



Testimony

Before the Subcommittees on Seapower
and Readiness and Management
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NAVY AND MARINE CORPS

Rebuilding Ship, Submarine, and Aviation Readiness Will Require Time and Sustained Management Attention

Statement of John H. Pendleton,
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GAO Highlights

Highlights of [GAO-19-225T](#), a testimony before the Subcommittees on Seapower and Readiness and Management Support, Committee on Armed Services, U.S. Senate

Why GAO Did This Study

The 2018 National Defense Strategy emphasizes that restoring and retaining readiness is critical to success in the emerging security environment. The Navy and Marine Corps are working to rebuild the readiness of their forces while growing and modernizing their aging fleet of ships and aircraft. However, achieving readiness recovery goals will take years as both services continue to be challenged to rebuild readiness amid continued operational demands.

This statement provides information on current and future readiness challenges facing (1) the Navy ship and submarine fleet and (2) Navy and Marine Corps aviation. GAO also discusses prior recommendations on Navy and Marine Corps readiness and progress to address them.

This statement is based on previously published work since 2015 related to Navy and Marine Corps readiness challenges, including shipyard workforce and capital investment, ship crewing, weapon system sustainment, the fighter pilot workforce, and modernizing force structure. GAO conducted site visits to the Pacific fleet in November 2018 and analyzed updated data, as appropriate.

What GAO Recommends

GAO has made a total of 45 recommendations in the prior work described in this statement. The Department of Defense concurred with most of them, and has many actions underway, but has not yet fully implemented any. Attention to these recommendations can assist the Navy and the Marine Corps as they seek to rebuild the readiness of their forces.

View [GAO-19-225T](#). For more information, contact John H. Pendleton at (202) 512-3489 or pendletonj@gao.gov.

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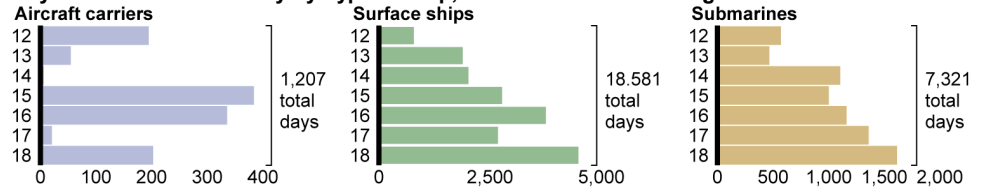
NAVY AND MARINE CORPS

Rebuilding Ship, Submarine, and Aviation Readiness Will Require Time and Sustained Management Attention

What GAO Found

The Navy has taken steps to address training shortfalls in the surface fleet, but faces persistent maintenance and personnel challenges as it seeks to rebuild ship and submarine readiness. While the Navy has corrective actions underway, they will take years to implement. Following ship collisions in 2017, the Navy has taken steps to ensure its crews are trained to standards prior to deployment and made significant progress in those efforts. However, the Navy has struggled to complete ship maintenance—with only 30 percent of maintenance completed on time since fiscal year 2012—leading to thousands of days that ships were unavailable for training and operations (see figure). Additionally, manning shortfalls and experience gaps continue to contribute to high sailor workload and are likely to continue through at least fiscal year 2021. The Navy has developed a plan to improve shipyards and is re-examining its ship manning, among other actions; however, these positive steps have not yet fully addressed GAO's recommendations. Looking to the future, the Navy has indicated that it wants to grow its fleet to meet demands. However, the costs of such growth are not yet known and would likely require resourcing well above currently planned levels.

Days of Maintenance Delay by Type of Ship, Fiscal Years 2012 through 2018



Source: GAO analysis of Navy data. | GAO-19-225T

Navy and Marine Corps aircraft availability has been limited due to numerous challenges (see figure). Specifically, the seven aircraft GAO reviewed have generally experienced decreasing availability since fiscal year 2011 and did not meet availability goals in fiscal years 2017 and 2018. The F-35—the future of naval aviation—also has not met availability goals due to part shortages and poor sustainment planning. In September 2018, the Department of Defense established aggressive targets for aircraft availability. While the Navy and Marine Corps are taking actions to improve aircraft availability, including addressing GAO's recommendations, aviation readiness will take many years to recover.

Sustainment Challenges Affecting Selected Navy and Marine Corps Aircraft

Aircraft	Aging aircraft		Maintenance		Supply support	
	Delays acquiring replacement aircraft	Unexpected replacement of parts and repairs	Delays in depot maintenance	Shortage of depot maintainer personnel	Parts obsolescence	Diminishing manufacturing source
AV-8B	✓	✓	✓	✓	✓	✓
C-2A		✓	✓	✓	✓	✓
E-2C		✓	✓	✓	✓	✓
E-2D			✓	✓	✓	✓
EA-18 G			✓	✓		✓
F/A-18 A-D	✓	✓	✓	✓	✓	✓
F/A-18 E-F		✓	✓	✓		✓

Source: GAO analysis of Navy data. | GAO-19-225T

Chairmen Wicker and Sullivan, Ranking Members Hirono and Kaine, and Members of the Subcommittees:

Thank you for the opportunity to be here today to discuss issues related to Navy and Marine Corps readiness.

In June 2017, we issued a report highlighting five key mission challenges facing the Department of Defense (DOD).¹ In that report, we noted that the United States faces an extremely challenging national security environment at the same time it is grappling with addressing an unsustainable fiscal situation in which DOD accounts for approximately half of the federal government's discretionary spending. Within this environment, DOD is working to both rebuild the readiness of its current forces and modernize to meet future threats. Since we issued that report, the department released a new National Defense Strategy in January 2018 that prioritizes the long-term challenges posed by highly capable adversaries and emphasizes the need to rebuild readiness. Additionally, Congress has passed appropriations to fund DOD's effort to restore readiness.

This statement provides information on current and future readiness challenges facing the (1) Navy ship and submarine fleet and (2) Navy and Marine Corps aviation. In appendix I, we also summarize our recommendations related to Navy and Marine Corps readiness that we have made in prior reports and we summarize any progress the Navy and Marine Corps have made to implement those recommendations.²

This statement is based on prior reports we issued from 2015 through 2018 examining Navy and Marine Corps readiness challenges, shipyard workforce and capital investment, ship crewing, weapon system sustainment, the fighter pilot workforce, and force structure.³ To perform

¹This report included a detailed discussion of our priority recommendations to DOD. Since August 2015, we have identified priority recommendations in letters to the Secretary of Defense—recommendations that we have made to DOD that we believe the department should give a high priority to addressing. See GAO, *Department of Defense: Actions Needed to Address Five Key Mission Challenges*, [GAO-17-369](#) (Washington, D.C.: June 13, 2017). As of April 2018, 85 priority recommendations remained open.

²Appendix I does not include classified recommendations made in classified reports, reports without recommendations, and reports in which we directed recommendations exclusively to the Office of the Secretary of Defense or the Department of the Air Force.

³A list of related classified and unclassified GAO products is provided in the Related GAO Products pages at the end of this statement.

our prior work, we analyzed Navy and Marine Corps readiness, maintenance, personnel, and training data, and interviewed cognizant Navy and Marine Corps officials involved in operations. The reports cited throughout this statement contain more details on the scope of the work and the methodology used to carry it out. This statement also includes updates to information as of November 2018, as appropriate, based on Navy and Marine Corps documentation and discussions with senior Navy leadership, the Fleet Forces Command, the Pacific Fleet, and other officials. We also conducted 10 group discussions with officers and enlisted personnel aboard a cruiser and a destroyer based in Yokosuka, Japan in November 2018 to discuss crew workload, training, and ship manning.⁴ We have also issued several classified reports since 2015 examining these issues and made recommendations to the Navy and the Marine Corps; however, this statement does not include that work.

We conducted the work on which this testimony is based 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.

Background

We testified before the Senate Committee on Armed Services in September 2017 after four significant mishaps at sea resulted in the loss of 17 sailors' lives and serious damage to Navy ships.⁵ We reported on some of the Navy's challenges, including the degraded condition and expired training certifications of ships homeported overseas, reductions to ship crews that contributed to sailor overwork and safety risks, and an inability to complete maintenance on time. Since that time, the Navy has completed two internal reviews to address these and other challenges, identifying 111 recommendations to improve surface fleet readiness. The Navy formed an executive group to guide and closely track the implementation of recommendations, and its reform efforts are ongoing. As of November 2018, the Navy reported that it had implemented 78 (i.e.,

⁴Discussions were held separately with Navy officers and enlisted personnel. The results of the discussions are not generalizable beyond the individuals we talked to.

⁵GAO, *Navy Readiness: Actions Needed to Address Persistent Maintenance, Training, and other Challenges Affecting the Fleet*, [GAO-17-809T](#) (Washington, D.C.: Sept. 19, 2017).

70 percent) of these recommendations. Navy officials recognize that full implementation will take significant time and management attention to address the fundamental readiness challenges identified. In figure 1, we show photographs of two of the four Navy ships involved in significant mishaps that occurred in 2017. Both the USS *Fitzgerald* and the USS *John S. McCain* were involved in collisions that resulted in sailor fatalities.

Figure 1: USS *Fitzgerald* Receiving Dry Dock Repairs and USS *John S. McCain* on Heavy Lift Transport after 2017 Collisions



USS *Fitzgerald*



USS *John S. McCain*

Source: Defense Visual Information Distribution Service. | GAO-19-225T

DOD has reported that more than a decade of conflict, budget uncertainty, and reductions in force structure have degraded its readiness; in response, the department has made rebuilding readiness a priority. The 2018 National Defense Strategy emphasizes that restoring and retaining readiness across the entire spectrum of conflict is critical to success in the emerging security environment. Nevertheless, DOD reported that readiness of the total military force remains low and has remained so since 2013. Our work has shown that the Navy has experienced increasing maintenance challenges as a high pace of operations has continued and maintenance has been deferred.⁶ Maintenance and personnel challenges also hinder readiness recovery of Navy aircraft. For the Marine Corps, our work has shown that ground force readiness has improved and remained stable in recent years, but acute readiness problems remain in aviation units.

⁶[GAO-17-369](#).

Over the past year, DOD has made department-wide progress in developing a plan to rebuild the readiness of the military force, with the military services providing regular input on the status of their readiness recovery efforts.⁷ In August 2018, we reported that the Office of the Secretary of Defense has developed a Readiness Recovery Framework that the department is using to guide the services' efforts and plans to use to regularly assess, validate, and monitor readiness recovery.⁸ The Office of the Secretary of Defense and the services have recently revised readiness goals and accompanying recovery strategies, metrics, and milestones to align with the 2018 National Defense Strategy and Defense Planning Guidance. We have ongoing work assessing DOD's progress in achieving its overall readiness goals.⁹

DOD's readiness rebuilding efforts are occurring in a challenging context that requires the department to make difficult decisions regarding how best to address continuing operational demands while preparing for future challenges. Our work has shown that an important aspect of this, across all of the services, is determining an appropriate balance between maintaining and upgrading legacy weapon systems currently in operational use and procuring new ones to overcome rapidly advancing future threats.

⁷In September 2016, we reviewed DOD and the military services' plans to rebuild readiness and reported that the efforts may be at risk without a department-wide plan for moving forward. We made five recommendations on implementing and overseeing readiness rebuilding efforts. See GAO, *Military Readiness: DOD's Readiness Rebuilding Efforts May Be at Risk without a Comprehensive Plan*, [GAO-16-841](#) (Washington, D.C.: Sept. 7, 2016).

