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Report to Congressional Committees

December 2022

TACTICAL AIRCRAFT INVESTMENTS

DOD Needs Additional Portfolio Analysis to Inform Future Budget Decisions

Accessible Version

GAO-23-106375

GAO Highlights

Highlights of GAO-23-106375, a report to congressional committees

December 2022

TACTICAL AIRCRAFT INVESTMENTS

DOD Needs Additional Portfolio Analysis to Inform Future Budget Decisions

Why GAO Did This Study

Most of DOD's existing tactical aircraft first entered service in the 1970s and 1980s and have exceeded their original service lives. As DOD seeks to modernize its tactical aircraft fleet, it must balance sustaining older aircraft currently in operation with developing and procuring more advanced capabilities to support the future force. This is a public version of a sensitive report issued in November 2022. Aircraft divestment details were deemed sensitive and have been omitted from this report.

A House report included a provision for GAO to review DOD's tactical aircraft capability gaps and capacity shortfalls, among other things. GAO's review (1) describes DOD tactical aircraft studies regarding projected gaps and shortfalls and (2) assesses DOD portfolio-level analyses informing tactical aircraft investments.

GAO reviewed eight military service and DOD studies completed between January 2020 and January 2022; analyzed budget documentation and related investment analyses for selected piloted aircraft in the Air Force, Navy, and Marine Corps tactical aircraft fleets; examined DOD portfolio management guidance and decision-making processes; discussed them with relevant officials; and compared those processes to portfolio management best practices.

What GAO Recommends

GAO is recommending that DOD (1) conduct integrated acquisition portfolio-level analysis of all fixed-wing tactical aircraft platforms and (2) require the information underpinning that analysis be provided to Congress. DOD generally concurred with GAO's recommendations.

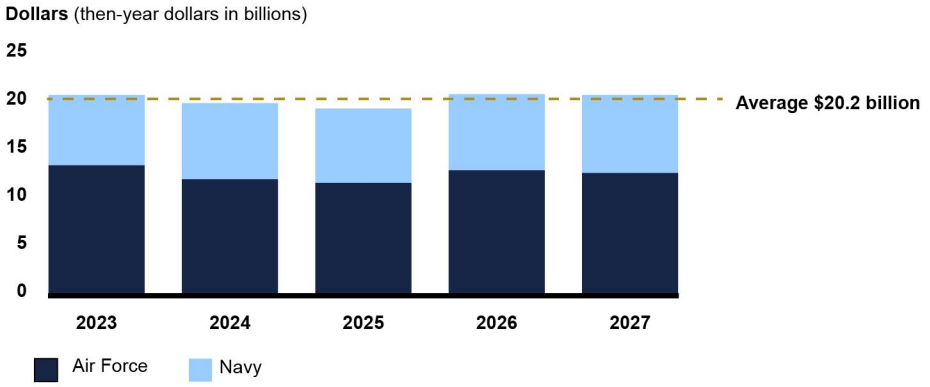
View GAO-23-106375. For more information, contact Marie A. Mak at (202) 512-4841 or makm@gao.gov.

What GAO Found

Tactical aircraft—fixed-wing fighter and attack planes—provide air-to-air, air-to-ground, and electronic warfare capabilities that are vital to combat operations and homeland defense. Recent studies conducted by the Department of Defense's (DOD) Joint Staff and the military services have found that DOD needs to modernize its tactical aircraft fleet. Seven of eight studies found that existing aircraft did not have the capabilities needed to compete in future combat scenarios and some noted the need to invest in advanced technologies to address future needs. Three of the studies, which the Navy prepared, identified shortfalls in the Navy's capacity, or inventory of tactical aircraft.

Over the next 5 years, the military services are proposing to acquire new aircraft while modernizing existing ones. Overall, the Air Force and Navy expect to spend roughly $20 billion annually across the tactical aircraft portfolio through 2027 to develop and produce new aircraft (see figure). At the same time, the services are proposing to retire a significant number of aircraft, reducing overall tactical aircraft capacity.

Departments of Air Force and Navy Tactical Aircraft Acquisition Funding Plans, Fiscal Years 2023-2027



Source: GAO analysis of Department of Defense's Fiscal Year 2023 President's Budget Request. | GAO-23-106375

Accessible Data for Departments of Air Force and Navy Tactical Aircraft Acquisition Funding Plans, Fiscal Years 2023-2027

	Dollars(then-year dollars in billions)	
Year	**Air Force**	**Navy**
2023	13.27	7.32
2024	11.82	7.92
2025	11.45	7.73
2026	12.77	7.91
2027	12.48	8.11

DOD is making significant development and procurement investments but has not yet conducted integrated acquisition portfolio-level analyses of its tactical

aircraft platforms. GAO has long reported on needed improvements to DOD's portfolio management practices such as collectively analyzing program interdependencies and risks. Portfolio management best practices state that comprehensive portfolio analyses should include potential tradeoffs and risks, among other things. While DOD has taken steps to improve portfolio management practices and conducted some integrated portfolio analyses, it has not yet conducted such an analysis of its fixed-wing tactical aircraft platform portfolio. Further, DOD guidance does not require that information underlying these analyses be reported to Congress. Without an analysis of the tactical aircraft platform portfolio and a requirement to report underlying information externally, DOD and Congress will continue to have limited information when making major investment decisions.

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Abbreviations

DOD	Department of Defense
IAPR	Integrated Acquisition Portfolio Review
JROC	Joint Requirements Oversight Council
NGAD	Next Generation Air Dominance
OSD	Office of the Secretary of Defense

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
Washington, DC 20548

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Congressional Committees

The Department of Defense (DOD) invested over $20 billion in fiscal year 2022 to modernize and recapitalize its fixed-wing fighter and attack planes. Fixed-wing fighter and attack planes, referred to as tactical aircraft, are piloted aircraft that provide air-to-air, air-to-ground, and electronic warfare capabilities. These aircraft are vital to the success of combat operations and homeland defense. As the department seeks to modernize its tactical aircraft capabilities, it continues to face difficult decisions balancing investments in tactical aircraft currently in operational use—such as the F-15, F-16, F/A-18, and F-22—with investments in the development of more advanced capabilities and the procurement of new aircraft needed to support the future force.

Most of DOD's tactical aircraft models first entered service in the 1970s and 1980s and have exceeded their original service lives. Structural fatigue and retirement of aging aircraft affects the size, or inventory, of DOD's force available to meet operational demands, often referred to as tactical aircraft capacity. In addition, many older aircraft do not possess the capabilities—equipment or characteristics—necessary to compete in existing and future threat environments. However, as new aircraft acquisitions have been delayed, the Air Force, Navy, and Marine Corps—referred to in this report as military services—have invested billions of dollars in service life extension, modernization, and sustainment efforts to address shortfalls in tactical aircraft capacity and to enhance aircraft capabilities.

House Report No. 117-118, accompanying a bill for the National Defense Authorization Act for Fiscal Year 2022, included a provision that GAO review DOD's tactical aircraft capacity shortfalls and capability gaps, among other things. Our review (1) describes Air Force, Navy, and Marine Corps studies regarding projected tactical aircraft capacity shortfalls and capability gaps, and (2) assesses the extent to which DOD has conducted portfolio-level analyses to inform tactical aircraft investments.

This report is a public version of a sensitive report that we issued in November 2022. DOD deemed some of the information in our November report to be sensitive, which must be protected from public disclosure. Therefore, this report omits sensitive information about tactical aircraft

divestment plans through 2027. Although the information provided in this report is more limited, the report addresses the same objectives as the sensitive report and uses the same methodology.

To describe military services projected fixed-wing tactical aircraft capacity shortfalls and capability gaps, we worked with the Office of the Secretary of Defense (OSD) and military service officials to identify a comprehensive list of 13 studies regarding these issues. We selected a total of nine Air Force, Navy, Marine Corps, and OSD studies that were completed in response to mandates or internal reviews between January 2020 and January 2022.[1] We excluded studies that were considered supplemental to other studies. We reviewed and assessed all nine studies, but this report does not contain our assessment of one of those studies because of its security classification. We reviewed and identified the purpose, time frame, funding constraints, and threat scenarios discussed in each study. We also interviewed officials from the military services and OSD who participated in the studies to discuss study findings, assumptions used, and conclusions, recommendations, or risks associated with any projected capacity shortfalls and capability gaps.

The studies we assessed largely focused on tactical aircraft capacity and capability requirements related to the 2018 National Defense Strategy. An

[1]The Department of the Army and the United States Space Force, a branch of the Department of the Air Force, do not operate piloted fixed-wing tactical aircraft; therefore, we excluded these services from our review. For the purposes of this report, we use the term “mandate” to refer to the following provisions of statutes and congressional reports. Section 134 of the National Defense Authorization Act for Fiscal Year 2020 directed the Secretary of the Navy to provide a report on the optimal composition of the carrier air wing on aircraft carriers and aviation combat element embarked on amphibious ships in 2030 and 2040. Section 143 of the National Defense Authorization Act for Fiscal Year 2020 directed the Secretary of the Air Force to provide an aviation force structure acquisition strategy that aligned with the Air Force’s stated capability and capacity requirements necessary to meet the National Defense Strategy. See Pub. L. No. 116-92, § 134, 143 (2019). Section 123 of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 directed the Secretary of the Navy to provide a strategy for the Navy for tactical fighter aircraft force structure acquisition that aligned with the Navy’s stated capability and capacity requirements necessary to meet the National Defense Strategy. See Pub. L. No. 116-283, § 123 (2021). A report accompanying a bill for the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 recommended a provision to direct the Secretary of the Navy to submit a report on the optimal compositions of the carrier air wing in 2030 and 2040 as well as alternative force design concepts. See S. Rep. No. 116-236, at 11 (2020).

updated National Defense Strategy was released in March 2022.[2] As of spring 2022, officials from the military services and OSD stated they had not completed analyses to understand tactical aircraft requirements related to the 2022 strategy.

To assess the extent to which DOD conducted portfolio-level analyses to inform its tactical aircraft investments, we reviewed budget documentation and related investment analyses, where available, for selected aircraft in the Air Force, Navy, and Marine Corps fixed-wing fighter and attack fleets. We also discussed portfolio-level analyses that inform investment decisions with OSD, Joint Staff, and military service officials. We selected fixed-wing aircraft based on primary mission function; we did not include rotary-wing aircraft, remotely piloted aircraft, or aircraft used solely for training. We refer to DOD's fixed-wing fighter and attack aircraft as tactical aircraft throughout this report.

We compared DOD's weapon system investment decision-making processes to portfolio management best practices. We also compared the amount of information in portfolio investment reviews with federal standards for internal control criteria related to external communication.[3] In addition, we used military services' statements from congressional hearings conducted in 2022 and leveraged prior and ongoing GAO work to determine program modernization status, acquisition progress, and costs associated with these efforts. We present program details in Appendix I.

