



## Testimony

Before the Subcommittees on  
Seapower and Readiness and  
Management Support, Committee  
on Armed Services, U.S. Senate

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# NAVY MAINTENANCE

## Persistent and Substantial Ship and Submarine Maintenance Delays Hinder Efforts to Rebuild Readiness

Accessible Version

Statement of Diana C. Maurer Director  
Defense Capabilities and Management

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# GAO Highlights

Highlights of [GAO-20-257T](#), 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 is working to rebuild its readiness while also growing and modernizing its aging fleet of ships. A critical component of rebuilding Navy readiness is implementing sustainable operational schedules, which hinge on completing maintenance on time. We have reported that the Navy faces persistent challenges with completing required maintenance on time.

This statement provides information on (1) the magnitude of maintenance delays for Navy ships and submarines, (2) factors contributing to maintenance delays, and (3) the Navy's efforts to address these factors. GAO also discusses its prior recommendations on the factors contributing to Navy maintenance delays and the Navy's progress in addressing the recommendations.

This statement is based on previously published work from 2015 through 2019 on Navy maintenance, ship acquisition, crew size, ship maintenance and deployment schedules, the condition of Naval shipyards, and recruiting skilled maintenance personnel.

## What GAO Recommends

GAO made 17 recommendations in prior work cited in this statement. The Department of Defense generally concurred with most of GAO's recommendations, and has fully implemented 6. Continued attention is needed to ensure that the remainder of these recommendations are addressed.

View [GAO-20-257T](#). For more information, contact Diana Maurer at (202) 512-9627 or [maurerd@gao.gov](mailto:maurerd@gao.gov).

December 4, 2019

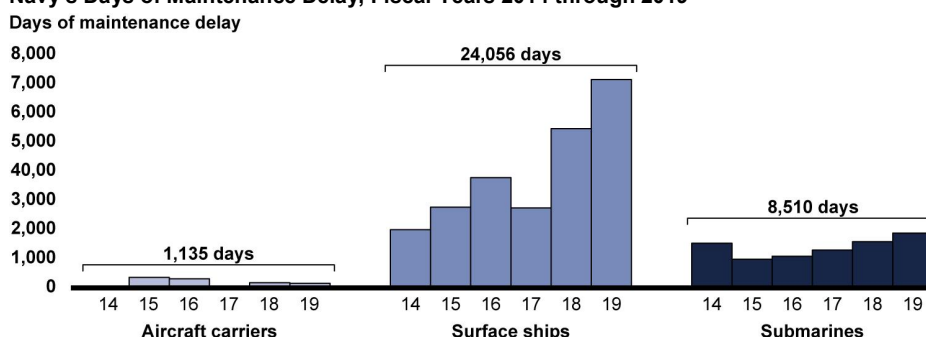
## NAVY MAINTENANCE

### Persistent and Substantial Ship and Submarine Maintenance Delays Hinder Efforts to Rebuild Readiness

## What GAO Found

The Navy continues to face persistent and substantial maintenance delays that affect the majority of its maintenance efforts and hinder its attempts to restore readiness. From fiscal year 2014 to the end of fiscal year 2019, Navy ships have spent over 33,700 more days in maintenance than expected. The Navy was unable to complete scheduled ship maintenance on time for about 75 percent of the maintenance periods conducted during fiscal years 2014 through 2019, with more than half of the delays in fiscal year 2019 exceeding 90 days. When maintenance is not completed on time, fewer ships are available for training or operations, which can hinder readiness.

### Navy's Days of Maintenance Delay, Fiscal Years 2014 through 2019



### Accessible Data for Navy's Days of Maintenance Delay, Fiscal Years 2014 through 2019

na	2014 (fiscal year)	2015 (fiscal year)	2016 (fiscal year)	2017 (fiscal year)	2018 (fiscal year)	2019 (fiscal year)
<b>Aircraft carriers</b>	7	385	335	23	203	182
<b>Surface ships</b>	2023	2795	3809	2766	5490	7173
<b>Submarines</b>	1558	1009	1111	1321	1610	1901

GAO identified multiple factors that contribute to maintenance delays, including insufficient shipyard capacity, shortage of skilled personnel, and deferred maintenance during operational deployments, among others. Ships awaiting or delayed in maintenance incur operating and support costs. For example, GAO estimated that the Navy spent more than \$1.5 billion in support costs from fiscal years 2008 through 2018 due to delayed maintenance for attack submarines.