⁸GAO, *Military Readiness: Update on DOD's Progress in Developing a Readiness Rebuilding Plan*, [GAO-18-441RC](#) (Washington, D.C.: Aug. 10, 2018). The Readiness Recovery Framework identifies primary readiness issues that each of the military services face, actions to address identified issues, and milestones and metrics to assess progress in addressing identified issues.

⁹Section 333 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L.No. 115-232 (2018), requires us to report annually until 2021 on the readiness of the armed forces to conduct full spectrum operations in the ground, sea, air, space, and cyber domains.

The Navy Fleet Faces Challenges in Rebuilding Readiness and the Costs Associated with Expanding the Fleet to Enhance Readiness in the Future Are Unknown

Based on updated information we received in November 2018, the Navy has taken steps to provide dedicated training time so its surface forces may meet existing Navy training standards and their training is certified when they deploy. However, the Navy continues to struggle with rebuilding the readiness of the existing fleet due to enduring maintenance and manning challenges. As the Navy seeks to expand its fleet by 25 percent, these challenges will likely be further exacerbated and the Navy will likely face additional affordability challenges.

Navy Has Taken Steps to Address Training Shortfalls in the Surface Fleet

After the collisions in 2017, the Navy focused on training surface ship crews to its existing standards. We testified in September 2017 that there were no dedicated training periods built into the operational schedules of the cruisers and destroyers based in Japan and 37 percent of training certifications for these surface ship crews had lapsed as of June 2017. Since that time, the Navy has worked to ensure surface ships are certified before they are deployed. For example, the Navy has established controls to limit waivers that allowed training lapses to worsen, now requiring multiple high-level approvals for ships to operate uncertified. Based on our analysis of updated data, the Navy has improved markedly in the percentage of cruisers and destroyers with lapsed certifications in Japan, from 41 percent of certifications expired in September 2017 to 9 percent as of November 2018, with less than 3 percent of certifications expired on ships in operational status.

While the Navy has demonstrated its commitment to ensuring that crews are certified prior to deploying, training for amphibious operations and higher-level collective training may not be fully implemented for several years. In September 2017, we reported that some Marine Corps units were limited in their ability to complete training to conduct an amphibious operation—a military operation that is launched from the sea to introduce a landing force ashore—by several factors, including a decline in the number of amphibious ships from 62 in 1990 to 32 as of November 2018, access to range space, and a high pace of deployments, among others. We recommended that the Navy and the Marine Corps develop an approach to mitigate their amphibious operations training shortfalls as the services await the arrival of additional amphibious ships into the fleet. Marine Corps officials told us that the Marine Corps and the Navy are

working together to maximize amphibious training opportunities. Additionally, the Navy has plans to phase in high-level collective training into the operational schedules of its ships homeported in Japan over the next several years. Previously, advanced and integrated training involving multiple ships was conducted ad hoc if at all for ships homeported in Japan. Such collective training is important because the 2018 National Defense Strategy states that the department's principal priority is to prepare for threats from strategic competitors due to the magnitude of the threat they pose. However, in November 2018, officials from Fleet Forces Command told us that fully implementing its training approach to prepare for advanced adversaries would not be fully implemented across the fleet for several years.

The Fleet Faces Persistent Maintenance and Personnel Challenges as the Navy Seeks to Rebuild Readiness

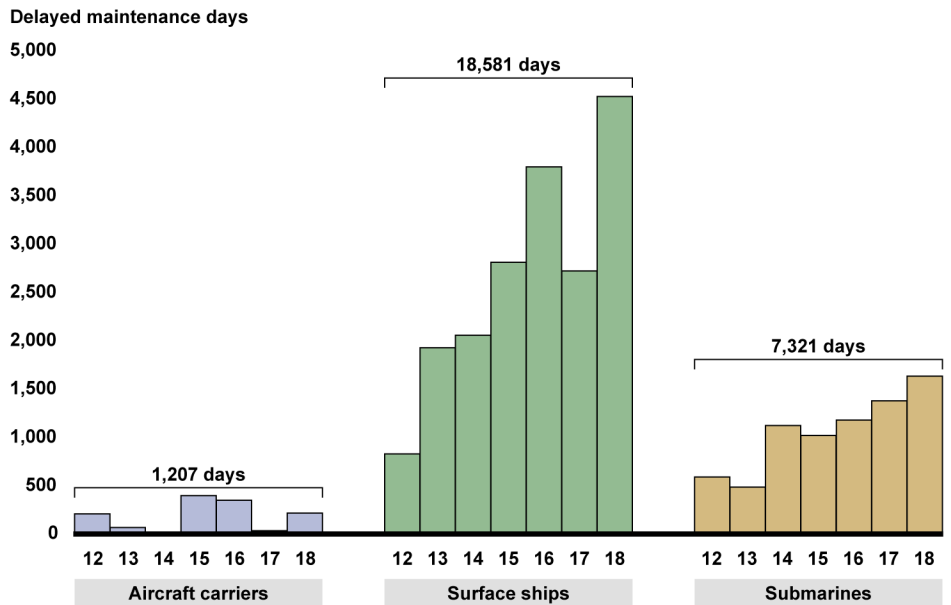
We have reported that the Navy faces persistent challenges in completing maintenance on time and providing sufficient manning to its ships. Unless these challenges are addressed, the Navy will be hampered in its ability to rebuild readiness and prepare for the future.

Maintenance Delays for Ships and Submarines Reduce Time for Training and Operations

Our work has found that the Navy has been unable to complete ship and submarine maintenance on time, resulting in continuing schedule delays that reduce time for training and operations and create costly inefficiencies in a resource constrained environment. The Navy's readiness recovery is premised on the rigorous adherence to deployment, training, and maintenance schedules. However, we reported in May 2016 on the difficulty that both the public and private shipyards were having in completing maintenance on time.¹⁰ We reported that, from 2011 through 2014, about 28 percent of scheduled maintenance for surface combatants was completed on time and 11 percent was completed on time for aircraft carriers. We updated these data as of November 2018 to include maintenance periods completed through the end of fiscal year 2018 and found that the Navy continues to struggle to complete maintenance on time. For fiscal years 2012-2018, our analysis for key portions of the Navy fleet shows that 30 percent of Navy maintenance was completed on time, leading to more than 27,000 days in which ships were delayed and unavailable for training and operations as shown in figure 2 below.

¹⁰GAO, *Military Readiness: Progress and Challenges in Implementing the Navy's Optimized Fleet Response Plan*, [GAO-16-466R](#) (Washington, D.C.: May 2, 2016).

Figure 2: Aircraft Carrier, Surface Ship, and Submarine Days of Maintenance Delay, Fiscal Years 2012–2018



Source: GAO analysis of Navy data. | GAO-19-225T

Note: In order to standardize the analysis across data for aircraft carriers, surface ships, and submarines, we calculated days of maintenance delay based on the difference between actual and planned completion dates. Additionally, these delayed maintenance days are arranged by the fiscal year in which they occurred. We included maintenance delays for converting decommissioned submarines to training ships because those conversions require shipyard resources and workers, and restrict the use of limited drydocks. Delayed maintenance days for aircraft carrier and submarine data for this analysis are limited to the Navy’s public shipyards and do not include data from private shipyards. As we reported in November 2018, attack submarine maintenance performed at private shipyards also experienced delays in execution. Additionally, data are not captured in this analysis for aircraft carrier and submarine maintenance availabilities that began prior to fiscal year 2010, as well as surface ship maintenance availabilities that began prior to fiscal year 2012, that may have resulted in delays that occurred after fiscal year 2012. Data showing delayed maintenance days for aircraft carriers and submarines are as of November 2018; for surface ships the data are as of October 2018.

In addition to affecting training and operations, maintenance delays are costly. In November 2018, we examined attack submarine maintenance delays and reported that the Navy was incurring significant operating and support costs to crew, maintain, and support attack submarines that are delayed getting into and out of shipyard maintenance periods. We estimated that over the past 10 years the Navy has spent \$1.5 billion in fiscal year 2018 constant dollars to support attack submarines that provide no operational capability—those sitting idle no longer certified to conduct normal operations—while waiting to enter the shipyards, and

those delayed in completing their maintenance at the shipyards (see figure 3).¹¹ We recommended that the Navy analyze how it allocates its maintenance workload across public and private shipyards. DOD concurred with our recommendation, stating that it has taken the first steps to take a more holistic view of submarine maintenance requirements and impacts across both the public and private shipyards. In an update provided in November 2018, the Navy told us that they are developing a contracting strategy to conduct two additional depot maintenance periods at private shipyards in the future.

¹¹While acknowledging the magnitude of these costs, Navy officials stated that there may be some benefits that could be realized from supporting these idle attack submarines since crews on idle attack submarines can conduct some limited training. GAO, *Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet*, [GAO-19-229](#) (Washington, D.C.: Nov. 19, 2018).

Figure 3: USS Albany Undergoing an Extended Maintenance Period at Norfolk Naval Shipyard



Source: U.S. Navy. | GAO-19-225T

Our prior work has shown that three primary factors at the naval shipyards contribute to maintenance delays:

- **Poor conditions and aging equipment limit the ability of the shipyards to meet current and future demands.** We reported in September 2017 that facility and equipment limitations at the shipyards contributed to maintenance delays for the aircraft carriers and submarines, hindering the shipyards' ability to support the Navy. Specifically, we found that the shipyards would be unable to support an estimated one-third of maintenance periods planned over the next

23 years.¹² We recommended that the Navy take steps to improve its management of shipyard investments; the Navy concurred with this recommendation and we are encouraged by its response.¹³ For example, the Navy has developed a plan for the optimal placement of facilities and major equipment at each public shipyard, which the Navy estimates can ultimately increase its maintenance efficiency by reducing personnel and materiel travel by an average of 65 percent. This equates to recovering about 328,000 man days per year—an amount roughly equal to that of an aircraft carrier maintenance period. However, the Navy’s preliminary estimate—that this effort will require an estimated \$21 billion and 20 years to address—is well beyond historical funding levels, and does not include some potentially significant costs (e.g., for utilities, roads, or environmental remediation).¹⁴

- **Shipyard workforce gaps and inexperience are limiting factors.** The Navy has reported a variety of workforce challenges at the Navy’s four public shipyards such as hiring personnel in a timely manner and providing personnel with the training necessary to gain proficiency in critical skills.¹⁵ The Navy has noted that some occupations require years of training before workers become proficient. According to Navy officials, a large portion of its workforce is inexperienced. For example, 45 percent of the Puget Sound and 30 percent of the

¹²This estimate did not factor in planned increases to the fleet that would make the shortfalls even greater.

¹³GAO, *Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations*, [GAO-17-548](#) (Washington, D.C.: Sept. 12, 2017). Senate Report 115-130, accompanying a bill for the Military Construction, Veterans Affairs, and Related Agencies Appropriations 2018 and Senate Report 115-125, accompanying a bill for the National Defense Authorization Act for Fiscal Year 2018 directed the Secretary of the Navy to submit a report providing an engineering master plan for the optimal placement of facilities and major equipment to support ship repair functions at each public shipyard, including an investment strategy to address the infrastructure requirements at each shipyard.

¹⁴Naval Sea Systems Command, *Report to Congress: Shipyard Infrastructure Optimization Plan, Report on the Navy’s Strategic Plan for Addressing the Infrastructure Deficiencies at the Public Naval Shipyards* (Washington, D.C.: February 2018).