We also examined relevant agency documents and reviewed the fiscal year 2023 President's Budget Request, which we refer to as the military services' budget request in this report. Using the military services' budget request, we selected and reported on each aircraft program's

[2]Title 10, section 113 of the U.S. Code requires DOD to provide a National Defense Strategy to the congressional defense committees and certain other entities every 4 years and intermittently otherwise as may be appropriate. During each year in which a strategy is not provided as required, DOD must submit an assessment of the current strategy, including an assessment of its implementation and whether any revision is necessary. See 10 U.S.C. § 113(g)(1). According to summaries of both the 2018 and the 2022 National Defense Strategies, defense goals include defending the homeland and deterring aggression by adversaries. An unclassified version of DOD's 2022 National Defense Strategy was released in October 2022.

[3]GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: September 2014).

modernization, development, and procurement investments that were among the highest dollar.

The performance audit upon which this report is based was conducted from September 2021 to October 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate, evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We subsequently worked with DOD, and from November 2022 to December 2022, we prepared this public version of the original controlled unclassified information report for public release. This public version was also prepared in accordance with these standards.

Background

Tactical air forces are critical to achieving and maintaining air dominance during combat operations. These forces include Air Force, Navy, and Marine Corps fixed-wing fighter and attack aircraft with air-to-air, air-to-ground, and electronic warfare missions, along with related equipment and support activities. In their combat role, these aircraft often operate during the first days of a conflict to penetrate enemy air space, defeat air defenses, and achieve air dominance. This allows follow-on ground, air, and naval forces freedom to operate within the battle space. Once air dominance is established, tactical aircraft continue to strike ground targets for the remainder of a conflict. Some tactical aircraft are also essential to protecting the homeland by responding to potential airborne and ground-based threats.

DOD's tactical aircraft fleet is generally comprised of the Air Force's A-10, F-15, F-16, F-22A, and F-35A (conventional takeoff and landing variant); the Navy's F/A-18E/F, EA-18G, and F-35C (carrier suitable variant); and the Marine Corps' AV-8B, F/A-18A-D, and F-35B (short takeoff and vertical landing variant) and F-35C aircraft.[4] Approximately half of DOD's current tactical aircraft fleet began manufacturing before 2000 and are more than 25 years old. The military services have identified replacement

[4]The Joint Strike Fighter program is delivering three variants of the F-35 aircraft: (1) the F-35A conventional takeoff and landing variant for the Air Force, (2) the F-35B short takeoff and vertical landing variant for the Marine Corps, and (3) the F-35C carrier-suitable variant for both the Marine Corps and the Navy.

aircraft for many of their aging ones. Those replacement aircraft are in varying stages of development and fielding. Table 1 shows the approximate quantity, age, and intended replacement of aircraft in DOD's tactical aircraft fleet.

Table 1: Current and Replacement Tactical Aircraft Inventories

Category	Category member	Generation[c]	Service	Total inventory (fiscal year 2020)[d]	Average age-years (fiscal year 2021)	Replacement aircraft
Current aircraft	A-10 (Thunderbolt II)	4th	Air Force	281	40.4	F-35A
Current aircraft	F-15C/D (Eagle)	4th	Air Force	234	37.2	F-15EX
Current aircraft	F-16 Fighting Falcon	4th	Air Force	936	31	To be determined[f]
Current aircraft	F/A-18A-D (Hornet)	4th	Navy/Marine Corps	305	28.2	F-35B/F-35C
Current aircraft	F-15E (Strike Eagle)	4th	Air Force	218	29.5	F-15EX[e]
Current aircraft	AV-8B (Harrier II)	4th	Marine Corps	77	24.5	F-35B
Current aircraft	F/A-18E/F (Super Hornet)	4th	Navy	530	13.5	F/A-XX
Current aircraft	F-22A (Raptor)	5th	Air Force	186	14	NGAD
Current aircraft	EA-18G (Growler)	4th	Navy	131	8.4	To be determined
Replacement aircraft acquisitions	F-35A	5th	Air Force	231	3.8	
Replacement aircraft acquisitions	F-35B	5th	Marine Corps	91	4.3	
Replacement aircraft acquisitions	F-35C	5th	Navy/Marine Corps	43	4.3	
Replacement aircraft acquisitions	F-15EX	4th	Air Force	[e]	[e]	
Replacement aircraft acquisitions	Next Generation Air Dominance (NGAD)[a]	6th	Air Force	[a]	[a]	
Replacement aircraft acquisitions	F/A-XX[b]	6th	Navy	[b]	[b]	

Source: GAO analysis of Department of Defense data and information provided by agency officials. | GAO-23-106375

[a] NGAD information is omitted due to classification.

[b] F/A-XX information is omitted due to classification.

[c] Fourth generation indicates aircraft that generally do not possess stealth characteristics. Fifth generation indicates aircraft that generally possess stealth characteristics.

[d] Current aircraft inventory totals as of September 2020.

[e] The F-15EX is expected to supplement or reinforce F-15E aircraft. As of April 2021, two F-15EX test aircraft had been delivered.

[f] The Air Force once intended the F-16 to be replaced by the F-35A. However, Air Force officials now state that the F-16 replacement is yet to be determined.

Previous GAO Reports on Tactical Aircraft Acquisition and Sustainment

In 2010, we found that the Air Force and Navy—including the Marine Corps—were projecting shortfalls in their tactical aircraft inventories that were expected to persist through the next decade.[5] We reported that these shortfalls were likely to occur even when optimistic assumptions on F-35 manufacturing and procurement were taken into account. Specifically, we found that while Air Force and Navy plans assumed a peak annual production of nearly 80 F-35As and 50 F-35B/Cs over the next 25-year period, each military service was expecting a shortfall of around 200 aircraft over this same period. We concluded that if ongoing F-35 program challenges resulted in reduced quantities or delays in delivery, billions of dollars in additional funding might be required to sustain, modernize, and extend the life of some tactical aircraft.

As a result, our 2010 report recommended that when reassessing tactical aircraft requirements and potential shortfalls, DOD should complete a comprehensive tactical aircraft analysis that compares and contrasts the costs and benefits of extending the lives of existing tactical aircraft with the costs and benefits of procuring additional new aircraft, including the F-35. In 2011, DOD implemented our recommendation as part of its mandate to submit an annual aircraft procurement plan covering a 30-year horizon.[6] Specifically, the procurement plan provided insight into projected fighter shortfalls for both the Air Force and Navy, options for mitigating those shortfalls, and each military service's expected individual investments in procuring various types of aircraft over a 30-year time

[5]GAO, *Tactical Aircraft: DOD's Ability to Meet Future Requirements Is Uncertain, with Key Analyses Needed to Inform Upcoming Investment Decisions,* GAO-10-789 (Washington, D.C.: July 29, 2010).

[6]See Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, § 141(a) (2008) (codified at 10 U.S.C. § 231a) (repealed 2018). At the time, DOD was required to annually include with defense budget materials a plan for procuring certain aircraft by the Navy and Air Force. Each annual aircraft procurement plan was required to include a detailed program for procuring the aircraft over the next 30 fiscal years.

frame. The requirement for this procurement plan was repealed by the John S. McCain National Defense Authorization Act for Fiscal Year 2019. DOD published its last 30-year report in 2018. A new requirement to issue an annual aircraft procurement plan— covering a 15-year time frame— was enacted by the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021.[7]

More recently, we reported on the challenges DOD faces with operating and sustaining weapon systems, including its fixed-wing fighter aircraft. GAO's previous work on acquisition and sustainment has reported that typically two-thirds of lifecycle costs occur in a system's sustainment phase. In November 2022, we found that many fixed-wing fighter aircraft in each military service were becoming increasingly more expensive and difficult to maintain as they faced issues with parts obsolescence or diminishing manufacturing sources.[8] In that same report, we examined annual mission capable goals—the percentage of total time when an aircraft can fly and perform at least one mission—of 49 types of aircraft. Our examination found that, for fiscal years 2011 through 2021, only four aircraft types, none of which were fixed-wing fighter aircraft, met their annual mission capable goals in a majority of those years.

More specifically, we found that mission capable rates have been a challenge for the F-35—the cornerstone of DOD's tactical aircraft fleet. We reported in April 2022 that the F-35 was not capable of conducting missions at expected rates (i.e., mission capable rates) and was falling short of its reliability and maintainability metrics.[9] Our work found that

[7]See John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, § 813(a)(1)(A) (2018) (repealing 10 U.S.C. § 231a); William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Pub. L. No. 116-283, § 151(a) (2021) (enacting a new requirement for DOD to annually submit an aircraft procurement plan for procuring certain aircraft by the Army, Navy and Air Force) (codified at 10 U.S.C. § 231a). Currently, each annual aircraft procurement plan must include a detailed program for procuring aircraft over the next 15 fiscal years. See 10 U.S.C. § 231a(c)(2)(A). DOD's new annual aircraft procurement plan was due in April 2022. However, as of August 2022, it had not been submitted.

[8]GAO, *Weapon System Sustainment: Aircraft Mission Capable Goals Were Generally Not Met and Sustainment Costs Varied by Aircraft,* GAO-23-106217 (Washington, D.C.: Nov. 10, 2022).

[9]GAO, *F-35 Sustainment: DOD Faces Several Uncertainties and Has Not Met Key Objectives*, GAO-22-105995 (Washington, D.C.: Apr. 28, 2022).

spare parts availability and maintenance were the two key factors driving the program's performance shortfalls.

In July 2022, we also reported that DOD faced considerable challenges in sustaining the F-35 engine and noted that DOD needed a new engine sustainment strategy to meet the desired outcomes of the military services.[10] We recommended DOD assess and make changes to the F-35 engine sustainment strategy and develop a shared model for forecasting spare parts needs with the engine's prime contractor. DOD concurred with our recommendations and stated that a new strategy was in development and would be revised as the program evolved. These sustainment challenges have driven steady increases in costs for F-35 sustainment. As we previously reported, the services face substantial affordability challenges as the gap between F-35 estimated sustainment costs and affordability constraints widens.[11]

DOD Actions Related to Tactical Aircraft

While the F-35 program—DOD's most expensive acquisition program—has remained the linchpin in DOD's tactical aircraft recapitalization plans because of its magnitude and the hundreds of tactical aircraft it was slated to replace, continuing program delays have affected some tactical aircraft plans. Since 2010, the F-35 program has experienced significant challenges in testing, production, performance, and sustainment that continue to directly affect modernization plans and retirement schedules of older tactical aircraft. For example, the program has had technical challenges with the simulator's development for a number of years, leading to repeated delays. These delays have led the program to postpone completion of initial operational testing multiple times.

