the Department has been successful. It is difficult to calculate mathematically the precise confidence levels associated with CAPE life-cycle cost estimates prepared for MDAP programs. Based on the rigor in methods used in building CAPE estimates, the strong adherence to the collection and use of historical cost information, and the review of applied assumptions, it is equally likely that the CAPE estimate will prove too low or too high for execution of the described program.