¹⁵The four public naval shipyards—Portsmouth Naval Shipyard, Norfolk Naval Shipyard, Puget Sound Naval Shipyard and Intermediate Maintenance Facility, and Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility—provide depot-level maintenance, which the Navy describes as the most involved and time-consuming maintenance work (e.g. overhauls, alterations, refits, restorations, nuclear refueling, and deactivations). Two private shipyards—General Dynamics Electric Boat and Huntington Ingalls Industries-Newport News Shipbuilding—build the Navy’s nuclear-powered ships and in some cases provide depot-level maintenance.

Portsmouth Naval Shipyards' skilled workforce have fewer than 5 years of experience. According to DOD officials, workforce shortages and inexperience contribute to maintenance delays. For example, at Pearl Harbor Naval Shipyard, two submarines were delayed approximately 20 months, in part because of shortages in ship fitters and welders, among other skilled personnel. Most of DOD's depots, which include the naval shipyards, have taken actions to maintain critical skills through retention incentives, bonuses, and awards. We plan to issue a report examining DOD's depot skill gaps, including those at the naval shipyards, later this month.

- **Depot supply support may not be cost-effective.** In June 2016, we reported that the naval shipyards and other depots had not implemented actions that would likely improve the cost-effectiveness of their supply operations. Specifically, the Navy had not transferred certain functions to the Defense Logistics Agency (DLA) at the shipyards in the same manner as the Navy and Air Force did for their aviation depots.¹⁶ The Navy and Air Force aviation depots that transferred these functions to DLA had reaped a number of efficiencies in their supply operations, including a 10-percent reduction in backorders over a 5-year period. We recommended that the Navy analyze whether such a transfer of functions is warranted at the shipyards and the Navy concurred with the recommendation.¹⁷ However, as of October 2018, the Navy had not conducted a comprehensive analysis of transferring these functions and had provided no plans to do so.

Navy Processes for Determining Manning of Ships Do Not Account for All Ship Workload

In May 2017, we reported that the Navy's process for determining manpower requirements—the number and skill mix of sailors needed on the Navy's ships—did not fully account for all ship workload.¹⁸ The Navy was using outdated standards to calculate the size of ship crews that may have been leading to overburdened crews working long hours. We

¹⁶The Navy's aviation depots are called Fleet Readiness Centers. The Navy operates three Fleet Readiness Centers at Cherry Point, North Carolina; Jacksonville, Florida; and North Island, California. The Air Force's aviation depots are referred to as Air Logistics Complexes and are located in Warner Robins, Georgia; Oklahoma City, Oklahoma; and Ogden, Utah.

¹⁷GAO, *Defense Inventory: Further Analysis and Enhanced Metrics Could Improve Service Supply and Depot Operations*, [GAO-16-450](#) (Washington, D.C.: June 9, 2016).

¹⁸GAO, *Navy Force Structure: Actions Needed to Ensure Proper Size and Composition of Ship Crews*, [GAO-17-413](#) (Washington, D.C.: May 18, 2017).

recommended steps to help ensure the Navy's manpower requirements meet the needs of the existing and future surface fleet, and the Navy has been studying ship workload and revising its guidance. As of November 2018, the Navy was continuing to analyze the manpower requirements of its ship classes to better size and compose ship crews, and the Navy was also working to improve shipboard manning. However, these efforts are not yet complete and it is too early to assess their effectiveness. Until manpower requirements are reassessed across the fleet, the Navy risks that ship crews will continue to be undersized and sailors will be overworked with potential negative effects on readiness and safety.

Additionally, the Navy provided information in November 2018 that showed that it is taking steps to ensure that ships have a minimum percentage of crew assigned and with the appropriate skills. The Navy has prioritized manning its surface ships homeported overseas. The Navy established a minimum threshold of filling at least 95 percent of authorized billets in its ship crews with sailors (referred to as fill), with a minimum goal of 92 percent of those sailors having the right qualifications for the billet (known as fit). According to Navy officials, the Navy is for the most part meeting its fill goals Navy-wide, but has not consistently met its fit goals. However, during group discussions in November 2018 with ship crews and interviews with Navy officials in Japan, we learned that the Navy's methods for tracking fit and fill do not account for sailor experience and may be inaccurately capturing the actual presence of sailors onboard and available for duty on its ships. Moreover, sailors consistently told us that ship workload has not decreased, and it is still extremely challenging to complete all required workload while getting enough sleep. Navy officials told us that manning challenges will continue through at least fiscal year 2021 as the Navy increases its end strength and trains its new sailors to gain the proper mix of skills to operate and maintain the fleet.

Navy Plans to Expand Its Fleet but Full Costs Are Unknown and Manning an Expanded Fleet Likely Will Be Challenging

To meet continued operational demands, the Navy is planning for the most significant fleet size increase in over 30 years. According to the Navy's fiscal year 2019 shipbuilding plan, the Navy plans to build and maintain a fleet of 355 battle force ships—an increase of about 25 percent above the Navy's current force of 287 ships.¹⁹ To reach its goal, the Navy plans to buy 301 ships through 2048 and extend the service life of its 66 Arleigh Burke class destroyers and up to 7 attack submarines.²⁰ Together, the fiscal year 2019 shipbuilding plan and the service life extensions would allow the Navy to reach a 355-ship fleet by the 2030s.

Congressional Budget Office reporting and our past work have shown that the Navy has consistently and significantly underestimated the cost and timeframes for delivering new ships to the fleet. For example, the Navy estimates that buying the new ships specified in the fiscal year 2019 plan would cost \$631 billion over 30 years while the Congressional Budget Office has estimated that those new ships would cost \$801 billion—a difference of 27 percent.²¹ We also reported in June 2018 that acquisition outcomes for ship classes built during the last 10 years have often not achieved cost, schedule, quality, or performance goals that were established.²² Furthermore, we have reported that:

- all 8 of the lead ships delivered over the past decade that we reviewed were provided to the fleet behind schedule, and more than half of those ships were delayed by more than 2 years,²³ and
- six ships of different classes valued at \$6.3 billion were delivered to the Navy with varying degrees of incomplete work and quality problems.²⁴

¹⁹Department of the Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2019* (February 2018). This plan reflects the Navy's plan to meet its 2016 force structure assessment.

²⁰Of the 301 ships, the Navy plans to purchase 245 combat ships and 56 combat logistics and support ships.

²¹Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2019 Shipbuilding Plan* (Washington, D.C.: October 2018). CBO's estimates are higher than the Navy's because CBO and the Navy made different assumptions about the design and capabilities of some future ships, used different estimating methods, and treated growth in shipbuilding labor and materials costs differently.

²²GAO, *Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments*, [GAO-18-238SP](#) (Washington, D.C.: June 2018).

²³[GAO-18-238SP](#).

As a result of past cost and schedule problems, our work has shown that the Navy has a less-capable and smaller fleet today than it planned over 10 years ago. The Navy has also received \$24 billion more in funding than it originally planned in its 2007 long-range shipbuilding plan but has 50 fewer ships in its inventory today, as compared with the goals it first established. Therefore, we have reported that as the Navy moves forward in implementing its shipbuilding plan it will be paramount for the Navy to learn from and apply lessons learned from the past.

In addition to the cost of buying the ships and submarines to expand fleet size, the Navy will likely face affordability challenges with regard to the manning of an expanded fleet with the right number of sailors with the right mix of skills. In May 2017, we reported that the personnel costs for surface ship classes in fiscal years 2000-2015 were the largest share of total operating and support costs and that careful planning will be needed as new ships are brought into the fleet.²⁵ We also reported that crew sizes on recently inducted ship classes grew from original projections as the Navy gained experience operating them. For example, the total crew size of Littoral Combat Ships has grown from 75 in 2003 to 98 personnel in 2016, a 31-percent increase. Navy officials told us that they plan to better articulate the personnel and resources needed for a larger fleet after fully accounting for workload and right-sizing ship crews. The Navy's end strength has since increased by over 11,000 personnel from fiscal year 2017 levels, which should help alleviate manning challenges as the fleet grows. In November 2018, officials from Fleet Forces Command provided us with projections of its manning shortfalls continuing through at least fiscal year 2021 and steps it was planning to take to mitigate them.

²⁴GAO, *Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality*, [GAO-17-418](#) (Washington, D.C.: July 13, 2017). According to Navy officials, incomplete work and quality problems in acquisition programs shifts repair costs from the shipbuilding accounts to the fleet's operations and maintenance accounts and contributes to a maintenance backlog from the first day the fleet is responsible for the ship.

²⁵[GAO-17-413](#). According to DOD, operating and support costs—which include personnel and maintenance costs—have traditionally constituted about 70 percent of a ship's total life-cycle costs.

Navy and Marine Corps Aging Aircraft and F-35s Face Maintenance and Supply Challenges That Affect Readiness Rebuilding Now and in the Future

Our work has shown that Navy and Marine Corps aircraft availability has been limited by aging aircraft, delayed maintenance, and insufficient supply support. Pilot and maintenance personnel shortfalls further limit readiness recovery across legacy air platforms. The growing F-35 program, which is meant to replace many aging aircraft, has presented additional operational and sustainment challenges, which will likely persist into the future if not corrected. DOD, the Navy, and the Marine Corps have emphasized mission capability of critical aviation platforms—including the Navy and Marine Corps F/A-18s and F-35s—and are taking steps to improve availability, but these efforts will take time to realize results.

Aircraft Availability Has Been Limited by Aging Fleets with Maintenance and Supply Challenges

Navy and Marine Corps aircraft availability has been limited by challenges associated with aging aircraft fleets, depot maintenance, and supply support challenges that limit the services' ability to keep aviation units ready.²⁶ The Navy and Marine Corps spend billions of dollars each year on sustainment, such as for spare parts and depot maintenance, to meet aircraft availability goals.²⁷ However, aircraft availability rates have generally declined since fiscal year 2011. While specific aircraft availability data are considered sensitive by the Navy and the Marine Corps, and cannot be discussed in detail, we found in September 2018 that the Navy and the Marine Corps generally did not meet aircraft availability goals in fiscal years 2011-2016 for the seven aircraft we reviewed. In updating data in November 2018, we found that none of the aircraft met aircraft availability goals for fiscal years 2017 and 2018.

According to the Navy, the pace of operations has increased wear and tear on its aircraft and decreased the time available for maintenance and modernization—a necessity for an aging fleet. For example, the average age of a legacy F/A-18A-D Hornet is 26 years, of an AV-8B Harrier is 21 years, and of the C-2A Greyhound is 29 years. Both services expect







²⁶GAO, *Weapon System Sustainment: Selected Air Force and Navy Aircraft Generally Have Not Met Availability Goals, and DOD and Navy Guidance Need to Be Clarified*, [GAO-18-678](#) (Washington, D.C.: Sept. 10, 2018).

²⁷Based on our analysis of the operating and support (O&S) costs in fiscal years 2011-2016, maintenance cost generally is one of the largest portions—about 42 percent—of total O&S costs for the seven aircraft we reviewed. [GAO-18-678](#).

these aircraft will continue to be used for the foreseeable future and in some cases into the 2030s.²⁸

The Navy and the Marine Corps face delays in the arrival of the F-35 to replace their legacy F/A-18A-D Hornets and AV-8B Harriers.²⁹ To compensate for the delay, the Navy and the Marine Corps are planning to procure additional aircraft, such as the F/A-18E-F Super Hornet, and extend the service life and upgrade the capabilities of their legacy aircraft. However, these efforts and the sustainment of the Navy and Marine Corps legacy aircraft fleet face key challenges as shown in figure 4.