In addition, annual F-35 production totals have not increased to the rates of 80 F-35As and 50 F-35B/Cs that were assumed at the time of our 2010 report. Instead, current program plans indicate F-35A annual production peak at 62 in 2022 and F-35B and F-35C production peak at 24 to 26 in 2020 and 2023, respectively. Further, the F-35 program continues to face a number of deficiencies affecting weapon system safety, suitability, or

[10]GAO, *F-35 Aircraft: DOD Should Assess and Update its Engine Sustainment Strategy to Support Desired Outcomes*, GAO-22-104678 (Washington, D.C.: July 19, 2022).

[11]GAO, *F-35 Sustainment: DOD Needs to Cut Billions in Estimated Costs to Achieve Affordability*, GAO-21-439 (Washington, D.C.: July 7, 2021).

effectiveness while also experiencing challenges with the aircraft's engine.

As the F-35 program has encountered challenges and delays, the military services have reacted by developing and implementing contingency plans to modernize and extend the lives of some older tactical aircraft. For example, over the last decade the Air Force and Navy have funded service life extension programs for F-16s and F/A-18 A-Ds—both originally expected to be replaced by F-35—to address fatigue of structural components and keep the aircraft capable and in operation.

While service life extension programs are one way to keep current aircraft capable and in operation, they do not guarantee that those aircraft will be available when needed or that they will possess required capabilities to meet future needs. DOD's tactical aircraft capacity—the size of its force available to meet operational demands—can be adversely affected by extended periods of aircraft depot maintenance and aircraft retirement. In addition, many older tactical aircraft do not possess the equipment or characteristics necessary to compete in existing and future threat environments, limiting DOD's tactical aircraft capability.[12]

To address short-term and long-term capacity and capability challenges, the military services have initiated efforts to acquire existing tactical aircraft systems with enhanced capabilities such as the Air Force F-15EX, while concurrently developing and acquiring new systems as part of the Air Force and Navy Next Generation Air Dominance (NGAD) programs. Both the Air Force and Navy have efforts under way to use digital engineering and agile software development, among other newer processes and practices, to develop and procure advanced tactical aircraft capabilities as part of their respective NGAD efforts.[13] NGAD, which is considered a family of systems, aims to ensure air superiority in

[12]According to DOD policy, capability gaps result from factors including the lack of a fielded capability, lack of proficiency or sufficiency in a fielded capability solution, or the need to replace a fielded capability solution to prevent a future gap. See Chairman of the Joint Chiefs of Staff Instruction 5123.01I, Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System (Oct. 30, 2021).

[13]Digital engineering, agile software development, and open architecture are considered keys to creating the speed and agility in the acquisition process needed to compete in the battlefield. The Navy NGAD includes a piloted tactical aircraft referred to as F/A-XX and is separate from Air Force NGAD.

the highly contested, or high-end, future threat environments that were forecasted in the 2018 National Defense Strategy.[14]

In the past, DOD has testified to Congress on facing capacity and capability risks and balancing service life extensions with the acquisition of new aircraft. For example, in 2019, Air Force leaders testified that the military service required approximately 2,100 tactical aircraft to meet warfighting demands, with the potential to increase in the future.[15] At that time, Air Force officials proposed that the development and acquisition of a new fourth-generation aircraft—the F-15EX—in lieu of a service life extension program for the aging F-15, would allow the Air Force to meet capacity needs. The officials also agreed that the new aircraft would operate as a gap-filler until the Air Force could fully transition to the F-35. Likewise, Navy leaders have previously testified that the Navy and Marine Corps required approximately 1,174 total tactical aircraft, and have

[14]Defense Acquisition University defines a family of systems as a set of systems that provides similar capabilities through different approaches to achieve similar or complementary effects. For example, the warfighter may need the capability to tracking moving targets. The family of systems that provides this capability could include piloted or remotely piloted aircraft with appropriate sensors, a space-based platform, or a special operations capability. Each can provide the ability to track moving targets, but with differing characteristics of persistence, accuracy, and timeliness, among others.

[15]Dr. William B. Roper, Jr., Assistant Secretary of the Air Force for Acquisition, U.S. Air Force, General James M. Holmes, Commander of the Air Combat Command, U.S. Air Force, Major General David S. Nahom, Director of Programs, U.S. Air Force, *Department of the Air Force Acquisition and Modernization Programs in the Fiscal Year 2020 National Defense Authorization President's Budget Request*, testimony before the Subcommittee on Tactical Air and Land Forces of the House Committee on Armed Services, 116th Cong.,1st sess., May 2, 2019. *Department of Defense Authorization for Appropriations for Fiscal Year 2020 and The Future Years Defense Program, Before the S. Comm. on Armed Services*, 116th Cong. 45-61 (2019) (statement of Lieutenant General Arnold W. Bunch Jr., United States Air Force).

previously committed to procuring a limited number of new Block III F/A-18E-Fs, in part to mitigate shortfalls due to delays in F-35 procurement.[16]

In 2018, the National Defense Strategy—DOD's primary strategy document, issued at least once every 4 years and which provides a foundation for all strategic guidance in the department—signaled the department's shift away from a focus on violent extremism and toward a focus on the challenges posed by major powers.[17] According to the strategy, the central challenge to U.S. prosperity and security is the reemergence of long-term, strategic competition with "revisionist powers" China and Russia.

The strategy notes that after 2 decades of unchallenged U.S. military dominance, the future strategic environment demands analysis that accepts uncertainty and complexity and that is capable of driving innovation amid rapidly changing threats. U.S. military advantage, the strategy stated, has been eroding as rapid technological changes spread globally and potential adversaries actively seek to undermine DOD's advantages. In addition, an unclassified summary of the strategy stated that the Joint Force must be able to strike diverse targets inside adversary air and missile defense networks (contested environments) to destroy mobile power-projection platforms. The strategy concluded that the department must pursue urgent change at a significant scale and warned that failure to properly implement the strategy will rapidly result in a force that is irrelevant to the threats it will face.

[16]According to Navy officials, the Multi-Year-4 Procurement of Block III Super Hornets from fiscal year 2018 through fiscal year 2021 was a combination of capability upgrades and capacity buys. Lieutenant General Jon M. Davis, Deputy Commandant for Aviation, U.S. Marine Corps, Rear Admiral Dewolfe H. Miller III, Director of the Air Warfare Division, U.S. Navy, Rear Admiral Michael T. Moran, Program Executive Officer Tactical Aircraft, U.S. Navy*, Naval Aviation Strike Fighter Issues and Concerns*, testimony before the Subcommittee on Tactical Air and Land Forces of the House Committee on Armed Services, 115th Cong., 1st sess., March 28, 2017. *Fiscal Year 2022 Budget Request of the Department of the Defense for Fixed-Wing Tactical and Training Aircraft Programs, Before the Subcomm. on Tactical Air and Land Forces of the H. Comm. on Armed Services*, 117th Cong. 9-10 (2021) (statement of Rear Admiral Andrew Loiselle, Director, Air Warfare Division, United States Navy).

[17]DOD, *2018 National Defense Strategy: Sharpening the American Military's Competitive Edge* (Jan. 19, 2018) (SECRET). See also, DOD, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Jan. 19, 2018). The 2018 National Defense Strategy notes that "revisionist powers" are those that want to shape a world consistent with their authoritarian model—gaining veto authority over other nations' economic, diplomatic, and security decisions.

In response to multiple mandates, OSD and the military services conducted studies to determine tactical aircraft requirements to effectively implement the 2018 National Defense Strategy.[18] These studies were completed prior to 2020 and largely assumed unconstrained funding when determining requirements. Among other things, those studies found that the Air Force should expand the size of its operational squadrons, ramp up F-35A annual procurements, and procure and pursue new, next-generation tactical aircraft systems. Specifically, they found that the Air Force should increase operational squadrons by approximately 24 percent and procure roughly 50 to 70 F-35As per year through 2030, in addition to the development and acquisition of F-15EX aircraft and NGAD capabilities. Similar studies found that the Navy's force structure should include a complement of aircraft with non-stealth and stealth capabilities and that its NGAD program should be an integrated family of systems incorporating future technologies including propulsion, sensors, networks, and automation.

Recent DOD Studies Continue to Identify the Need to Modernize Tactical Aircraft Fleet

DOD completed eight studies throughout 2020 and early 2022 that reaffirmed the need to modernize DOD's tactical aircraft fleet to address capability gaps and, to a lesser degree, capacity shortfalls.[19] Seven of eight military service and Joint Staff studies we reviewed identified future tactical aircraft capability gaps, but only three studies identify capacity shortfalls. Specifically, three of the four Navy studies identified tactical aircraft capacity shortfalls, which the Navy refers to as "strike fighter shortfalls." The Air Force, Marine Corps, and Joint Staff studies did not identify capacity shortfalls. While all of the studies assumed or addressed funding constraints, assumptions made about the threat and time frame

[18]Section 1060 of the National Defense Authorization Act for Fiscal Year 2018 directed the Secretary of Defense to provide for and oversee an assessment of the Armed Forces global force posture, and section 1064 of the National Defense Authorization Act for Fiscal Year 2018 required the Secretary of Defense to provide for the performance of independent studies of alternative aircraft inventories through 2030, and an associated force-sizing construct, for the Air Force. See Pub. L. No. 115-91, § 1060, 1064 (2017).

[19]We also reviewed an analysis conducted by the OSD Cost Assessment and Program Evaluation office. This study analyzed tactical aircraft capacity and capabilities across the Air Force, Navy, and Marine Corps and according to officials, provided recommendations to support the fiscal year 2023 budget request. We provided details on the Cost Assessment and Program Evaluation study to congressional staff in a classified setting.

varied. Table 2 summarizes each of the tactical aircraft studies that we reviewed.

Table 2: Overview of Eight Studies Related to Tactical Aircraft Capability and Capacity Completed from January 2020 through January 2022

			Study findings		Study assumptions		
Study publication date	**Organization**	**Study purpose**	**Capacity shortfalls identified**	**Capability gaps identified**	**Threat scenario**	**Funding constraints**	**Time frame**
May 2020	Navy	Response to mandate	Yes	Yes	Single threat	Yes	Time frame assumptions varied[a]
August 2020	Air Force	Response to mandate	No	Yes	Multiple threats	Yes	Time frame assumptions varied[a]
December 2020	Navy	Response to mandate	Yes	Yes	Single threat	Yes	Time frame assumptions varied[a]
December 2020	Navy	Internal review	No	Yes	Single threat	Yes	Time frame assumptions varied[a]
March 2021	Navy	Response to mandate	Yes	Yes	Multiple threats	Yes	Time frame assumptions varied[a]
March 2021	Marine Corps	Internal review	No	No	Multiple threats	Yes	Time frame assumptions varied[a]
August 2021	Air Force	Internal review	No	Yes	Multiple threats	Yes	Time frame assumptions varied[a]
January 2022	Joint Staff	Internal review	No	Yes	Single threat	Yes	Time frame assumptions varied[a]

Source: GAO analysis of Department of Defense documents | GAO-23-106375

Note: This table reflects eight of nine studies GAO reviewed. We excluded a study by the Office of Secretary of Defense's Cost Assessment and Program Evaluation office due to security classification. Our review of each study included a review of the findings and assumptions to provide a description of the study content. We did not assess the completeness, validity, or quality of data used to conduct any study. Mandates refer to the National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92, § 134 and § 143 (2019); William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Pub. L. No. 116-283, § 123 (2021); and S. Rep. No. 116-236, at 11 (2020) (accompanying a bill for the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021).