### Factors Contributing to Navy Maintenance Delays

Acquisition	Operations	Maintenance
<ul style="list-style-type: none"> <li>• Not purchasing technical data used in maintenance</li> <li>• Providing ships to fleet with defects</li> <li>• Optimistic sustainment assumptions</li> </ul>	<ul style="list-style-type: none"> <li>• Low crew levels</li> <li>• Extended deployments</li> <li>• Deferred maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Condition of facilities and equipment</li> <li>• Availability of spare parts</li> <li>• Skilled personnel shortages</li> <li>• Insufficient shipyard capacity</li> <li>• Adherence to planning process</li> </ul>

Source: GAO. | GAO-20-257T

The Navy has several efforts underway to improve its maintenance operations, but they will take years to implement, and will require sustained management attention and funding above current levels. For example, the Navy estimates it will take 20 years to improve the infrastructure at its shipyards, 4 years to restore ship crew levels, and several years to improve maintenance planning. Until the Navy addresses these challenges, it will be hindered in its ability to rebuild readiness and prepare for the future, particularly as it grows the size of the fleet.

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

Thank you for the opportunity to be here today to discuss our work related to Navy ship and submarine maintenance challenges.

The Department of Defense (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 is critical to success in the emerging security environment.<sup>1</sup> Nevertheless, DOD reports that the readiness of the total military force remains low and has remained so since 2013. DOD's readiness rebuilding efforts are occurring while the department is making difficult decisions regarding how best to address continuing operational demands while preparing for future challenges. Our work shows that an important aspect of rebuilding readiness, 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.

The Navy is working to rebuild its readiness while also growing and modernizing its aging fleet of aircraft carriers, submarines, and surface ships. A critical component of rebuilding Navy readiness is implementing sustainable operational schedules, including a carefully orchestrated cycle of maintenance, training, and operations for the entire fleet of 290 ships. Completing maintenance on time is integral to this effort. The Navy's plan to grow the size of the fleet also depends on ships receiving sufficient and timely maintenance to remain operational so that they can reach their expected service lives and remain in the fleet.

This statement provides information on the (1) magnitude of maintenance delays for Navy ships and submarines, (2) factors contributing to

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<sup>1</sup>DOD, *2018 National Defense Strategy: Sharpening the American Military's Competitive Edge* (Jan. 19, 2018) (SECRET). See also, DOD, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Jan. 19, 2018).

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maintenance delays, and (3) the Navy's efforts to address these factors. We also discuss our prior recommendations on Navy maintenance challenges and the Navy's progress in addressing them in appendix I.<sup>2</sup>

This statement is based on prior reports we issued from 2015 through 2019 examining Navy maintenance challenges, shipyard workforce and capital investment, ship crewing, scheduling, and force structure.<sup>3</sup> To perform our prior work, we analyzed Navy documentation and data on shipyard condition, shipyard performance, condition of overseas homeported ships, and workforce, among others; reviewed Navy and DOD guidance; and conducted interviews with Navy officials. 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 selected updates as of November 2019, as appropriate, based on Navy data, documentation, and discussions with Navy officials.

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.