Figure 4: Sustainment Challenges Affecting Selected Navy and Marine Corps Aircraft

Aircraft	Aging aircraft		Maintenance		Supply support	
	 Delays in acquiring replacement aircraft	 Unexpected replacement of parts and repairs	 Delays in depot maintenance	 Shortage of depot maintainer personnel	 Parts obsolescence ^a	 Diminishing manufacturing source ^b
AV-8B	✓	✓	✓	✓	✓	✓
C-2A		✓	✓	✓	✓	✓
E-2C		✓	✓	✓	✓	✓
E-2D			✓	✓	✓	✓
EA-18 G			✓	✓		✓
F/A-18 A-D	✓	✓	✓	✓	✓	✓
F/A-18 E-F		✓	✓	✓		✓

Source: GAO analysis of Navy data. | GAO-19-225T

^aObsolescence is a lack of availability of a part due to its lack of usefulness or it is no longer current or available for production.

^bDiminishing manufacturing source is a loss or impending loss of manufacturers or suppliers of items.

²⁸GAO-18-678.

²⁹GAO-18-678.

Specifically, our prior work has shown that the Navy and the Marine Corps are confronted with two sets of challenges in sustaining their aircraft:

- **Depot maintenance complexities for aging aircraft and spare parts availability.** Depot maintenance on aging weapon systems, including Navy and Marine Corps aircraft, becomes less predictable as structural fatigue occurs and parts that were not expected to be replaced begin to wear out.³⁰ While the Navy and the Marine Corps reported that sustainment funding accounts, such as those for depot maintenance and spare parts, have been funded at increased levels in fiscal years 2017 and 2018, efforts to improve spare parts availability take time to produce results due to long lead times for acquiring some items. In addition, Navy and Marine Corps aircraft face challenges associated with diminishing manufacturing sources and parts obsolescence. DOD has a program intended to manage these risks, but we reported in September 2017 that its implementation varied across DOD weapon system program offices.³¹ We made recommendations to improve the program's management; DOD concurred and has initiated improvement efforts.
- **Maintenance personnel inexperience and retention.** The Navy has had difficulty attracting and retaining skilled maintainers, such as sheet metal workers and machinists at its aviation depots (i.e., Fleet Readiness Centers), which directly affects its ability to complete planned maintenance. Some of the depots experienced challenges attracting and retaining skilled personnel due to competition with nearby contractors that are able to offer higher pay, according to Navy depot officials. Similar to the shipyards, the aviation depots also lack experienced personnel, affecting the efficiency and quality of maintenance. For example, 41 percent of the skilled workers at Fleet Readiness Center Southwest have 2 years or fewer of experience. Workforce inexperience and attrition of skilled personnel were some of the reasons cited for machining defects detected in the landing

³⁰For additional information on this issue, see GAO, *Defense Inventory: Further Analysis and Enhanced Metrics Could Improve Service Supply and Depot Operations*, [GAO-16-450](#) (Washington, D.C.: June 9, 2016).

³¹The Diminishing Manufacturing Sources and Material Shortages program is meant to address parts supply challenges. GAO, *Defense Supply Chain: DOD Needs Complete Information on Single Sources of Supply to Proactively Manage the Risks*, [GAO-17-768](#) (Washington, D.C.: Sept. 28, 2017).

gear for F/A-18, E-2, and C-2A aircraft by a recent Navy report.³² All of the depots have undertaken retention efforts such as incentives, bonuses, and awards to address these issues.

Until the Navy and Marine Corps address maintenance and supply challenges it will be difficult to meet Secretary of Defense-established mission capability goals. Specifically, in September 2018, the Secretary of Defense issued a memorandum emphasizing that a key component of implementing the 2018 National Defense Strategy is ensuring critical aviation platforms meet their mission capability targets by the end of fiscal year 2019. The memorandum established a goal of achieving a minimum of 80-percent mission capable rates for various aircraft, including for the Navy's and Marine Corps' F/A-18 inventories, by the end of fiscal year 2019 while also reducing operating and maintenance costs. To accomplish this, the Navy and the Marine Corps developed the Return to Readiness strategy in November 2018 that includes a broad array of actions to improve the availability of spare parts and evaluate the application of best commercial practices to naval aviation sustainment, among other actions. Office of the Secretary of Defense and Navy program officials told us, and based on our prior work we agree, that this goal will be challenging to achieve by the end of fiscal year 2019.

Pilot Shortages Have Worsened in Recent Years and Are Projected to Remain through 2023

We reported in April 2018 that fighter pilot shortages in the Navy and the Marine Corps have been worsening in recent years and shortfalls are projected to remain through at least fiscal year 2023.³³ Our analysis of Navy and Marine Corps data showed that the Navy's shortage of first operational tour fighter pilots more than doubled from 12 percent in fiscal year 2013 to 26 percent in fiscal year 2017.³⁴ Similarly, the Marine Corps' overall shortage of fighter pilots quadrupled from 6 percent in fiscal year 2006 to 24 percent in fiscal year 2017.

Also, as we reported in April 2018, service officials attributed the pilot shortages to reduced training opportunities and increased attrition due to career dissatisfaction, among other factors. Officials from both services

³²Commander, *Fleet Readiness Centers: Fleet Readiness Southwest Landing and Arresting Gear Quality Escape Investigation Report*, May 11, 2017.

³³GAO, *Military Personnel: DOD Needs to Reevaluate Fighter Pilot Workforce Requirements*, [GAO-18-113](#) (Washington, D.C.: Apr. 11, 2018).

³⁴A fighter pilot's first operational tour at sea is completed between 3 and 6 years of service.

stated at the time that they have ensured that deploying squadrons have been fully staffed with fighter pilots by using various approaches including using senior pilots to staff junior positions and having pilots deploy more frequently and for longer periods. However, we reported that squadron leaders and fighter pilots said that these approaches had a negative impact on the fighter pilot training and retention and ultimately may be exacerbating the situation.

Further compounding their pilot shortages, we also found that the services have not recently reevaluated squadron requirements to reflect an increased fighter pilot workload. As a result, the reported shortage actually could be greater. The services were taking actions, including increasing retention incentives for fighter pilots. To help determine the magnitude of the shortages and help target strategies to better meet their personnel needs, we recommended, and the Navy and Marine Corps agreed, to reevaluate fighter pilot squadron requirements.

New F-35 Aircraft Facing Sustainment and Operational Challenges

Sustainment challenges are not just an issue for older aircraft, but represent an enduring challenge for the F-35 Lightning II aircraft—a key component to the future of tactical aviation for the Navy and Marine Corps. The Navy and Marine Corps are both flying F-35s now as the program ramps up development, and they plan to procure nearly 700 aircraft over the coming decades. The sustainment costs of the F-35 fleet are projected to exceed \$1 trillion over its 60-year life cycle. In October 2017, we reported that:

- F-35B aircraft (including Marine Corps aircraft) were *available* (i.e., the aircraft were safe to fly, available for use, and able to perform at least one tasked mission) about 52 percent of the time from March 2017 through June 2017, which fell short of the 65-percent goal established by the Marine Corps for non-deployed units and
- F-35B aircraft (including Marine Corps aircraft) were *fully mission capable* (i.e., the aircraft were capable of accomplishing all tasked missions) about 15 percent of the time from March 2017 through June 2017, which fell short of the 60-percent goal established by the Marine

Corps for non-deployed units.³⁵

We also reported on numerous sustainment challenges leading to less than desirable outcomes for F-35 warfighter readiness. For example, F-35 aircraft were unable to fly 22 percent of the time because of parts shortages from January 2017 through August 7, 2017. Additionally, DOD's capabilities to repair F-35 parts at military depots were 6 years behind schedule, which resulted in average part repair times that are twice that of the program's objective.

As DOD gains experience with the F-35, our work has shown that the department has encountered additional challenges. In 2017, the Marine Corps became the first military service to station F-35 aircraft overseas, transferring aircraft to Iwakuni, Japan. While in the Pacific, DOD expects to disperse its F-35s into smaller detachments to outmaneuver the enemy and counter regional threats. However, in April 2018, we reported that this approach posed logistics and supply challenges.³⁶ In June 2018, we reported that the F-35 program had not improved its reliability and maintainability over the past year and continued to fall short on half of its performance targets.³⁷ Furthermore, we found that the program may not meet its required targets before each variant of the F-35 is expected to demonstrate maturity—the point at which the aircraft has flown enough hours to predictably determine reliability and maintainability over its lifespan. This means that the Navy and the Marine Corps may have to decide whether they are willing to accept less reliable and maintainable aircraft than originally planned. Among other outcomes, this could result in higher maintenance costs and lower aircraft availability than anticipated which also could pose readiness challenges in the future. As we reported

³⁵GAO, *F-35 Aircraft Sustainment: DOD Needs to Address Challenges Affecting Readiness and Cost Transparency*, [GAO-18-75](#) (Washington, D.C.: Oct. 26, 2017). At the time of our October 2017 report, the information presented here, including aircraft availability and mission capability rates, and the goals for those metrics, were not considered sensitive by the department. The Navy considers the current rates and goals to be sensitive.

³⁶GAO, *Warfighter Support: DOD Needs to Share F-35 Operational Lessons Across the Military Services*, [GAO-18-464R](#) (Washington, D.C.: Apr. 25, 2018). This was a public version of a more detailed March 2018 classified report.

³⁷GAO, *F-35 Joint Strike Fighter: Development Is Nearly Complete, but Deficiencies Found in Testing Need to Be Resolved*, [GAO-18-321](#) (Washington, D.C.: June 5, 2018).

in October 2017, the poor reliability of certain parts is already contributing to shortages of F-35 spare parts.³⁸

Challenges posed by the F-35 program are largely the result of sustainment plans that do not fully include or consider key requirements. Our work has shown that planning for sustainment and aligning its funding are critical if DOD wants to meet its aircraft availability goals and effectively deploy to support operations. To address the challenges associated with F-35 sustainment and operational deployment, we recommended that DOD revise its sustainment plans, align associated funding, and mitigate the risks associated with key supply chain-related challenges for deployed F-35s in the Pacific, among others.³⁹ DOD concurred with these recommendations and stated that it is taking steps to address them. Furthermore, as previously discussed, the Secretary of Defense has established an 80-percent mission capability goal for critical aviation assets, including the F-35. Due to current low availability and numerous sustainment issues, the F-35 fleet will be challenged in meeting the goal.

In sum, the Navy's and Marine Corps' significant readiness challenges have developed over more than a decade of conflict, budget uncertainty, and reductions in force structure. Both services have made encouraging progress identifying the causes of their readiness decline and have begun efforts to arrest and reverse it; however, our prior work shows that fully addressing the persistent readiness challenges will require years of sustained management attention. Our work cited today contains 25 specific recommendations to the Navy and the Marine Corps and an additional 20 recommendations to various other DOD components to assist these services in rebuilding the readiness of their forces and in modernizing for the future. Attention to these recommendations can assist the Navy and the Marine Corps as they seek to rebuild the readiness of their forces.

Chairmen Wicker and Sullivan, Ranking Members Hirono and Kaine, and Members of the Subcommittees, this concludes my prepared statement. I would be pleased to respond to any questions you may have at this time.

³⁸[GAO-18-75](#).

³⁹[GAO-18-75](#) and [GAO-18-464R](#).