[a]Detailed information is not available due to classified nature of the content.

The information below provides an unclassified discussion of military service and Joint Staff findings from the studies we reviewed.[20]

Air Force. The Air Force did not identify a capacity shortfall but rather determined that the ideal capacity was largely dependent on the mix of tactical aircraft capabilities. Specifically, the Air Force found that fifth- and sixth-generation aircraft—which are generally considered more advanced than older aircraft—along with other advanced aircraft could allow the Air Force to meet its mission needs with fewer aircraft than are in the current inventory. The Air Force is statutorily required to maintain a minimum of 1,145 fighter aircraft in its primary mission aircraft inventory.[21]

Although the Air Force did not identify existing capacity shortfalls in these two most recent studies, it identified potential future capability gaps when assessing selected scenarios. As such, the Air Force noted the need for tactical aircraft with more advanced capabilities. In addition, the Air Force identified the need for advanced weapons and improvements to infrastructure such as air-to-air refueling, networks, and battlespace awareness. To address future capability gaps while acknowledging acquisition and sustainment affordability challenges, both studies recommended retirement, also referred to as divestment, of some fourth-generation tactical aircraft. Specifically, the studies recommend divestment of the A-10 and F-15C/D, to redirect funding to pursue the NGAD family of systems, among other development efforts.

Air Force officials noted that these studies and findings were rooted in the 2018 National Defense Strategy and did not take into account the updated strategy released in March 2022. These officials told us they plan to conduct additional analyses to understand the effects of the updated strategy to inform the fiscal year 2024 budget request.

Navy. The Navy identified both current capacity shortfalls and future capability gaps in its tactical aircraft fleet. Specifically, as of August 2021,

[20]All of the studies we reviewed provided additional details that were classified. We reported on these details to congressional staff in the appropriate setting.

[21]10 U.S.C. § 9062(i)(1). For the purposes of this provision, the term “fighter aircraft” refers to aircraft that is designated by a mission design series prefix of F- or A-, is crewed by one or two crewmembers, and executes single-role or multi-role missions. The term “primary mission aircraft inventory” means aircraft assigned to meet the primary aircraft authorization to a unit for the performance of its wartime mission. See 10 U.S.C. § 9062(i)(2).

Navy officials identified a strike fighter shortfall of 34 aircraft in 2022, which they anticipated being fully resolved by 2025.[22] They noted that closing the strike fighter shortfall by 2025 was dependent on successfully procuring 78 new Block III F/A-18E/Fs, conducting service life modifications to 134 existing F/A-18E/F Block II aircraft, procuring at least 20 F-35C aircraft per year, and managing F/A-18E/F flight hours by using F-16s and F-5s for training.[23]

After publication of the studies we assessed, however, the Navy reduced its planned F-35 procurement in its fiscal year 2023 budget request and now plans to procure fewer than 20 F-35Cs per year through 2027. Those adjustments would delay resolving the Navy's projected strike fighter shortfall from 2025 to 2031. Strike fighter shortfall projections, updated in April 2022, indicate a Navy strike fighter shortfall as high as 39 in 2022. Navy officials told us they believe the shortfall is manageable by transferring aircraft from non-deployed squadrons to meet deployment requirements.

The Navy also identified capability gaps, which it expects to become more prominent due to projected future threats. Similar to the Air Force studies, the Navy emphasized the importance of the mix of capability and capacity. The Navy studies indicated that a mix of fourth- and fifth-generation aircraft would be sufficient for threat scenarios through the next decade, while a fifth- and sixth-generation mix is required to address longer-term threat scenarios. The Navy's goal is to transition to what it refers to as the "Air Wing of the Future," which is expected to include a variety of advanced capabilities including crewed and uncrewed aircraft, with a piloted aircraft—currently referred to as F/A-XX—operating as a main element of the NGAD family of systems. Like the Air Force, the Navy stressed the importance of investing in technologies beyond crewed and uncrewed aircraft platforms, including advanced weapons, network integration, and development of mission autonomy to support its NGAD efforts.

Marine Corps. The Marine Corps, through the Johns Hopkins Applied Physics Laboratory, completed a comprehensive F-35 capability and

[22]The Navy calculates a strike fighter shortfall based on the difference between operational demand and aircraft available on the flight line.

[23]The F/A-18E/F service life modification adds Block III capability and extends the service life from 6,000 to 10,000 hours.

capacity study in March 2021.[24] This study did not identify shortfalls or capability gaps in the Marine Corps' F-35 plans. However, it did recommend increasing the size of deployed U.S. Marine Corps F-35C tactical aircraft integration squadrons on an aircraft carrier from 10 to 14 aircraft per squadron to account for aircraft in depot-level maintenance.[25] Additionally, it recommended increasing the number of total F-35C squadrons from four to six, of which four would be located in the continental United States while the other two would be deployed to other locations.[26] Based on the assessed need for additional F-35Cs, the study recommended procuring fewer F-35Bs to increase procurements of F-35Cs. However, the study notes that it did not assess the Marine Corps' ability to sustain a 14-plane squadron and that if the Marine Corps maintains an F-35C squadron size of 10, the Navy would have to increase the number of F/A-18E/Fs to fulfill its tactical aircraft requirements on a carrier.

Joint Staff. The Joint Staff conducted an analysis that assessed multiple technology options across DOD's tactical aircraft portfolio to understand the risks and benefits of each option when responding to a specific threat assumption. In its findings, the Joint Staff noted areas in which tactical aircraft capability improvements were needed to respond to future threats.

Officials we spoke with from OSD, Joint Staff, and military services told us that ground rules and assumptions are major drivers in any capacity and capability assessment. Specifically, officials noted that changes in assumptions about threat scenarios, available funding, and time frames would likely produce different results. Four of the eight studies in our review assumed competition with multiple threats simultaneously. These assumptions are consistent with the threats identified in the 2018 National Defense Strategy.[27] Officials from the military services and OSD and Joint Staff noted that threat scenario assumptions are major requirements drivers. For example, they noted that addressing simultaneous threats

[24]We did not evaluate the *Marine Corps Force Design 2030*, published in March 2020, because it is considered a work in progress.

[25]Tactical aircraft integration squadrons are operational support in the form of U.S. Marine Corps squadron deployments on an aircraft carrier as part of U.S. Navy's carrier air wings.

[26]This study also recommended increasing the size of operational squadrons in the continental United States from 10 to 12 aircraft per squadron.

[27]The studies in our review were completed prior to the release of a new National Defense Strategy in March 2022.

from multiple aggressors would likely require additional capacity and capability, when compared to addressing a single-aggressor conflict.

Additionally, all eight studies addressed funding constraints in their analyses. Some officials we spoke with noted that not considering funding constraints can lead to capacity and capability requirements that are unachievable. Most of the studies we analyzed stressed affordability, and some studies provided recommendations for investment decisions within an individual military service's tactical aircraft portfolio. For example, the Air Force studies recommended divesting of some fourth-generation tactical aircraft to release funding for modernization and development efforts such as the F-35 and NGAD. Air Force officials acknowledge near-term divestments are risky but maintain that the approach is less risky than not having the necessary capabilities in the future. Similarly, to address acquisition and sustainment affordability and maintain the right mix of capability and capacity, one Navy study recommended maintaining a mix of fourth- and fifth-generation aircraft while investing in an NGAD family of systems to address future threats.

Finally, all of the studies in our review assumed that pressing threats would emerge in the future. As a result, the Air Force and Navy identified capability gaps as some fourth-generation aircraft may not be able to operate effectively in high-end scenarios in the assumed time frame. Specifically, the Air Force identified the need to advance capabilities of its tactical aircraft fleet to address threats it believes will exist in the future. One Air Force study noted moderate risk in meeting the 2018 National Defense Strategy demands even with the Air Force's planned modernization efforts. Additionally, one Navy study stated that the Navy should begin transitioning to the NGAD family of systems to meet the capability required to defeat peer adversaries in the future.

DOD Has Not Conducted Integrated Portfolio-Level Analysis across Tactical Aircraft Investments

While DOD is proposing major investments and changes to its current mix of tactical aircraft, it has not conducted an integrated acquisition portfolio-level analysis that provides insight into interdependencies and risks across tactical aircraft platforms across all services. To address tactical aircraft capacity shortfalls and capability gaps, in their fiscal year 2023 budget request, the military services propose investments in aircraft

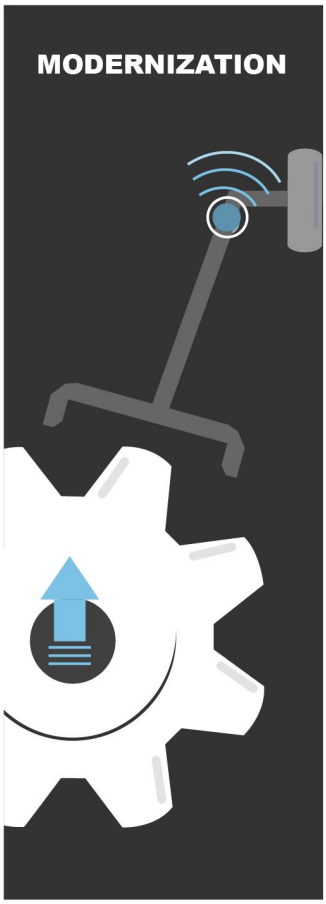
modernization, new aircraft procurement and development, and the divestment of some existing tactical aircraft. The annual average of more than $20 billion associated with these efforts, in addition to rising sustainment costs for existing aircraft, makes affordability a DOD-wide concern. To collectively optimize its weapon system investments and address continued affordability challenges, DOD has recently taken steps to improve its portfolio management practices, including conducting some focused portfolio-level analyses. However, DOD has not conducted a comprehensive integrated acquisition portfolio-level analysis of its tactical aircraft platforms.

Military Services Are Making Investment Decisions to Address Their Respective Tactical Aircraft Needs

The military services are taking similar approaches to mitigate tactical aircraft capability gaps and capacity shortfalls identified in their recent studies. Specifically, the military services are using several strategies, including modernizing some existing tactical aircraft with new capabilities and structural enhancements, investing in new procurement and development efforts, and proposing divestment of some older platforms. In their fiscal year 2023 budget requests, for example, the military services propose investments in modernization or procurement of selected aircraft such as the F/A-18E/F, F-22A, and F-35s to keep their fleets operationally viable into the future.