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## Background

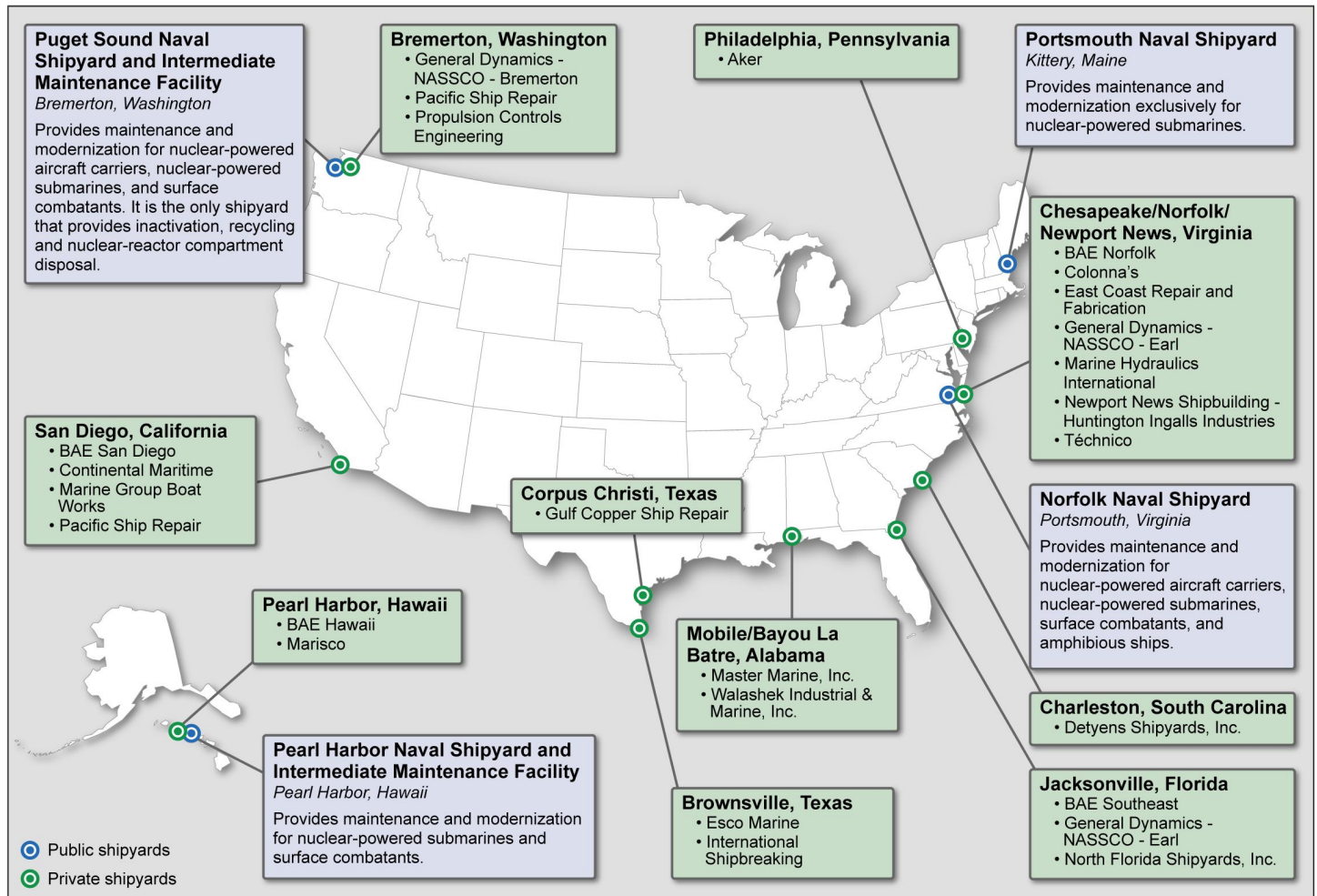
Maintenance for the nuclear elements of the fleet (i.e., aircraft carriers and submarines) is generally performed at the four public Naval shipyards, while maintenance for the conventional elements of the fleet (e.g., cruisers, destroyers, amphibious assault ships, and Military Sealift Command ships) is generally performed at private shipyards and ship repair companies throughout the United States, as shown in figure 1.

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<sup>2</sup>Appendix 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, Department of the Air Force, or Department of the Army.

<sup>3</sup>A list of related unclassified GAO products is provided in the Related GAO Products pages at the end of this statement.