GAO Contact and Staff Acknowledgments

If you or your staff have questions about this testimony, please contact John H. Pendleton, Director, Defense Capabilities and Management at (202) 512-3489 or pendletonj@gao.gov.

Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Suzanne Wren, Assistant Director; Clarine Allen; Steven Banovac; John Bumgarner; Chris Cronin; Benjamin Emmel; Cynthia Grant; Mae Jones; Amie Lesser; Tobin McMurdie; Shahrzad Nikoo; Carol Petersen; Cody Raysinger; Michael Silver; John E. "Jet" Trubey; and Chris Watson.

Appendix I: Implementation Status of Prior GAO Recommendations Related to Navy and Marine Corps Readiness

Over the past 4 years, we have issued a number of reports related to Navy and Marine Corps readiness and we used them to develop this statement. Table 1 summarizes the recommendations in these reports.¹ The Department of Defense (DOD) concurred with most of the 45 recommendations and has many actions underway. However, DOD has not fully implemented any of the recommendations to date. For each of the reports, the specific recommendations and any progress made in implementing them are summarized in tables 2 through 16.

¹This summary does not include classified recommendations made in classified reports, reports without recommendations, and reports in which we directed recommendations exclusively to the Office of the Secretary of Defense or the Department of the Air Force.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Table 1: Recommendations That GAO Has Made Since 2015 on Navy and Marine Corps Readiness Cited in This Report

Product date	Product title and number	Number of open recommendations
Recommendations to Navy and Marine Corps		
November 19, 2018	<i>Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet (GAO-19-229)</i>	1 ^a
September 10, 2018	<i>Weapon System Sustainment: Selected Air Force and Navy Aircraft Generally Have Not Met Availability Goals, and DOD and Navy Guidance Need to Be Clarified (GAO-18-678)</i>	1 ^b
April 11, 2018	<i>Military Personnel: DOD Needs to Reevaluate Fighter Pilot Workforce Requirements (GAO-18-113)</i>	2 ^c
March 28, 2018	<i>Military Aircraft: F-35 Brings Increased Capabilities, but the Marine Corps Needs to Assess Challenges Associated with Operating in the Pacific (GAO-18-79C)</i>	2 ^d
September 26, 2017	<i>Navy and Marine Corps Training: Further Planning Needed for Amphibious Operations Training (GAO-17-789)</i>	3
September 12, 2017	<i>Naval Shipyards: Actions Needed to Improve Poor Conditions That Affect Operations (GAO-17-548)</i>	3
July 13, 2017	<i>Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality (GAO-17-418)</i>	4
May 18, 2017	<i>Navy Force Structure: Actions Needed to Ensure Proper Size and Composition of Ship Crews (GAO-17-413)</i>	4
September 7, 2016	<i>Military Readiness: DOD's Readiness Rebuilding Efforts May Be at Risk without a Comprehensive Plan (GAO-16-841)</i>	3 ^e
May 29, 2015	<i>Navy Force Structure: Sustainable Plan and Comprehensive Assessment Needed to Mitigate Long-Term Risks to Ships Assigned to Overseas Homeports (GAO-15-329)</i>	2
Subtotal		25
Recommendations to DOD components in coordination with Navy and Marine Corps		
June 5, 2018	<i>F-35 Joint Strike Fighter: Development Is Nearly Complete, but Deficiencies Found in Testing Need to Be Resolved (GAO-18-321)</i>	2
April 25, 2018	<i>Warfighter Support: DOD Needs to Share F-35 Operational Lessons Across the Military Services (GAO-18-464R)</i>	2 ^f
October 26, 2017	<i>F-35 Aircraft Sustainment: DOD Needs to Address Challenges Affecting Readiness and Cost Transparency (GAO-18-75)</i>	4
September 28, 2017	<i>Defense Supply Chain: DOD Needs Complete Information on Single Sources of Supply to Proactively Manage the Risks (GAO-17-768)</i>	6
June 9, 2016	<i>Defense Inventory: Further Analysis and Enhanced Metrics Could Improve Service Supply and Depot Operations (GAO-16-450)</i>	6
Subtotal		20
Total		45

Source: GAO analysis. | [GAO-19-225T](#)

Appendix I: Implementation Status of Prior GAO Recommendations Related to Navy and Marine Corps Readiness

Note: This table does not include classified recommendations made in classified reports, reports without recommendations, and reports in which we directed recommendations exclusively to the Office of the Secretary of Defense or the Department of the Air Force.

^aGAO-19-229 is an unclassified version of a GAO-19-192C that included three additional classified recommendations to Navy leadership, that are not counted here.

^bGAO-18-678 included a recommendation directed to the Office of the Secretary of Defense, that is not counted here.

^cGAO-18-113 included a recommendation directed to the Secretary of the Air Force, that is not counted here.

^dGAO-18-79C is a classified report that included four recommendations, all of which were deemed unclassified by DOD. Two recommendations were directed to the Commandant of the Marine Corps and are included here. The other two recommendations were directed to the F-35 Program Executive Officer and are included in GAO-18-464R.

^eGAO-16-841 included two recommendations directed to the Office of the Secretary of Defense, and are not counted here.

^fGAO-18-464R is an unclassified version of GAO-18-79C. Two recommendations were directed to the F-35 program office and are included here. The other two recommendations were directed to the Commandant of the Marine Corps and are included in GAO-18-79C.

Table 2: Status of Recommendations from Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet (GAO-19-229)

Recommendation #1:	
<p>The Secretary of the Navy should ensure that the Chief of Naval Operations conducts a business case analysis to inform maintenance workload allocation across public and private shipyards; this analysis should include an assessment of private shipyard capacity to perform attack submarine maintenance, and should incorporate a complete accounting of both (a) the costs and risks associated with attack submarines sitting idle and (b) the qualitative benefits associated with having the potential to both mitigate risk in new submarine construction and provide additional availability to the combatant commanders.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: In response to our report, DOD stated that it has taken the first steps to take a more holistic view of submarine maintenance requirements and impacts across both the public and private shipyards. In an update provided in November 2018, the Navy told us that they are developing a contracting strategy to conduct two additional depot maintenance periods at private shipyards in the future.</p>

Source: GAO analysis. | GAO-19-225T

Note: This table does not include three recommendations directed to Navy leadership that were deemed classified by DOD.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Table 3: Status of Recommendations from *Weapon System Sustainment: Selected Air Force and Navy Aircraft Generally Have Not Met Availability Goals, and DOD and Navy Guidance Need to Be Clarified (GAO-18-678)*

Recommendation #1:	
The Secretary of the Navy should update or issue new guidance clarifying the requirements for documenting sustainment strategies for legacy weapon systems, including for fixed-wing aircraft.	Status: Open
	Concurrence: Yes
	Comments: We will monitor DOD's efforts to address this recommendation.

Source: GAO analysis. | [GAO-19-225T](#)

Note: This table does not include a recommendation that was directed to the Office of the Secretary of Defense.

Table 4: Status of Recommendations from *Military Personnel: DOD Needs to Reevaluate Fighter Pilot Workforce Requirements (GAO-18-113)*

Recommendation #1:	
The Secretary of the Navy should ensure that the Chief of Naval Operations reevaluate fighter pilot squadron requirements, to include updating current assumptions of fighter pilot workload and assessing the impact of future incorporation of Unmanned Aerial Systems platforms into combat aviation.	Status: Open
	Concurrence: Yes
	Comments: DOD noted that across the Navy, many organizations and offices including the resource sponsor (Naval Air Forces) will play integral roles in determining the future size and mix of manpower requirements for fighter pilot squadrons. We will continue to monitor DOD actions taken to address this recommendation.
Recommendation #2:	
The Secretary of the Navy should ensure that the Commandant of the Marine Corps and the Deputy Commandant for Aviation reevaluate fighter pilot squadron requirements.	Status: Open
	Concurrence: Yes
	Comments: DOD noted that across the Marine Corps, many organizations and offices in addition to the Deputy Commandant for Aviation play integral roles in the continuous evaluation and determination regarding current and future size and mix of manpower requirements for fighter and attack squadrons. We will continue to monitor DOD actions taken to address this recommendation.

Source: GAO analysis. | [GAO-19-225T](#)

Note: This table does not include a recommendation that was directed to the Secretary of the Air Force.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Table 5: Status of Recommendations from *Military Aircraft: F-35 Brings Increased Capabilities, but the Marine Corps Needs to Assess Challenges Associated with Operating in the Pacific* (GAO-18-79C)

Recommendation #1:	
The Commandant of the Marine Corps should assess the risks associated with key supply chain-related challenges related to operating and sustaining the F-35 in the Pacific, and determine how to mitigate these risks.	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: According to DOD officials, as of July 2018, the Marine Corps was engaging in a number of risk mitigation efforts for key supply-chain-related challenges related to operating and sustaining the F-35 in the Pacific, working with key stakeholders, including the Joint Program Office, industry, and entities such as the Defense Logistics Agency and the U.S. Transportation Command. Current risk mitigation efforts already underway include a strategy to ensure that spare parts with a delivery time of greater than 2 years are placed on contract, as are plans to increase local repair capability to capitalize on resident skill already possessed by the local Marine Aviation Logistics Squadron. Other risk mitigation efforts currently under consideration include material lay-in investments to improve supplier capacity and performance, and assessment of the delivery times for off-station repair parts to mitigate future risks. The Marine Corps continues to assess supply-chain-related challenges in the Pacific and will continue to develop risk mitigation strategies in response to those challenges. We are encouraged by the Marine Corps' focus on the potential risks associated with key supply-chain-related challenges in the Pacific. However, until these assessments are complete and the Marine Corps has determined how to mitigate these risks, this recommendation will remain open.</p>
Recommendation #2:	
The Commandant of the Marine Corps should determine the F-35's ability to support distributed operations through the use of exercises and/or analyses.	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: According to DOD officials, as of July 2018, the Marine Corps continued to assess the F-35's ability to support distributed operations through the Marine Corps' Training and Exercise Employment Plan in preparation for real world operations. These exercises include land-based and shipboard operations. The Marine Corps has also established Deployment Transfer Locations throughout the Pacific in order to support distributed operations. We are encouraged by the Marine Corps' continued focus on the F-35's ability to support distributed operations in the Pacific. However, until the Marine Corps determines its ability to support distributed operations through exercises and/or analyses, this recommendation will remain open.</p>

Source: GAO analysis. | [GAO-19-225T](#)

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Note: This report is classified and included four recommendations, all of which were deemed unclassified by DOD. Two recommendations were directed to the Commandant of the Marine Corps and are included here. The other two recommendations were directed to the F-35 Program Executive Officer and are included in table 13, which summarizes [GAO-18-464R](#).