Additionally, both the Air Force and Navy are investing in development and procurement aimed at addressing projected high-end threats. The NGAD family of systems is one of those efforts. The Air Force also continues to invest in development and procurement of the F-15EX, which is aimed at replacing aging F-15C/Ds while complementing F-22As and F-35s. However, in its fiscal year 2023 budget request, the Air Force proposed decreasing its total planned procurement of F-15EXs by more than 40 percent. Figure 1 includes selected modification efforts, per platform, that are included in the military services' fiscal year 2023 budget requests.

Figure 1: Selected Planned Air Force, Navy, and Marine Corps Tactical Aircraft Modernization, Development, and Procurement Investments, Fiscal Year 2023



Aircraft	Description
A-10 (Air Force)	• Central Interface Control System replacement to address issues and failures. • Wing Replacement Program to enable the A-10 fleet to remain operational into the 2030 time frame.
F-15C/D/E (Air Force)	• Infrared Search and Track system will provide air-to-air detection, tracking, and ranging capability for F-15C/D/E in a radar-contested environment. • Radar Modernization Program provides improved performance to include increased range and resolution.
F-16 (Air Force)	• Software upgrades allow integration of new precision weapons and enhanced avionics. • Upgrade to Active Electronically Scanned Array radar.
F-22 (Air Force)	• Sensor Systems improvements to maintain air dominance and preserve first look, first shot, and first kill capability. • Navigational System upgrades ensure the F-22's ability to maintain Precision, Navigation, and Timing capabilities in GPS-degraded environments.
F-35 (Air Force/Navy)	• Block 4 modernization adds new hardware, software, and weapons, including Advanced Anti-Radiation Guided Missile-Extended Range. • Block 4 modification program is expected to bring early Low Rate Initial Production aircraft and integrated systems to a common fleet configuration.
F/A-18E/F (Navy)	• Upgraded radars enhance aircraft survivability, lethality, and networking effectiveness in highly contested environments into the 2030s. • Service Life Modification (SLM) is a two-phased process: Phase I extends the service life from 6,000 to 7,500 hours; Phase 2 (Full Kit SLM) extends it from 7,500 to 10,000 hours and incorporates Block III capability.
EA-18G (Navy)	• Upgraded capabilities to counter advanced Integrated Air Defense System by detecting and identifying unknown radar emitters. • Enhancements that support the Airborne Electronic Attack Enhancements/Next Generation Jammer Mid Band software and hardware integration.
F/A-18 A-D (Marine Corps)	• Upgrades capability expansion of Active Electronically Scanned Array radar. • Service Life Extension program increases service life from 6,000 to 10,000 hours.
AV-8B (Marine Corps)	• Research and innovation studies for airframe and subsystem safety and reliability improvements. • Upgrade systems to integrate an infrared and low-light television targeting device capable of detecting, classifying, and auto-tracking air-to-surface targets.
New Procurement & New Development	
F-15EX (Air Force)	• Procurement of 80 F-15EX will replace the F-15C/D fleet and reinforce the F-15E fleet. Delivery expected to begin in fiscal year 2024. • Upgrades to include Eagle Passive Active Warning and Survivability System.
F/A-18E/F (Navy)	• The last of the Block III F/A-18EF delivers in third quarter of fiscal year 2024.
F-35A/B/C (Air Force/ Marine Corps/ Navy)	• Procure 366 F-35s (198 F-35A, 80 F-35B, and 88 F-35C variants) with Block 4 capabilities funded from 2023 through 2027. • Newly developed Technology Refresh 3 processors, expected in fiscal year 2024, supports Block 4 upgrades.
NGAD (Air Force) F/A-XX (Navy)	• Family of systems enhancements in survivability, lethality, persistence, and interoperability across a range of military operations.

Source: GAO analysis of the Department of Defense's Fiscal Year 2023 President's Budget Request. | GAO-23-106375

Accessible Data for Figure 1: Selected Planned Air Force, Navy, and Marine Corps Tactical Aircraft Modernization, Development, and Procurement Investments, Fiscal Year 2023

Category	Aircraft	Description
MODERNIZATION	A-10 (Air Force)	• Central Interface Control System replacement to address issues and failures.
MODERNIZATION	A-10 (Air Force)	• Wing Replacement Program to enable the A-10 fleet to remain operational into the 2030 timeframe.
MODERNIZATION	F-15C/D/E (Air Force)	• Infrared Search and Track system will provide air-to-air detection, tracking and ranging capability for F-15C/D/E in a radar-contested environment.
MODERNIZATION	F-15C/D/E (Air Force	• Infrared search and track system the operations in radar-contested environments.
MODERNIZATION	F-16 (Air Force)	• Software upgrades allows integration of new precision weapons, and enhanced avionics.
MODERNIZATION	F-16 (Air Force)	• Upgrade to Active Electronically Scanned Array radar.
MODERNIZATION	F-22 (Air Force)	• Sensor Systems improvements to maintain air dominance and preserve first look, first shot, and first kill capability.
MODERNIZATION	F-22 (Air Force)	• Navigational System upgrades ensure the F-22's ability to maintain Precision, Navigation and Timing capabilities in GPS degraded environments.
MODERNIZATION	F-35 (Air Force/Navy)	• Block 4 modernization adds new hardware, software, and weapons, including Advanced Anti-Radiation Guided Missile-Extended Range.
MODERNIZATION	F-35 (Air Force/Navy)	• Block 4 modification program is expected to bring early Low Rate Initial Production aircraft and integrated systems to a common fleet configuration.
MODERNIZATION	F/A-18 EF (Navy)	• Upgrades radars enhances aircraft survivability, lethality, and networking effectiveness in highly contested environments into the 2030's.
MODERNIZATION	F/A-18 EF (Navy)	• Service Life Modification (SLM) is a two-phased process, Phase I extends the service life from 6,000 to 7,500 hours; Phase 2 (Full Kit SLM) extends it from 7,500 to 10,000 hours and incorporates Block III capability.
MODERNIZATION	EA-18G (Navy)	• Upgraded capabilities to counter advanced Integrated Air Defense System by detecting and identifying unknown radar emitters.
MODERNIZATION	EA-18G (Navy)	• Enhancements that support the Airborne Electronic Attack Enhancements/Next Generation Jammer Mid Band software and hardware integration.
MODERNIZATION	F/A-18A/D (Marine Corps)	• Upgrades capability expansion of Active Electronically Scanned Array radar.
MODERNIZATION	F/A-18A/D (Marine Corps)	• Service Life Extension program increases service life from 6,000 to 10,000 hours.
MODERNIZATION	AV-8B (Marine Corps)	• Research and innovation studies for airframe and subsystem safety and reliability improvements.
MODERNIZATION	AV-8B (Marine Corps)	• Upgrade systems to integrate an infrared and low-light television targeting device capable of detecting, classifying, and auto-tracking air-to-surface targets.

Category	Aircraft	Description
New Procurement & New Development	F-15EX (Air Force)	• -Procurement of 80 F-15EX will replace the F 15C/D fleet and reinforce the F-15E fleet. Delivery expected to begin in FY2025.
New Procurement & New Development	F-15EX (Air Force)	• Upgrades to include Eagle Passive Active Warning and Survivability System.
New Procurement & New Development	F-18E/F (Navy)	• The last of the Block III F/A-18E/F delivers third quarter fiscal year 2024.
New Procurement & New Development	F-35A/B/C (Air Force/Marine Corps/Navy)	• Procure 366 F-35s (198 F-35A, 80 F-35B, and 88 F-35C variants) with Block 4 capabilities funded between 2023 through 2027.
New Procurement & New Development	F-35A/B/C (Air Force/Marine Corps/Navy)	• Newly developed Technology Refresh 3 processors, expected in FY2024, supports Block 4 upgrades.
New Procurement & New Development	NGAD Air Force /Navy)	• Family- of-systems enhancements in survivability, lethality, persistence, and interoperability across a range of military operations.

Note: These investments represent program-specific budget lines. There may be other efforts such as advanced engine development, which includes the adaptive engine transition program.

In addition to the investments in modernization and procurement, and given affordability concerns due to budget constraints, the military services are considering divestments of some older tactical aircraft that they believe no longer provide capabilities required to meet the demands of highly contested threat environments and that can be costly to operate and maintain. In particular, Air Force leaders have stated that these divestments are also necessary to free up funding to continue modernizing other existing tactical aircraft. As part of the Air Force's documentation supporting its fiscal year 2023 budget request, the service proposed divesting a significant number of aircraft through 2027. Service officials stated that maintaining a specific quantity of aircraft without regard for the capabilities they might provide in the future is not a prudent approach. As mentioned previously, Air Force leaders believe that while this divestment approach may present some capacity risk, this risk is acceptable to avoid capability risks associated with failing to modernize in preparation for future threats. Figure 2 provides details on the Air Force's planned tactical aircraft divestments and procurements through 2027.

Details on fiscal years 2024 through 2027 were deemed sensitive and have been omitted.[28]

Figure 2: Air Force Tactical Aircraft Divestment and Procurement Plans from Fiscal Year 2023 through Fiscal Year 2027

Aircraft	Fiscal year 2023	Fiscal year 2024	Fiscal year 2025	Fiscal year 2026	Fiscal year 2027	Total Future Years Defense Program	Total aircraft inventory end of fiscal year 2027
A-10	-21	Details related to fiscal years 2024 through 2027 were deemed sensitive and have been omitted.					
F-15C	-67						
F-15E	0						
F-15EX	6						
F-16	-26						
F-22	-33						
F-35	56						
Totals	-85						

Source: GAO presentation of Air Force documentation supporting the department's fiscal year 2023 budget request. | GAO-23-106375

Accessible Data for Figure 2: Air Force Tactical Aircraft Divestment and Procurement Plans from Fiscal Year 2023 through Fiscal Year 2027

Aircraft	Fiscal Year 2023
A-10	-21
F-15C	-67
F-15E	0

[28]In 2016, we found that DOD and the Air Force did not have quality information on the full implications of A-10 divestment, including gaps that could be created by A-10 divestment and mitigation options. We recommended that the Air Force fully identify mission gaps, risks, and mitigation strategies, and develop high-quality, reliable cost estimates of the savings from divestment before again proposing to divest its A-10 fleet, and that DOD establish quality information requirements to guide major weapon system divestments. In March 2019, the Air Force identified the need for the A-10 through the 2030s. GAO, *Force Structure: Better Information Needed to Support Air Force A-10 and Other Future Divestment Decisions*, GAO-16-816 (Washington, D.C.: Aug. 24, 2016). We did not assess the quality of information the Air Force used in identifying its current divestment plans.

Aircraft	Fiscal Year 2023
F-15EX	6
F-16	-26
F-22	-33
F-35	56
Totals	-85

The Navy has proposed to divest of all 25 land-based EA-18G aircraft by 2025; these aircraft have been used to satisfy joint force requirements for expeditionary electronic attack support. Air Force officials believe this divestment could adversely affect joint tactical aircraft operations. According to DOD officials, these decisions are the result of the military services independently working to balance three risk areas over time: balancing aircraft quantities and capabilities needed in the near-term, addressing affordability concerns within their respective services, and preparing for future needs.