**Figure 1: Public and Private Shipyards in the United States That Perform Ship Repair, Maintenance, and Modernization**



Source: GAO analysis of Navy data. | GAO-20-257T

A number of organizations and commands within the Navy share responsibilities for setting maintenance policies and planning, scheduling, and executing ship maintenance, from the offices of the Secretary of the Navy and Chief of Naval Operations, to fleet commanders and ships' crews.<sup>4</sup> Naval Sea Systems Command is the primary Navy ship maintenance organization. It is charged with, among other things,

<sup>4</sup>The Navy categorizes ship maintenance at three levels: organizational maintenance, which is conducted by crews as part of their duties; intermediate maintenance, which exceeds the capacity of the crew and requires additional support, such as the use of fleet maintenance organizations; and depot-level maintenance, which exceeds the capacity of an intermediate maintenance facility and may be performed at a public or private shipyard.

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maintaining ships to meet fleet requirements within defined cost and schedule parameters; managing critical modernization, maintenance, and inactivation programs; life-cycle management of maintenance requirements; and management and oversight of the public naval shipyards. Its offices also perform contract administration, program management, and planning for future maintenance periods informed by the historical maintenance needs of Navy ships.

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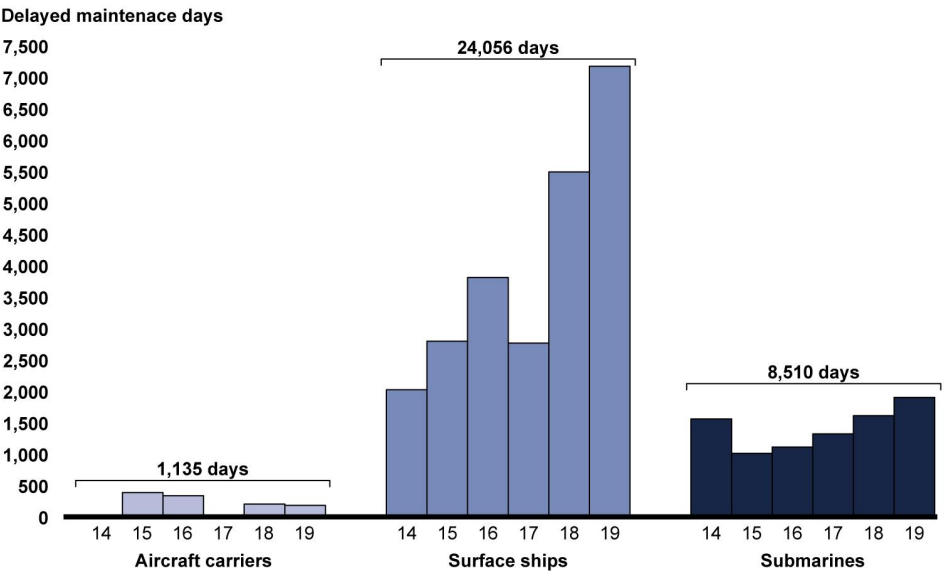
## Persistent and Substantial Maintenance Delays for Ships and Submarines Reduce Time for Training and Operations and Result in Additional Costs

Our work has found that the Navy has been generally unable to complete ship and submarine maintenance on time, resulting in reduced time for training and operations and additional costs in a resource-constrained environment. The Navy's readiness recovery is premised on the adherence to set 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.<sup>5</sup> We reported that, from 2011 through 2014, about 72 percent of scheduled maintenance for surface combatants, and 89 percent of scheduled maintenance for aircraft carriers, was completed late. We updated these data as of November 2019 to include ongoing and completed maintenance periods through the end of fiscal year 2019, and found that the Navy continues to struggle to complete maintenance on time, as we discuss below. The Navy was unable to complete scheduled ship maintenance on time about 75 percent of the time during fiscal years 2014 through 2019, which equates to about 33,700 days of maintenance delays (see figure 2).

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<sup>5</sup>GAO, *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 2014 through 2019**