Table 6: Status of Recommendations from Navy and Marine Corps Training: Further Planning Needed for Amphibious Operations Training (GAO-17-789)

Recommendation #1:	
<p>The Secretary of the Navy, in coordination with the Chief of Naval Operations and the Commandant of the Marine Corps, should develop an approach, such as building upon the Amphibious Operations Training Requirements review, to prioritize available training resources, systematically evaluate among training resource alternatives to achieve amphibious operations priorities, and monitor progress toward achieving them.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: Marine Corps officials told us that as of August 2018, the Marine Corps has ongoing actions intended to address this recommendation. For example, the Marine Corps is developing an annual requirements order detailing the naval ship services required to execute amphibious operations training. Once issued, the order will be used to schedule naval ship training support to optimize amphibious training opportunities and to identify joint- and service-level exercises that may provide venues and resources for amphibious operations training. These officials stated that the Navy and Marine Corps are also developing joint amphibious training plans to support Marine Corps amphibious readiness standards. Completion of these actions should allow the Navy and Marine Corps to better mitigate amphibious operations training shortfalls.</p>
Recommendation #2:	
<p>The Secretary of the Navy, in coordination with the Chief of Naval Operations and the Commandant of the Marine Corps, should clarify the organizations responsible and time frames to define and articulate common outcomes for naval integration and use those outcomes to (1) develop a joint strategy; (2) more fully establish compatible policies, procedures, and systems; (3) better leverage training resources; and (4) establish mechanisms to monitor results.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: As of August 2018, the Department of the Navy had identified ongoing actions intended to address this recommendation. Specifically, the Navy is developing a joint Navy and Marine Corps strategy for naval integration with common outcomes. Additionally, the Navy is studying the feasibility of developing compatible Navy and Marine Corps scheduling systems to address amphibious training requirements. Completion of these actions should help align Navy and Marine Corps efforts to maximize training opportunities for amphibious operations.</p>

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #3:

The Commandant of the Marine Corps should develop guidance for the development and use of virtual training devices that includes (1) developing requirements for virtual training devices that consider and document training tasks and objectives, required proficiency, and available training time; (2) setting target usage rates and collecting usage data; and (3) conducting effectiveness analysis of virtual training devices that defines a consistent process for performing the analysis, including the selection of the devices to be evaluated, guidelines on conducting the analysis, and the data that should be collected and assessed.

Status: Open

Concurrence: Yes

Comments: As of August 2018, the Marine Corps had completed some actions intended to address the recommendation, and had additional actions ongoing. For example, in June 2017 the Marine Corps issued the Marine Corps Ground Training Simulations Implementation Plan. The plan provides a framework for the Marine Corps' use of current and future simulations technology and virtual training environments to align training efforts and resource requirements. According to Marine Corps officials, as part of the implementation plan, the Marine Corps is also developing an analysis of alternatives to inform its virtual training developmental efforts that considers training tasks, required proficiency, and available training time. Additionally, Marine Corps officials told us they are implementing the Ground Simulation Training Effectiveness Program, which provides guidelines on conducting effectiveness analysis, including selecting the devices to be evaluated and identifying the data that should be collected and assessed. Once fully implemented, these actions should help the Marine Corps more effectively and efficiently integrate virtual training devices into operational training.

Source: GAO analysis. | [GAO-19-225T](#)

Table 7: Status of Recommendations from Naval Shipyards: Actions Needed to Improve Poor Conditions That Affect Operations (GAO-17-548)

Recommendation #1:

The Secretary of the Navy should develop a comprehensive plan for shipyard capital investment that establishes (1) the desired goal for the shipyards' condition and capabilities; (2) an estimate of the full costs to implement the plan, addressing all relevant requirements, external risk factors, and associated planning costs; and (3) metrics for assessing progress toward meeting the goal that include measuring the effectiveness of capital investments.

Status: Open

Concurrence: Yes

Comments: As of October 2018, Naval Sea Systems Command had produced a Shipyard Optimization Report, a plan intended to guide the overhaul and improvement of the naval shipyards, which the Navy presented to Congress in February 2018. However, the plan did not include metrics for assessing progress. Navy officials have stated that the Navy intends to develop metrics to meet this element, but that this development will take place during a second phase that will be complete in fiscal year 2019.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #2:

The Secretary of the Navy should conduct regular management reviews that include all relevant stakeholders to oversee implementation of the plan; review metrics; assess the progress made toward the goal; and make adjustments, as necessary, to ensure that the goal is attained.

Status: Open

Concurrence: Yes

Comments: In June 2018, the Navy issued NAVSEA Notice 5450, which established a new program management office responsible for planning, developing, scheduling, budgeting, and sustaining the replacement of shipyard facilities and equipment. By creating this office, the Navy has taken a first step toward establishing a result-oriented management approach, but additional steps, such as identifying all relevant stakeholders, holding meetings, and reviewing oversight metrics are needed to fully address this recommendation.

Recommendation #3:

The Secretary of the Navy should provide regular reporting to key decision makers and Congress on the progress the shipyards are making to meet the goal of the comprehensive plan, along with any challenges that hinder that progress, such as cost. This may include reporting on progress to reduce their facilities restoration and modernization backlogs, improve the condition and configuration of the shipyards, and recapitalize capital equipment.

Status: Open

Concurrence: Yes

Comments: DOD officials stated in October 2018 that the Naval Sea Systems Command's Shipyard Optimization Report, along with the creation of the Readiness Reform Oversight Council, address this recommendation. While the Readiness Reform Oversight Council does appear to involve some of the key stakeholders who should be receiving the regular reporting we recommended, regular reporting on progress cannot be achieved with only a single disclosure at the beginning of the effort. While it is possible that the newly created Shipyard Program Management Office will be able to provide such reporting, that organization is still being developed. We will continue to monitor DOD actions taken to address this recommendation.

Source: GAO analysis. | [GAO-19-225T](#)

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Table 8: Status of Recommendations from *Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality* (GAO-17-418)

Recommendation #1:	
<p>The Secretary of the Navy should revise the Navy’s ship delivery policy to clarify what types of deficiencies need to be corrected and what mission capability (including the levels of quality and capability) must be achieved at (1) delivery and (2) when the ship is provided to the fleet (at the obligation work limiting date). In doing so, the Navy should clearly define what constitutes a complete ship and when that should be achieved.</p>	<p>Status: Open</p> <hr/> <p>Concurrence: No</p> <hr/> <p>Comments: Navy acquisition officials confirmed that the ship delivery policy, OPNAVINST 4700.8K, is the primary policy governing the delivery and post-delivery process for ships. Additionally, we reviewed the other policies identified by DOD during the course of our audit and found that they were not focused on construction and the post-delivery period, and did not provide guidance on the level of quality and completeness expected when ships are provided to the fleet. As such, we maintain that the Navy’s ship delivery policy is a key instruction for ensuring that complete, mission-capable ships are provided to the fleet. In line with our finding that the Navy’s ship delivery policy has not ensured complete and mission-capable ships are being delivered to the fleet, Congress included a provision in the John S. McCain National Defense Authorization Act for Fiscal Year 2019 that stipulated that the Navy could no longer count ships toward its battle force at commissioning, which occurs shortly after delivery, and instead may only count ships in the battle force once they were both commissioned and capable of contributing to the Navy’s missions. In continuing to not acknowledge the importance of its ship delivery policy and taking steps to clarify it, the Navy is missing important opportunities to improve the completeness and capability of its ships and remains at risk of providing ships to the fleet with significant quality problems. To fully implement this recommendation, the Navy should revise its ship delivery policy to clearly define what constitutes a complete and defect-free ship and by when that should be achieved.</p>

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #2:

The Secretary of the Navy should reconcile policy with practice to support the Navy Board of Inspection and Survey's role in making a recommendation for fleet introduction. Accomplishing this may require a study of the current timing of ship trials, and the costs and benefits associated with adding a Navy Board of Inspection and Survey assessment prior to providing ships to the fleet.

Status: Open

Concurrence: No

Comments: DOD noted that the current timing of Navy Board of Inspection and Survey trials provides the Navy with an opportunity to ensure contractual obligations have been met and identify construction deficiencies for correction during the post-delivery period. DOD also stated that adding another Navy Board of Inspection and Survey trial at the end of the post-delivery period would not be cost-effective and could delay ship deployment schedules. However, we found that most of the significant construction deficiencies identified prior to delivery were not corrected until the post-delivery period, and that the Navy Board of Inspection and Survey generally did not have an opportunity to inspect these corrections before ships were provided to the fleet. Given this, we maintain that the Navy should reassess the timing of its post-delivery trials in support of the Navy Board of Inspection and Survey's responsibility to make recommendations for fleet introduction. Until this occurs, the Navy will continue to be at risk of providing ships to the fleet with significant deficiencies.

Recommendation #3:

The Secretary of the Navy should reflect additional ship milestones in Selected Acquisition Reports to Congress, including obligation work limiting dates and readiness to deploy.

Status: Open

Concurrence: Partial

Comments: DOD agreed to report obligation work limiting dates in its Selected Acquisition Reports to Congress and is in the process of making this change. DOD plans include obligation work limiting dates in the Navy's 2018 Selected Acquisition Reports and to fully implement this change by March 2019. However, DOD did not agree to report ready-to-deploy dates in the Selected Acquisition Reports to Congress, noting that operational factors outside of acquisition concerns can affect the timing of this milestone. While we agree that readiness to deploy is a fleet determination, we continue to believe that this date is important for congressional oversight, as it remains the best milestone for determining when a ship has achieved a sufficient level of completeness to operate under the Navy's current framework for ship delivery.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #4:

The Secretary of the Navy should, in Selected Acquisition Reports to Congress, ensure that the criteria used to declare initial operational capability aligns with DOD guidance, and reflect the definition of this milestone in the reports.

Status: Open

Concurrence: Yes

Comments: For shipbuilding programs that have not yet achieved initial operational capability, the Navy will include the initial operational capability definition in its 2018 Selected Acquisition Reports to Congress. DOD is in the process of making this change and plans to complete the effort by March 2019. However, to fully meet the intent of this recommendation, DOD should report the initial operational capability definition for all shipbuilding programs, not just those that have yet to reach this milestone. The department also needs to ensure that the criteria used to declare initial operational capability align with DOD guidance. Taking these additional steps would result in more meaningful and consistent information being provided to Congress.

Source: GAO analysis. | [GAO-19-225T](#)

Table 9: Status of Recommendations from Navy Force Structure: Actions Needed to Ensure Proper Size and Composition of Ship Crews (GAO-17-413)

Recommendation #1:

The Secretary of the Navy should have the Navy conduct a comprehensive reassessment of the Navy standard workweek and make any necessary adjustments.

Status: Open

Concurrence: Yes

Comments: As of November 2018, the Navy was in the process of conducting a study of afloat workload to establish accurate fleet manpower requirements and inform manning level changes, with a report on the study expected in November 2018. The results of the study are expected to be promulgated to cognizant stakeholders, and revisions will be made to the Navy Total Force Manpower Policies and Procedures Instruction (OPNAVINST 1000.16L) in February 2019.

Recommendation #2:

The Secretary of the Navy should have the Navy update guidance to require examination of in-port workload and identify the manpower necessary to execute in-port workload for all surface ship classes.

Status: Open

Concurrence: Yes

Comments: As of November 2018, the Navy had completed two in-port workload studies, and had planned future studies for various ship classes. These studies are expected to inform an update to OPNAVINST 1000.16L in February 2019.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #3:

The Secretary of the Navy should have the Navy develop criteria and update guidance for reassessing the factors used to calculate manpower requirements periodically or when conditions change.

Status: Open

Concurrence: Yes

Comments: As of November 2018, the Navy Total Force Manpower Training and Education Requirements Division published a Manpower Guidance Memorandum on March 1, 2018, that outlines the requirement for reassessing the factors used to calculate manpower requirements. This is expected to inform the planned revision to OPNAVINST 1000.16L.

Recommendation #4:

The Secretary of the Navy should have the Navy identify personnel needs and the costs associated with the planned larger Navy fleet size, including consideration of the updated manpower factors and requirements.