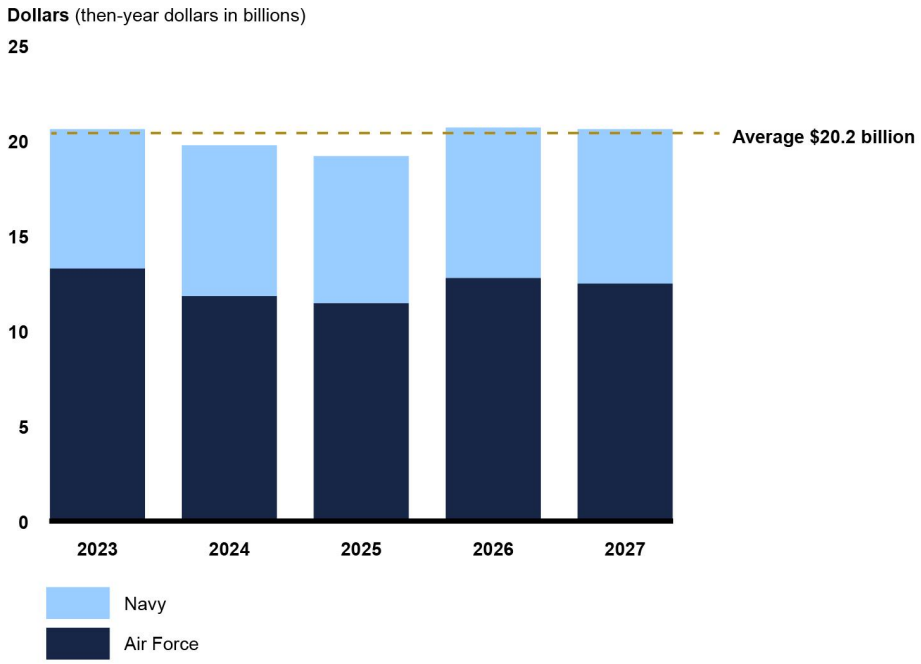
In addition, both the Air Force and Navy plan to defer F-35 procurements. The Air Force, in its fiscal year 2023 budget request, planned to defer a total of 66 F-35 aircraft between fiscal years 2023 and 2027, compared to the program's fiscal year 2021 production plans. Officials stated that the deferrals are not a reduction in the overall F-35 fleet size but, in part, a move to ensure aircraft are configured with more advanced capabilities needed to address future threats—a compilation of upgraded capabilities collectively known as F-35 Block 4.[29] Similarly, the Navy planned to defer the procurement of 31 F-35s through 2027. While the Air Force stated it deferred aircraft due to funding and capability needs, Navy officials told us that its F-35 deferrals were a result of competing Navy priorities. In addition to F-35 deferrals, the Navy also delayed 19 F/A-18E/F service life modifications through 2027. Due to these deferrals, the Navy now expects to close its strike fighter shortfall in 2031, 6 years later than it projected in 2021. For more specific investment and divestment plans for the programs we reviewed, see appendix I.

Despite the military services' proposed divestments and deferrals of some tactical aircraft, the services continue to face acquisition and sustainment affordability challenges. As figure 3 shows, the Air Force, Navy, and

[29]F-35 Block 4 is a modernization effort aimed at upgrading the aircraft's hardware and software to help address new threats that have emerged since the aircraft's original requirements were established in 2000.

Marine Corps together plan to spend an average of $20.2 billion annually over the next 5 years to develop and procure tactical aircraft.

Figure 3: Air Force, Navy, and Marine Corps Tactical Aircraft Acquisition Funding Plans (2023-2027)



Source: GAO analysis of the Department of Defense's Fiscal Year 2023 President's Budget Request. | GAO-23-106375

Accessible Data for Figure 3: Air Force, Navy, and Marine Corps Tactical Aircraft Acquisition Funding Plans (2023-2027)

	Dollars (then-year dollars in billions)	
Year	**Air Force**	**Navy**
2023	13.27	7.32
2024	11.82	7.92
2025	11.45	7.73
2026	12.77	7.91
2027	12.48	8.11

Allotting an average of $20.2 billion per year on tactical aircraft acquisitions will be challenging, especially when considering the cost of acquisition of other systems in addition to the increasing costs of sustainment. For example, we reported in November 2022 that DOD

spent about $22 billion on operations and support of tactical aircraft in fiscal year 2020 alone.[30] Considering these two estimates collectively, it could cost more than $40 billion per year to develop, procure, operate, and sustain DOD's tactical aircraft fleet.

Further, DOD will need to fund these costs annually while attempting to address rising sustainment costs of the F-35. In July 2021, we reported that since 2012, estimated F-35 life cycle sustainment costs have steadily increased from $1.11 trillion to $1.27 trillion, even though DOD has made efforts to reduce costs.[31] We found that DOD does not have a pathway to close the substantial gap between estimated sustainment costs for the F-35 and service-established affordability constraints. We made a number of recommendations to address these concerns and, as of July 2021, DOD officials stated they were working to address our recommendations.

DOD's fiscal year 2023 budget request includes additional acquisition funding needs of at least $15.7 billion for other high-priority development and procurement programs, exacerbating the affordability challenges described above. The need to balance a number of these competing priorities with tactical aircraft needs makes it increasingly important that DOD make budget decisions based on comprehensive and sound analyses.

DOD Has Initiated Some Portfolio Management Practices but Has Not Conducted Integrated Portfolio Analysis of Tactical Aircraft Platforms

Since 2019, DOD has taken steps to improve its portfolio management approach, as we have recommended. We found in August 2015 that leading commercial companies use portfolio management—a disciplined process that helps optimize investments by ensuring organizations have the right mix of new products that meet customer needs within available resources. Portfolio management focuses on products collectively at an enterprise, or portfolio, level and involves evaluating, selecting, prioritizing, and allocating limited resources to projects that best accomplish strategic or organizational goals. In that report, we found that

[30]GAO-23-106217.

[31]GAO-21-439 and GAO, *Additional Opportunities to Reduce Fragmentation, Overlap, and Duplication and Achieve Billions of Dollars in Financial Benefits*, GAO-22-105301 (Washington, D.C.: May 11, 2022).

DOD was not effectively using portfolio management to optimize its weapon system investments, as evidenced by affordability challenges in areas such as shipbuilding and potential duplication among some of its programs.[32]

Our 2015 report found DOD drafted investment plans that reflect individual military service preferences that were not affordable over the long term. We concluded that DOD defaulted to optimizing and addressing problems in individual programs instead of focusing on portfolios of programs that might provide greater military capability at lower risk or cost. As a result, we recommended that the Secretary of Defense revise a DOD directive to reflect leading practices and promote development of better tools to enable integrated portfolio reviews and analyses of weapon system investments. We also recommended that the Secretary of Defense direct the military services to update or develop policies that require them to conduct annual portfolio reviews.

Although our recommendations remain open, DOD is in the process of implementing policy changes aimed at improving its portfolio management practices. DOD's actions include the following:

- In 2019, OSD officials told us they would start drafting a policy update that would use capability portfolio management to optimize investments across the defense enterprise or at the portfolio level. However, in March 2021, officials told us they were awaiting the confirmation of a new Under Secretary of Defense for Acquisition and Sustainment to finalize it; this confirmation occurred in April 2022. According to OSD officials, the department expected to finalize the policy update in October 2022, but as of December 2022, they were still in the process of finalizing the update. When implemented, this policy could improve DOD's ability to manage its entire weapon system portfolio, including tactical aircraft.
- In 2021, the Chairman of the Joint Chiefs of Staff issued an instruction providing guidance to, among other things, initiate capability portfolio management reviews.[33] These reviews are directed by the Joint Requirements Oversight Council (JROC) and address opportunities,

[32]GAO, *Weapon System Acquisitions: Opportunities Exist to Improve the Department of Defense's Portfolio Management*, GAO-15-466 (Washington, D.C.: Aug. 27, 2015).

[33]Chairman of the Joint Chiefs of Staff Instruction, 3100.01E, *Joint Strategic Planning System* (Washington, D.C.: May 21, 2021).

challenges, risk, and trade-space associated with specific priority portfolios that enable DOD's strategic objectives.[34]

- In 2021, the Under Secretary of Defense for Acquisition and Sustainment began conducting portfolio-level reviews, known as Integrated Acquisition Portfolio Reviews (IAPR), to identify acquisition portfolio interdependencies and critical risks across services and agencies to shape future investment decisions. According to OSD officials, they conducted an IAPR of specific tactical aircraft weapons in September 2021 and plan to conduct another tactical aircraft weapons focused review in 2022.

In addition, DOD implemented one of our prior recommendations related to conducting joint force structure analyses that is aimed at improving investment decisions. In 2019, we found that DOD lacked a body or process to consider joint analyses or compare competing force structure analyses. We recommended OSD establish an approach for comparing competing force structure analyses and conduct joint analyses for force structure to support leadership decision-making.[35] In 2022, DOD issued a memorandum that included a set of principles and standards to guide strategic analyses and stated that the Analysis Working Group within OSD would work with organizations across DOD to ensure principles and standards for conducting joint analysis were met.[36] This guidance identified certain standards that applied specifically to campaign analysis intended to inform the Secretary of Defense, including beginning analyses with a common starting point, exploring risks, and considering cost as a variable. We have not reviewed any additional analysis conducted by DOD since it issued this guidance in February 2022.

While these efforts may be steps in the right direction, OSD officials noted that as of August 2022, they had not conducted an IAPR that assesses the portfolio of tactical aircraft platforms. In addition, officials stated that

[34]The Joint Requirements Oversight Council manages the Joint Capabilities Integration and Development System process in support of the Chairman of the Joint Chiefs of Staff to validate gaps in joint warfighting capabilities and requirements that resolve those gaps.

[35]GAO, *Defense Strategy: Revised Analytic Approach Needed to Support Force Structure Decision-Making*, GAO-19-385 (Washington, D.C.: Mar. 14, 2019).

[36]In April 2021, the Deputy Secretary of Defense established the Analysis Working Group to guide the department's analytic capabilities. Analysis Working Group core members include officials from Joint Staff, Office of the Under Secretary of Defense for Policy, Cost Assessment and Program Evaluation, and Chief Data Officer of the Department of Defense.

while they could complete one in the future, they did not have such an IAPR on the 2022 planning calendar and have not yet defined the scope of the 2023 IAPRs. According to OSD officials, in practice, the JROC's capability management reviews have driven the scope of OSD's IAPRs for the benefit of integration, collaboration, and consistency across DOD portfolio studies. However, while DOD's charter for IAPRs indicates the reviews are to complement other portfolio reviews, it does not specifically preclude OSD from scoping or identifying its own priority areas for its portfolio reviews.[37] Further, according to the charter, these reviews are established to identify and address interdependencies and critical risks within each portfolio to strengthen synchronization of warfighting concepts, technologies, requirements, and program execution to inform enterprise decisions, including investment decisions, and enable end-to-end mission capability. In addition, the charter states that the reviews will be used to create portfolio roadmaps to identify when capabilities are fielded and when older systems will be retired, among other things.

Portfolio management best practices state that taking an integrated approach to conducting reviews helps avoid pursuing more investments than are affordable, balance near- and long-term needs, and maximize return on investment. To conduct a comprehensive portfolio-level analysis of tactical aircraft, the analysis should include key elements, including but not limited to portfolio goals; potential overlap; potential tradeoffs; capability gaps; risk; and cost, schedule, and performance information on each platform within the portfolio. While it is useful to conduct analyses related to specific weapons capabilities, as OSD has done, these analyses do not provide a comprehensive view of the potential tradeoffs to achieving end-to-end capability of the entire tactical aircraft portfolio. As such, although DOD is in the process of developing its fiscal year 2024 budget request, its insight into tactical aircraft platform interdependencies and risks is limited and its near-term budget requests are not adequately informed.

Detailed information such as portfolio-level investment analyses are particularly important given DOD's affordability challenges and acquisition history. DOD is aiming to address affordability, in part, by divesting of some aircraft in order to invest in new capabilities. However, historically,

[37]Charter for Integrated Acquisition Program Review, Department of Defense (Aug. 31, 2021). The charter provides that portfolio review topics will be identified by the Assistant Secretary of Defense for Acquisition based on priorities outlined by the Deputy Secretary of Defense and Vice Chairman of the Joint Chiefs of Staff, with inputs from the Service and Agency Acquisition Executives.

DOD's acquisition outcomes have been poor. Programs have often taken longer and cost more than originally planned, delaying capability delivery to the warfighter. As a result, plans to divest of aircraft that the Air Force considers critical to the air superiority mission, such as the F-22A and EA-18G, without a mature replacement system in place could present operational risk. While Air Force officials stated that the proposed F-22A divestments include aircraft that are used for training and not configured for combat, they have recognized the risk in their divest-to-invest approach. Further, Navy officials said they are reassessing the requirement for airborne electronic attack support to the Joint Force.

In addition, we reviewed the two documents that OSD identified as establishing IAPR policy—the IAPR charter and a January 2022 memorandum outlining IAPR expectations—and found that those two documents did not specifically require that the cost, tradeoff, and risk factors considered when conducting IAPRs be provided to congressional defense committees. Principles established in federal internal control standards advocate open, two-way reporting lines between internal and external stakeholders to facilitate oversight and support informed decisions aimed at achieving objectives and managing risks.[38] The lack of a requirement to report integrated acquisition portfolio-level information on tactical aircraft platforms can impair congressional oversight and the defense committees' ability to make well-informed funding and oversight decisions related to DOD's efforts to modernize its tactical aircraft fleet.

Conclusions

Divesting of existing tactical aircraft to pay for new development creates a delicate balance and is a decision that should be made with the most detailed information. DOD's ongoing efforts to improve its portfolio management practices are a step in the right direction and could provide insight into certain aspects of its investments such as tactical aircraft weapons. However, the lack of an integrated acquisition portfolio review of tactical aircraft platforms leaves DOD and Congress with limited insight into interdependencies, risks, and related trade-offs among some of DOD's highest priority and most expensive investments. Further, without a comprehensive portfolio management approach and a requirement to report the information underpinning the integrated acquisition portfolio reviews to Congress, DOD will miss an opportunity to provide additional

[38]GAO-14-704G.

insight into the factors the military services consider as they propose retiring or sustaining existing tactical aircraft platforms and funding new developments. Considering the significant cost of sustaining weapon systems, competing priorities within the military services, and quickly evolving threats, it is prudent that DOD and Congress both have comprehensive information as soon as practicable to make well-informed investment decisions going forward.

Recommendations for Executive Action

We are making the following two recommendations to DOD:

The Secretary of Defense should conduct an integrated acquisition portfolio review of all piloted fixed-wing tactical aircraft platforms. This review should analyze key elements including, but not limited to, portfolio goals; potential overlap; potential tradeoffs; capability gaps; risk; and cost, schedule, and performance information on each platform within the portfolio. (Recommendation 1)

The Secretary of Defense should establish a requirement that ensures the congressional defense committees receive information underpinning DOD's integrated acquisition portfolio review of all piloted fixed-wing tactical aircraft platforms. (Recommendation 2)

Agency Comments and Our Evaluation

We provided a draft of this report to DOD for review and comment. In written comments, reproduced in appendix II, DOD concurred with our first recommendation noting that an integrated acquisition portfolio review of DOD's piloted fixed-wing tactical aircraft platforms would be conducted over the next one or two fiscal years. DOD partially concurred with our second recommendation indicating that it can provide information related to budget decisions about its piloted fixed-wing tactical aircraft through other reporting mechanisms already required by Congress, such as DOD's annual aircraft procurement plan. We agree that existing reporting mechanisms like the annual procurement plan can provide DOD an opportunity to provide this information. However, we continue to believe that a DOD reporting requirement would provide assurance that Congress receives this information as it makes decisions about funding for piloted fixed-wing tactical aircraft.

DOD also provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, Secretary of Defense, the Secretaries of the Air Force and Navy, and the Commandant of the Marine Corps. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-4841 or Makm@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.

Marie A. Mak
Director, Contracting and National Security Acquisitions

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Committee on Armed Services
United States Senate

The Honorable Jon Tester
Chairman
The Honorable Richard Shelby
Ranking Member
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Adam Smith
Chairman
The Honorable Mike Rogers
Ranking Member
Committee on Armed Services
House of Representatives

The Honorable Betty McCollum
Chair
The Honorable Ken Calvert
Ranking Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Details of Selected Department of Defense Tactical Aircraft Investment Plans

Department of Air Force Programs

A-10 (Thunderbolt II)

Figure 4: A-10

Source: U.S. Air Force/ Tech. Sgt. Paul Labbe. | GAO-23-106375

The A-10 is a single-seat aircraft specifically designed for close air support and defeating enemy armor. The A-10 is maneuverable at low speeds and altitude and can carry a variety of conventional munitions. The aircraft's wide combat radius and short takeoff and landing capability permit operations near the front lines.

Documentation supporting the Air Force's fiscal year 2023 budget request includes a proposal to divest 21 A-10s in fiscal year 2023. Additional divestment details were deemed sensitive and have been omitted from

this report. According to the Air Force, the A-10 is not considered suitable for operating in high-threat environments, and retiring these aircraft frees up investment funding and workforce that can transition to other programs. At the same time of these planned divestments, the Air Force is also planning to invest $466 million through fiscal year 2027 on the A-10 platform, including installing upgraded radios and displays and incorporating several reliability and maintainability improvements to known critical fatigue locations of the A-10 by replacing wings on 218 aircraft. According to Air Force leadership, aircraft planned for divestment in fiscal year 2023 will not receive the upgraded wings.

In August 2016, we found that the Department of Defense (DOD) and the Air Force did not have quality information on the full implications of A-10 divestment, including gaps that could be created by A-10 divestment and mitigation options.[1] At the time, we recommended DOD develop quality information that fully identifies gaps in capacity or capability that would result from A-10 divestment. Consistent with our recommendation, the Air Force conducted a force structure study and found a continued need for the A-10. We did not assess the quality of information used by the Air Force in its most recent studies that support divestment of the aircraft.

[1]GAO, *Force Structure: Better Information Needed to Support Air Force A-10 and Other Future Divestment Decisions*, GAO-16-816 (Washington, D.C.: Aug. 24, 2016).

F-15C/D (Eagle) and F-15E (Strike Eagle)

Figure 5: F-15C

Source: U.S. Air Force/ Senior Airman Zachary Bumpus. | GAO-23-106375

The F-15C/D Eagles are all-weather, maneuverable, tactical single-seat fighters (F-15C) and two-seat fighters (F-15D) designed to perform air-to-air combat missions. The F-15 C/D has electronic systems and weaponry to detect, acquire, track, and attack enemy aircraft while operating in friendly or enemy-controlled airspace. The F-15E is designed to perform air-to-air and air-to-ground missions.

The Air Force anticipates its inventory of F-15C/D will reach the end of its service life within the next decade. Documentation supporting the fiscal year 2023 budget request proposed a divestment of 67 F-15Cs from the active fleet. Additional divestment details were deemed sensitive and have been omitted from this report.

Similarly, the Air Force plans to begin divesting of F-15E aircraft over the next few years. Currently, the Air Force plans to spend more than $2.4 billion through 2027 to, among other things, improve F-15E operational capability, reliability and maintainability, and flight safety. For example, in its fiscal year 2023 budget request, the service continues to pursue the

Eagle Passive Active Warning and Survivability System, which modernizes the aircraft's current electronic warfare system.

F-15EX (Eagle II)

Figure 6: F-15EX

Source: U.S. Air Force/ 1st Lt. Savanah Bray. | GAO-23-106375

The F-15EX is a development effort that features an increased payload capacity, fly-by-wire controls, a digital cockpit, modernized sensors, radars, and electronic warfare capabilities. The F-15EX airframe is designed to last for 20,000 flight hours and is planned to be a complementary platform to fifth-generation F-35 and F-22 stealth aircraft operating in highly contested environments.

The fiscal year 2023 budget request accelerates the procurement of F-15EX Eagle II aircraft through 2026 and includes a proposal to decrease the total F-15EX planned procurement quantities from 144 to 80 aircraft. According to Air Force officials, affordability concerns were a major driver for this adjustment. According to the fiscal year 2023 budget request, the Air Force expects funding for F-15EX procurement to conclude in 2024.

F-16 (Fighting Falcon)

Figure 7: F-16

Source: U.S. Air Force/Airman 1st Class Matthew Seefeldt. | GAO-23-106375

The F-16 Fighting Falcon is a compact, single-engine, multirole fighter aircraft. It is a highly maneuverable aircraft with single- and two-seat models that participates in air-to-air combat and air-to-surface attack missions.

In its fiscal year 2023 budget request, the Air Force proposed transitioning away from its oldest F-16 aircraft. Additional divestment details were deemed sensitive and have been omitted from this report. Research, development, test and evaluation funding in the fiscal year 2023 budget request is slated to upgrade aircraft. These upgrades include software that allows for integration of new precision weapons and improved avionics. Other improvements focus on swapping out the current mechanically scanned radar for the Active Electronically Scanned Array Radar, which provides greater capability to detect, track, and identify low-observable, low-flying, and slow-flying targets. In addition to these planned actions, the service is requesting $109 million in fiscal year 2023 to continue the F-16's service life extension program. The goal of this program is to extend the life of select F-16s beyond 8,000 equivalent flying hours to ensure a continually viable fighter force.