Status: Open

Concurrence: Yes

Comments: As of November 2018, Navy officials confirmed that this recommendation has an anticipated implementation date of February 2019, adding that total ownership costs that capture all facets of personnel needs and costs will be adjusted based upon the Navy's growth linked to the 30-year ship building plan and aviation master plan. The refinement of all manpower determination planning factors and assumptions, the ongoing data collection and analysis garnered from the in-port workload studies, and the outcome of the operational afloat workweek study are expected to inform all existing and future force structure manpower requirements.

Source: GAO analysis. | [GAO-19-225T](#)

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Table 10: Status of Recommendations from *Military Readiness: DOD's Readiness Rebuilding Efforts May Be at Risk without a Comprehensive Plan* (GAO-16-841)

<p>Recommendation #1:</p> <p>The Secretaries of the Departments of the Army, the Navy, and the Air Force should establish comprehensive readiness rebuilding goals to guide readiness rebuilding efforts and a strategy for implementing identified goals, to include resources needed to implement the strategy.</p>	<p>Status: Open</p> <p>Concurrence: Partial</p> <p>Comments: The military services have defined their readiness rebuilding goals and, in some cases, extended these goals since we reported in 2016. Further, through the department's Readiness Recovery Framework, the military services have identified key readiness issues that their respective forces face and actions to address these issues, as well as metrics by which to assess progress toward achieving overall readiness recovery goals. The Office of the Secretary of Defense continues to work with the military services to ensure that the services' actions and metrics clearly align with readiness recovery goals in an executable strategy. We will continue to monitor progress regarding DOD's Readiness Recovery Framework before closing this recommendation as implemented.</p>
<p>Recommendation #2:</p> <p>The Secretaries of the Departments of the Army, the Navy, and the Air Force should develop metrics for measuring interim progress at specific milestones against identified goals for all services.</p>	<p>Status: Open</p> <p>Concurrence: Partial</p> <p>Comments: The military services have taken steps to develop metrics for measuring interim progress at specific milestones against identified readiness recovery goals. Through the Readiness Recovery Framework process, the military services have identified key readiness issues that their respective forces face and actions to address these issues, as well as metrics to assess progress toward readiness recovery goals that include quantifiable deliverables at specific milestones. The Office of the Secretary of Defense continues to work with the military services to ensure that the services' metrics and milestones clearly align with readiness recovery goals. We will continue to monitor progress regarding DOD's Readiness Recovery Framework before closing this recommendation as implemented.</p>

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #3:

The Secretaries of the Departments of the Army, the Navy, and the Air Force should identify external factors that may impact readiness recovery plans, including how they influence the underlying assumptions, to ensure that readiness rebuilding goals are achievable within established time frames. This should include, but not be limited to, an evaluation of the impact of assumptions about budget, maintenance time frames, and training that underpin the services' readiness recovery plans.

Status: Open

Concurrence: Partial

Comments: DOD noted that the department would continue to work with the military services to refine their readiness recovery goals and identify the requisite resources needed to meet them. We will continue to monitor progress regarding DOD's Readiness Recovery Framework before closing this recommendation as implemented.

Source: GAO analysis. | [GAO-19-225T](#)

Note: This table does not include two recommendations that were directed to the Office of the Secretary of Defense.

Table 11: Status of Recommendations from Navy Force Structure: Sustainable Plan and Comprehensive Assessment Needed to Mitigate Long-Term Risks to Ships Assigned to Overseas Homeports ([GAO-15-329](#))

Recommendation #1:

The Secretary of the Navy should fully implement the Navy's optimized fleet response plan and develop and implement a sustainable operational schedule for all ships homeported overseas.

Status: Open

Concurrence: Yes

Comments: In August 2015, the Navy reported that it had approved and implemented six different revised optimized fleet response plan schedules that covered all ships homeported overseas. We closed the recommendation as implemented in 2015. In 2017, the Navy suffered four significant mishaps at sea resulting in the loss of 17 sailors' lives and serious damage to its ships. Three of the four ships involved were homeported in Japan. The resulting Navy investigations revealed that due to heavy operational demands, the Navy had not fully implemented the revised operational schedules it developed in 2015 for ships based in Japan. In light of this information, we re-opened this recommendation. As of October 2018, the Navy had developed a change to the operational schedule for ships homeported in Japan, and is expecting to codify this revised schedule in November 2018. The Navy also established Commander, Naval Surface Group, Western Pacific to oversee surface ship maintenance, training, and certification for ships based in Japan. We will continue to monitor the Navy's adherence to these revised schedules before closing this recommendation as implemented.

Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness

Recommendation #2:

The Secretary of the Navy should develop a comprehensive assessment of the long-term costs and risks to the Navy's surface and amphibious fleet associated with the Navy's increasing reliance on overseas homeporting to meet presence requirements, make any necessary adjustments to the Navy's overseas presence based on this assessment, and reassess these risks when making future overseas homeporting decisions and developing future strategic laydown plans.

Status: Open

Concurrence: Yes

Comments: As of November 2018, the Navy had tasked the Office of the Chief of Naval Operations Assessments Division to conduct an assessment of the long-term costs and risks to the Navy's fleet associated with the Navy's increasing reliance on overseas homeporting. The Office of the Chief of Naval Operations plans to complete the review by the end of 2018.

Source: GAO analysis. | [GAO-19-225T](#)

Table 12: Status of Recommendations from F-35 Joint Strike Fighter: Development Is Nearly Complete, but Deficiencies Found in Testing Need to Be Resolved ([GAO-18-321](#))

Recommendation #1:

The F-35 program office should resolve all critical deficiencies before making a full-rate production decision.

Status: Open

Concurrence: Yes

Comments: DOD stated that critical deficiencies would be resolved before full-rate production, expected in October 2019. As of August 2018, DOD had not resolved these deficiencies.

Recommendation #2:

The F-35 program office should identify what steps are needed to ensure the F-35 meets reliability and maintainability requirements before each variant reaches maturity, and update the Reliability and Maintainability Improvement Program with these steps.

Status: Open

Concurrence: Yes

Comments: As August 2018, DOD had not taken actions to implement this recommendation. We will monitor DOD's efforts to address this recommendation.

Source: GAO analysis. | [GAO-19-225T](#)

Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness

Table 13: Status of Recommendations from *Warfighter Support: DOD Needs to Share F-35 Operational Lessons Across the Military Services* (GAO-18-464R)

Recommendation #1:

The F-35 Program Executive Officer should test operating the F-35 disconnected from its Autonomic Logistics Information System (ALIS) for extended periods of time in a variety of scenarios to assess the risks related to operating and sustaining the aircraft, and determine how to mitigate any identified risks.

Status: Open

Concurrence: Yes

Comments: According to DOD officials, as of July 2018, the Initial Operational Test and Evaluation test plan did not include an evaluation of continued disconnected operations. However, the military services are planning more limited operational tests in the near future. For example, the Marine Corps is planning a future deployment to demonstrate an ability to rapidly deploy with three to four aircraft, and operate for 2 to 3 days without connectivity back to the squadron kit. While this is not intended to replicate an extended 30-day disconnected operation, it may provide initial indications of how extended disconnected operations may function. As the emerging ALIS strategy comes into focus, particularly in terms of the decentralized maintenance capability, it is expected that a robust test plan will be developed and implemented. We are encouraged that the department is aware of the issue and working toward, as necessary, potential mitigation strategies. However, until the F-35 is tested disconnected from ALIS for extended periods of time in a variety of scenarios to assess any risks related to operating and sustaining the aircraft, this recommendation will remain open.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #2:

The F-35 Program Executive Officer should formally share or make available, through a new or existing communications mechanism, F-35 operational lessons learned across the services.

Status: Open

Concurrence: Yes

Comments: According to DOD officials, as of July 2018, the Air Force, the Marine Corps, and the Navy all had robust systems for capturing and sharing F-35 operational lessons learned. However, although these systems are accessible by members of the other services, there is a general lack of awareness of how to access systems across the military services. The department is considering a number of possible solutions to facilitate cross-service sharing of lessons learned, with most of the solutions requiring action from the individual services. For example, there has been discussion of utilizing the already-established Joint Lessons Learned Information System website, and creating a specific repository for the F-35. We are encouraged that the department is aware of the importance of sharing operational lessons learned across the services and that a solution is likely on the horizon. However, until the department reaches a consensus and implements the optimal path forward, this recommendation will remain open.

Source: GAO analysis. | [GAO-19-225T](#)

Note: This report is an unclassified version of [GAO-18-79C](#). Two of the four recommendations were directed to the F-35 program office and are included here. The remaining two recommendations were directed to the Commandant of the Marine Corps and are included in table 5, which summarizes recommendations made in [GAO-18-79C](#).

Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness

Table 14: Status of Recommendations from F-35 Aircraft Sustainment: DOD Needs to Address Challenges Affecting Readiness and Cost Transparency (GAO-18-75)

Recommendation #1:

The Under Secretary of Defense for Acquisition, Technology and Logistics, in coordination with the F-35 Program Executive Officer, should revise sustainment plans to ensure that they include the key requirements and decision points needed to fully implement the F-35 sustainment strategy and align funding plans to meet those requirements.

Status: Open

Concurrence: Yes

Comments: Officials from the Office of the Under Secretary of Defense for Acquisition and Sustainment (USD (A&S)) said that as of October 2018, USD (A&S) and the F-35 Program Executive Officer (PEO) were focusing actions and resources toward achieving key production, development and sustainment objectives by 2025. For sustainment, the two primary objectives are to increase F-35 availability and reduce sustainment costs. According to these officials, the PEO, with industry- and department-level input, is updating sustainment plans to accelerate depot repair capacity, reduce spares demand and improve the stability, security, and mission capabilities of the Autonomic Logistics Information System. These efforts and others will inform the Fiscal Year 2020-2024 Program Budget decisions, to ensure that investments return the most in terms of increased availability and reduced cost. Officials said that these actions, strategy updates and investments will continue over the Future Year's Defense Plan. We will continue to monitor DOD's efforts to revise the department's sustainment plans and align the department's future budgets to support those plans, but it is too soon to determine the extent to which these efforts—when completed—will address the concerns that we identified our report.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #2:

The Under Secretary of Defense for Acquisition, Technology and Logistics, in coordination with the F-35 Program Executive Officer, should re-examine the metrics that it will use to hold the contractor accountable under the fixed-price, performance-based contracts to ensure that such metrics are objectively measurable, are fully reflective of processes over which the contractor has control, and drive desired behaviors by all stakeholders.

Status: Open

Concurrence: Yes

Comments: Officials from USD (A&S) said that as of October 2018, the F-35 PEO re-examines sustainment metrics every year, so that the department can objectively measure and hold the contractor accountable for delivering increased availability and reduced cost, and to align sustainment processes and deliverables to those that the contractor controls. In the fiscal year 2018 annual sustainment contract, the PEO established a fee structure to better motivate the contractor to deliver threshold performance values, established an improved metric compared with the 2017 contract, and initiated a new fee for delivery of supply chain performance metrics directly under the contractor's control. Officials said that the PEO will continue to re-examine metrics annually to ensure that they align with government and industry interests, drive desired behavior, increase F-35 availability, and reduce cost. We recognize the department's progress related to this recommendation, but the key metrics being used by the F-35 program to incentivize the contractor remain a concern as they are not fully reflective of processes over which the contractor has control. This could make it difficult to hold the contractor accountable under performance based contracts, as we reported. We will continue to monitor DOD's efforts to re-examine metrics to ensure that they are objectively measurable, fully reflective of processes over which the contractor has control, and drive desired behaviors by all stakeholders.

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #3:

The Under Secretary of Defense for Acquisition, Technology and Logistics, in coordination with the F-35 Program Executive Officer, should, prior to entering into multi-year, fixed-price, performance-based contracts, ensure that DOD has sufficient knowledge of the actual costs of sustainment and technical characteristics of the aircraft after baseline development is complete and the system reaches maturity.

Status: Open

Concurrence: Yes

Comments: Officials from USD (A&S) said that as of October 2018, the F-35 PEO is overseeing a Sustainment Actual Cost Working Group, made up of representatives from both the Office of the Secretary of Defense and the F-35 Joint Program Office. The working group is striving to improve DOD's insight into the actual cost of F-35 sustainment. According to these officials, to date, the working group has identified a number of gaps in the cost data that the department receives from prime and subcontractors and is now collaborating with the vendors and with contracting officials to find ways to improve the quality, granularity, and timeliness of the actual F-35 cost data that the department receives. In addition, the F-35 system has not yet completed key operational tests or reached system maturity. Until DOD has a full understanding of the actual costs of sustainment and technical characteristics of the aircraft at system maturity, DOD may not be well positioned to enter into a long-term, fixed-price, performance-based contract. We will continue to monitor DOD's efforts in this area.

Recommendation #4

The Under Secretary of Defense for Acquisition, Technology and Logistics, in coordination with the F-35 Program Executive Officer, should take steps to improve communication with the services and provide more information about how the F-35 sustainment costs they are being charged relate to the capabilities received.

Status: Open

Concurrence: Yes

Comments: Officials from USD (A&S) said that as of October 2018, USD (A&S) was undertaking a study on F-35 Sustainment Affordability and Transparency, in response to the Senate Armed Services Committee report accompanying a bill for the National Defense Authorization Act for Fiscal Year 2018. According to these officials, the study examines affordability and transparency issues between the services and the F-35 Joint Program Office, which inhibit the services' visibility into expected F-35 costs versus budgets, what they are paying for in sustainment, and what they are getting for that money. Work on this study is ongoing. We will review DOD's report, once completed, to determine the extent to which DOD's efforts address our recommendation.

Source: GAO analysis. | [GAO-19-225T](#)

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Table 15: Status of Recommendations from *Defense Supply Chain: DOD Needs Complete Information on Single Sources of Supply to Proactively Manage the Risks* (GAO-17-768)

Recommendation #1:	
<p>The Under Secretary of Defense for Acquisition, Technology and Logistics, in conjunction with the Defense Contract Management Agency and the military departments, should assess whether risk mitigation actions have been identified in the event of a loss of each task critical assets facility in the defense industrial base and, based on this assessment, develop risk mitigation actions with associated implementation plans and timelines and provide this information to congressional and DOD decision makers.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: DOD officials stated that the department addressed this recommendation by issuing DOD Instruction 3020.45 in August 2018; however, DOD did not have an update on how the department will share this information with congressional decision makers.</p>
Recommendation #2:	
<p>The Under Secretary of Defense for Acquisition, Technology and Logistics, in conjunction with the Defense Contract Management Agency and the military departments, should provide congressional and DOD decision makers with information on the potential effects on defense capabilities in the event of a loss of each task critical assets facility in the defense industrial base.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: DOD officials stated that as of August 2018, the department's efforts to address this recommendation were in progress and stated that the issuance of the mission assurance instruction furthered this progress. However, DOD did not provide information on its plan to develop a mechanism to share this information with Congress.</p>
Recommendation #3:	
<p>The Under Secretary of Defense for Acquisition, Technology and Logistics, in conjunction with the Defense Contract Management Agency and the military departments, should provide congressional and DOD decision makers with information on DOD's organic facilities that have been identified as task critical assets, similar to the information provided previously on commercial facilities. This information also should include (1) the potential effects on defense capabilities in the event of a loss of the facility and (2) risk mitigation actions and associated implementation plans with timelines.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: DOD officials stated that as of August 2018, the department's efforts to address this recommendation were in progress and that the issuance of the mission assurance instruction furthered this progress. However, DOD did not provide information on its plan to develop a mechanism to share this information with Congress.</p>
Recommendation #4:	
<p>The Under Secretary of Defense for Acquisition, Technology and Logistics, in conjunction with the Defense Contract Management Agency and the military departments, should take steps to share information on risks identified through the annual Critical Asset Identification Process with relevant program managers or other designated service or program officials. At a minimum, relevant officials should receive information on the most critical facilities (such as task critical assets) that produce parts supporting their programs. This information-sharing could occur through service-specific channels of communication or another method of internal communication deemed appropriate by DOD.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: DOD officials stated that as of August 2018, they were in the process of developing proactive steps to share information on risks identified through the annual Critical Asset Identification Process with relevant program managers, or with other designated service or program officials as necessary. They further stated that the issuance of the mission assurance instruction will assist with these efforts. We will assess this instruction and will continue to monitor DOD actions taken to address this recommendation.</p>

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #5:

The Under Secretary of Defense for Acquisition, Technology and Logistics, in conjunction with the military departments, should develop a mechanism to ensure that program offices obtain information from contractors on single source of supply risks.

Status: Open

Concurrence: Yes

Comments: DOD officials stated that as of August 2018, assessing the health of the defense industrial base and associated supply chains was the focus of an Executive Order issued in July 2017 and that the resulting interagency report will be released within the next year. DOD officials stated that the issuance of this report will provide significant information toward addressing this recommendation. We will assess this report upon issuance.

Recommendation #6:

The Under Secretary of Defense for Acquisition, Technology and Logistics, in conjunction with the military departments, should issue a department-wide Diminishing Manufacturing Sources and Material Shortages policy, such as an instruction, that clearly defines requirements of Diminishing Manufacturing Sources and Material Shortages management and details responsibilities and procedures to be followed by program offices to implement the policy.

Status: Open

Concurrence: Yes

Comments: The DOD official that is the lead for the Diminishing Manufacturing Sources and Material Shortages program stated that as of August 2018, the department was in the process of addressing this recommendation. A working group lead by the official and comprising of all relevant offices developed a draft Diminishing Manufacturing Sources and Material Shortages instruction and accompanying manual that details program requirements, responsibilities, and procedures to be followed. The official expects the instruction and manual to be issued by December 2019.

Source: GAO analysis. | [GAO-19-225T](#)

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Table 16: Status of Recommendations from *Defense Inventory: Further Analysis and Enhanced Metrics Could Improve Service Supply and Depot Operations* (GAO-16-450)

Recommendation #1:	
<p>The Assistant Secretary of Defense for Logistics and Materiel Readiness, in conjunction with the Director, Defense Logistics Agency, and the Secretaries of the Army and the Navy and the Commandant of the Marine Corps, to assess through a comprehensive business case analysis—drawing on lessons learned from previous efforts—the costs and benefits of the Defense Logistics Agency managing the retail supply, storage, and distribution functions at the Army and Marine Corps depots and Navy shipyards.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: As of August 2018, the Department of Defense (DOD) had designated the transfer of these retail functions as an operating priority and identified it as a key reform effort within logistics in the department. The Marine Corps has conducted its analysis and decided to transition additional supply, storage, and distribution functions to the Defense Logistics Agency over a 4-year period, with all implementation activities scheduled to be complete by 2022. The Navy and Defense Logistics Agency are working on a strategic memorandum of understanding to guide decisions on the role of the Defense Logistics Agency at the Navy shipyards, according to a senior DOD official. Without the Navy finalizing its business case analyses, decision makers will not be positioned to make cost-effective decisions regarding supply operations at military depots.</p>
Recommendation #2:	
<p>The Assistant Secretary of Defense for Logistics and Materiel Readiness, in conjunction with the Director, Defense Logistics Agency, and the Secretaries of the Army and the Navy and the Commandant of the Marine Corps to use the analysis to make a decision on the degree to which the Defense Logistics Agency should manage these functions at the Army and Marine Corps depots and Navy shipyards.</p>	<p>Status: Open</p> <p>Concurrence: Yes</p> <p>Comments: As of August 2018, DOD had designated the transfer of these retail functions as an operating priority and identified it as a key reform effort within logistics in the department. The Marine Corps has conducted its analysis and decided to transition additional supply, storage, and distribution functions to the Defense Logistics Agency over a 4-year period, with all implementation activities scheduled to be completed by 2022. However, the Navy has not made any decisions regarding the additional transfer of supply, storage and distribution functions to the Defense Logistics Agency. Without the Navy making decisions based on business case analyses on the degree to which additional supply, storage, and distribution functions will transfer to the Defense Logistics Agency, DOD will not be assured that it is operating its supply operations at military depots in a cost-effective manner.</p>

**Appendix I: Implementation Status of Prior
GAO Recommendations Related to Navy and
Marine Corps Readiness**

Recommendation #3:

The Assistant Secretary of Defense for Logistics and Materiel Readiness, in conjunction with the Director, Defense Logistics Agency, and the Secretaries of the Army, Navy, and Air Force and the Commandant of the Marine Corps to develop and implement metrics that measure the accuracy of planning factors, such as the schedule, bill of materials, and replacement factors used for depot maintenance.

Status: Open

Concurrence: Yes

Comments: As of August 2018, DOD has begun to identify metrics that measure the accuracy of planning factors used for depot maintenance. However, these metrics are not scheduled to be fully implemented until December 2018.

Recommendation #4:

The Assistant Secretary of Defense for Logistics and Materiel Readiness, in conjunction with the Director, Defense Logistics Agency, and the Secretaries of the Army, the Navy, and the Air Force and the Commandant of the Marine Corps to take action, as appropriate and necessary, to resolve any issues identified through measuring the accuracy of planning inputs in an effort to improve supply and depot maintenance operations.

Status: Open

Concurrence: Yes

Comments: As of August 2018, DOD had begun to identify metrics that measure the accuracy of planning factors used for depot maintenance. However, these metrics are not scheduled to be fully implemented until December 2018. Thus, no actions have been taken to resolve any identified issues based on the results of the metrics.

Recommendation #5:

The Assistant Secretary of Defense for Logistics and Materiel Readiness, in conjunction with the Director, Defense Logistics Agency, the Secretaries of the Army, the Navy, and the Air Force, and the Commandant of the Marine Corps to take steps to develop and implement metrics, to the extent feasible, to measure and track disruption costs created by the lack of parts at depot maintenance industrial sites by, for example, establishing a team of supply and depot maintenance experts from the Defense Logistics Agency and the services to assess potential data sources, approaches, and methods.

Status: Open

Concurrence: Yes

Comments: As of September 2018, DOD had begun examining potential methods for measuring and tracking disruption costs created by the lack of parts at depot maintenance industrial sites. However, DOD and the services have identified a number of data challenges in being able to compute such costs and are in the process of working through those issues so that they can begin measuring and tracking disruption costs.

Recommendation #6:

The Assistant Secretary of Defense for Logistics and Materiel Readiness, in conjunction with the Director, Defense Logistics Agency, the Secretaries of the Army, the Navy, and the Air Force, and the Commandant of the Marine Corps to take action as appropriate to address any inefficiencies identified by the disruption cost metrics in supply and depot maintenance operations.

Status: Open

Concurrence: Yes

Comments: As of August 2018, DOD had begun to develop metrics that measure and track disruption costs created by the lack of parts at depot maintenance industrial sites. However, these metrics are not scheduled to be implemented until October 2018. Thus, no actions have been taken to resolve any identified issues based on the results of the metrics.

Source: GAO analysis. | [GAO-19-225T](#)

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