F-22A (Raptor)

Figure 8: F-22A

Source: U.S. Air Force/Staff Sgt. Natasha Stannard. | GAO-23-106375

The F-22 is a fifth-generation, air superiority fighter that incorporates a stealthy and highly maneuverable airframe, advanced integrated avionics, and engines capable of sustained supersonic flight. The aircraft performs air-to-air and air-to-ground missions and is designed to attack enemy aircraft and ground targets at great distances.

In its fiscal year 2023 budget request, the Air Force proposed retirement of 33 of its Block 20 F-22s—which, according to Air Force leadership, are used for training and not configured as frontline combat aircraft. According to the Air Force, it is cost prohibitive to upgrade the older Block 20 F-22s. The Air Force is also modernizing the aircraft to include enhanced capabilities, including for tactical information transmission, combat identification, navigation, sensors, fuel tanks, and electronic protection.

Department of Navy Programs

EA-18G (Growler)

Figure 9: EA-18G

Source: U.S. Navy/Elizabeth A Wolter. | GAO-23-106375

The EA-18G is the first newly designed electronic warfare aircraft produced in more than 35 years and combines the F/A-18 Super Hornet platform with an advanced electronic warfare suite. The EA-18G provides full-spectrum offensive Airborne Electronic Attack capability to counter enemy Integrated Air Defense Systems and communications.

The fiscal year 2023 budget request includes the proposed divestment of all land-based Growlers, which support joint force requirements for tactical airborne electronic attack capability and capacity. This divestment involves five Growler squadrons based at Naval Air Station Whidbey Island, Washington, and collectively consists of 25 airframes. Half of the aircraft will be divested in fiscal year 2024 and the remainder in fiscal year 2025. According to Navy officials, it is divesting from this ‘non-core’

mission in deference to higher-priority missions, and its remaining sea-based fleet will remain operational.

The Air Force informed Congress that if the Navy goes through with this proposal, it would leave the joint force—particularly the Air Force—without an electronic warfare capability considered critical to its operations. The Navy informed us that the service is currently conducting studies to determine how best to recapitalize the capabilities resident in the EA-18G, which reaches its end of service life in the 2040 time frame. The results of these assessments are expected to inform the fiscal year 2024 budget request. The Navy is also planning to invest in a Growler Block II upgrade, which includes an upgraded Electronic Attack Unit and Reactive Electronic Attack Measures to provide the warfighter with capabilities to counter advanced dynamic Integrated Air Defense Systems.

F/A-18A-D (Hornet)

Figure 10: F/A-18 Hornet

Source: U.S. Marine Corps/ Sgt. Dominic Romero. | GAO-23-106375

The F/A-18A-D is a twin engine, multi-mission tactical aircraft. In its fighter mode, it is used primarily as a fighter escort and air defense; in its attack mode, it is used for interdiction and air support.

Currently employed in the Marine Corps squadrons, the F/A-18A-D is beyond its original service life. Overall, the Department of the Navy expects to spend about $560 million between fiscal years 2023 and 2027 on F/A-18A-D unique upgrades. Along with flight hour extensions, these aircraft require capability upgrades to their radars, electronic warfare suites, and avionics systems to maintain lethality, survivability, and availability to force requirements.

F/A-18E/F (Super Hornet)

Figure 11: F/A-18E

Source: U.S. Navy/Chief Petty Officer Shannon Renfroe. | GAO-23-106375

The F/A-18E/F is a twin-engine strike fighter, air-to-ground attack aircraft, and air-to-air fighter. Its missions include escort and fleet air defense, force projection, interdiction, and close air support, among others.

According to Navy officials, the fiscal year 2023 budget request deferred 19 F/A-18E/F service life modifications (between fiscal years 2023 and 2027)—an effort to increase service life from 6,000 to 10,000 hours—in order to fund other Navy priorities. However, the Navy plans to fund a number of Super Hornet upgrades including the infrared search and track system, which improves the aircraft with the capability for operating in highly contested environments. Additionally, officials noted that while the Navy recently invested in new F/A-18E/F procurements, the last of their initial planned 78 Block III aircraft—aircraft with an extended service life—are expected to be delivered in 2024. While Congress provided additional funding that supported procuring 12 additional F/A-18E/Fs in fiscal year 2022, the Navy stated these new aircraft would be delivered in late 2025 and would have service life remaining until the 2050s. However, Navy officials said they expect to retire these aircraft by the early 2040s with nearly half their service life remaining due to inadequate capability versus a future global power competition threat.

AV-8B (Harrier)

Figure 12: AV-8B

Source: U.S. Marine Corps/Lance Cpl. Dalton Swanbeck. | GAO-23-106375

The AV-8B Harrier is a vertical/short take-off and landing attack aircraft. The AV-8B conducts close air support, intermediate range intercept, and

attack missions. The AV-8B can deploy from aircraft carriers and other suitable seagoing platforms, as well as forward operating bases, expeditionary airfields, and remote landing sites.

The fiscal year 2023 budget requests $9.2 million in research, development, test and evaluation funds to continue design, development, weapons integration, expansion flight test requirements, and safety and reliability improvements to the airframe and engine and to mitigate obsolescence issues. Another $26.7 million in procurement continues the incorporation of electrical and structural enhancements, along with engine safety and inventory sustainment upgrade efforts. These upgrades continue to enable combat deployments and are preparing the platform for continued use through 2028. The F-35B Short Takeoff and Vertical Landing variant is the multi-role strike fighter replacing the AV-8B Harrier.

Joint Programs

F-35 (All Variants-A/B/C)

Figure 13: F-35C

Source: U.S. Air Force/Christian DeLuca and Staff Sgt. Brian Kelly. | GAO-23-106375

The F-35 Lightning II is a strike fighter aircraft that integrates low-observable (stealth) technology with advanced sensors and computer

networking capabilities for the U.S. Air Force, Marine Corps, and Navy. Each service has its own variant of the aircraft with service-specific capabilities.

DOD is now in the fourth year of a $15 billion modernization effort—known as Block 4—to upgrade the hardware and software systems of the F-35. DOD intends for Block 4 to modernize the aircraft and address new threats that have emerged since the aircraft's original requirements were established in 2000. While the military services have been taking delivery of F-35 aircraft with limited Block 4 capabilities since 2019, the new post Block 4 upgrades are under development.[2] Most existing F-35s are getting the Technology Refresh 3 package. Known as TR-3, the package includes updated display units, updated memory system capacity, and updated core processing and computer power.[3]

Further, the F-35 program is in the early stages of planning to modernize the F-35 engine. According to F-35 Joint Program Office officials, the F-35 program will need to modernize the current engine to provide the additional power and thermal management capabilities necessary to support F-35 aircraft modernization.

[2]Previously, we reported that Block 4 was composed of 66 unique capabilities. According to program officials, that number has grown to 88 with new capabilities added.

[3]The program office is undertaking multiple TR-3 related mitigation efforts. For example, if the TR-3 hardware is delayed, the program office plans to install TR-2 hardware and software kits to fill the production gap and retrofit the aircraft with TR-3 kits when they are available. Officials acknowledge that any further delays in TR-3 development could result in a corresponding delay to Block 4 capabilities that require TR-3 to function.

Appendix II: Comments from the Department of Defense

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3600 DEFENSE PENTAGON
WASHINGTON, DC 20301-3600

ACQUISITION

Ms. Marie A. Mak
Director, Contracting and National Security Acquisitions
U.S. Government Accountability Office
441 G Street, NW
Washington DC 20548

Dear Ms. Mak:

This is the Department of Defense (DoD) response to the GAO Draft Report GAO-23-105453, "TACTICAL AIRCRAFT INVESTMENTS: DOD Needs Additional Portfolio Level Analysis to Inform Future Budget Decisions," dated September 21, 2022 (GAO Code 105453).

The Department is providing its official written response to GAO's recommendations for inclusion in the report. All additional technical comments on the report have been adjudicated verbally and via email between the Primary Action Officer (PAO) and your GAO team. A security review has also been conducted, and the paragraph markups will be provided separately.

My point of contact on this matter is Mr. James A. Ruocco, Director, Air Platform and Weapons, and can be reached at james.a.ruocco2.civ@mail.mil or 703-697-7663.

Sincerely,

Tanya M. Skeen

Tanya M. Skeen
Acting Assistant Secretary of Defense
for Acquisition

Enclosure(s):
As stated

GAO DRAFT REPORT DATED SEPTEMBER 21, 2022
GAO-23-105453 (GAO CODE 105453)

"TACTICAL AIRCRAFT INVESTMENTS: DOD Needs Additional Portfolio Level Analysis to Inform Future Budget Decisions"

DEPARTMENT OF DEFENSE COMMENTS TO THE GAO RECOMMENDATIONS

Recommendation 1: The Secretary of Defense should conduct an integrated acquisition portfolio review of all piloted-fixed wing tactical aircraft platforms. The review should analyze key elements including but not limited to portfolio goals; potential overlap; potential tradeoffs; capability gaps; risk; and cost, schedule, and performance information on each platform within the portfolio.

DoD RESPONSE: Concur. The Department intends to conduct an IAPR of piloted-fixed wing tactical aircraft platforms within the next one to two fiscal years.

Recommendation 2: The Secretary of Defense should establish a requirement that ensures the congressional defense committees receive information underpinning its integrated acquisition portfolio review of all piloted fixed-wing tactical aircraft platforms.

DoD RESPONSE: Partially concur. The Department disagrees with GAO's recommendation to establish a requirement to provide information from Integrated Acquisition Portfolio Reviews as information derived from them is pre-decisional and used for internal deliberative purposes. The Department can provide information related to budget decisions about its piloted fixed-wing tactical aircraft platforms to the congressional defense committees via means already required by the National Defense Authorization Act, e.g. the Annual Aviation Inventory and Funding Plan, or via briefings as requested by Congress.

Accessible Text for Appendix II: Comments from the Department of Defense

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U.S. Government Accountability Office
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Sincerely,

Tanya M. Skeen
Acting Assistant Secretary of Defense
for Acquisition

Enclosure(s):
As stated

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"TACTICAL AIRCRAFT INVESTMENTS: DOD Needs Additional Portfolio Level Analysis to Inform Future Budget Decisions"

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Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Marie A. Mak, (202) 512-4841 or makm@gao.gov

Staff Acknowledgments

In addition to the contact named above, Travis Masters (Assistant Director), Megan Setser (Analyst in Charge), Naina Azimov, Vinayak Balasubramanian, John Bumgarner, Breanne Cave, Nick Cornelisse, Tim Moss, Bonita Oden, Terry Richardson, Chris Watson, and Alyssa Weir made key contributions to this report.

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U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548

Strategic Planning and External Liaison

Stephen J. Sanford, Managing Director, spel@gao.gov, (202) 512-4707
U.S. Government Accountability Office, 441