Source: GAO analysis of Navy data. | GAO-20-257T

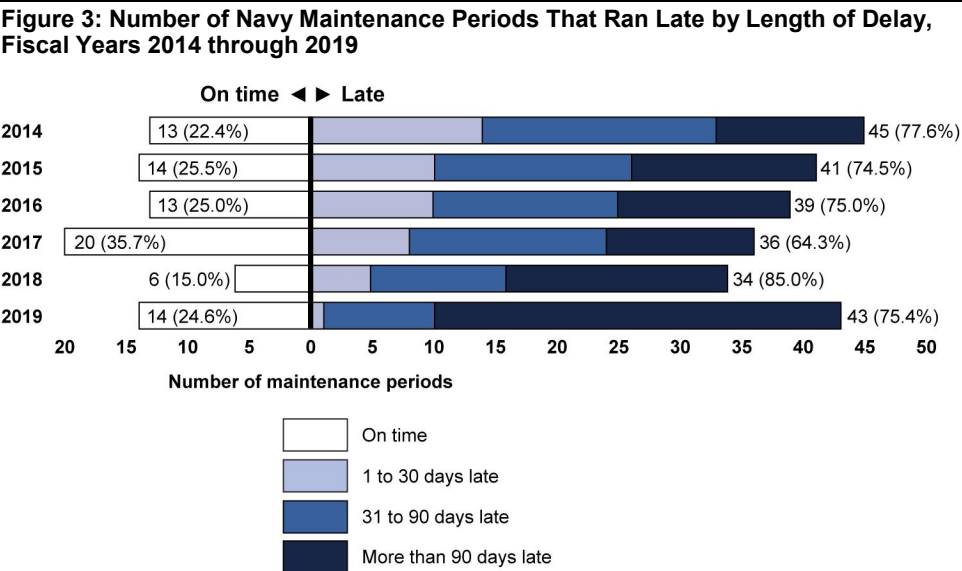
Note: Delayed maintenance days are allocated to the fiscal year in which they occurred. Delayed maintenance days data for aircraft carriers for this analysis are limited to the Navy's public shipyards and do not include data from private shipyards. Data for submarines includes days of maintenance delay from maintenance conducted at both public and private shipyards. Surface ship maintenance is conducted at private shipyards. Days of delayed maintenance data is as of November 2019.

**Accessible Data for Figure 2: Aircraft Carrier, Surface Ship, and Submarine Days of Maintenance Delay, Fiscal Years 2014 through 2019**

Na	2014 (fiscal year)	2015 (fiscal year)	2016 (fiscal year)	2017 (fiscal year)	2018 (fiscal year)	2019 (fiscal year)
Aircraft carriers	7	385	335	23	203	182
Surface ships	2023	2795	3809	2766	5490	7173
Submarines	1558	1009	1111	1321	1610	1901

Furthermore, these delays have been growing longer and more frequent. In fiscal year 2014, about 20 percent of the Navy's maintenance periods were more than 90 days late. However, in fiscal year 2019, more than 57 percent of its maintenance periods were similarly late (see figure 3).





Source: GAO analysis of Navy data. | GAO-20-257T

Note: Maintenance periods are allocated to the fiscal year in which they were completed.

Accessible Data for Figure 3: Number of Navy Maintenance Periods That Ran Late by Length of Delay, Fiscal Years 2014 through 2019				
na	On time	1 to 30 days late	31 to 90 days late	More than 30 days late
2014 (fiscal year)	13	14	19	12
2015 (fiscal year)	14	10	16	15
2016 (fiscal year)	13	10	15	14
2017 (fiscal year)	20	8	16	12
2018 (fiscal year)	6	5	11	18
2019 (fiscal year)	14	1	9	33

When maintenance is not completed on time, there are two primary effects. First, fewer ships are available to conduct training or operations, which can hinder readiness. For example, in fiscal year 2019, maintenance delays resulted in the Navy losing the equivalent of 19 surface ships. Second, maintenance delays are costly. In November 2018, we examined attack submarine maintenance delays and reported that the Navy incurred significant operating and support costs to crew and maintain attack submarines that are delayed during maintenance periods.<sup>6</sup> We estimated that from 2008 to 2018, the Navy spent \$1.5 billion to support attack submarines that provided no operational capability—attack submarines 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.<sup>7</sup> We recommended that the Navy analyze how it allocates its maintenance workload across public and private shipyards. DOD concurred with our recommendation, and in December 2018, the Navy analyzed its workload allocation and moved two additional attack submarine maintenance availabilities to the private shipyards, with the possibility of moving additional availabilities to the private sector over the next 5 years.

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## Navy Maintenance Challenges Stem from Multiple Interrelated Factors

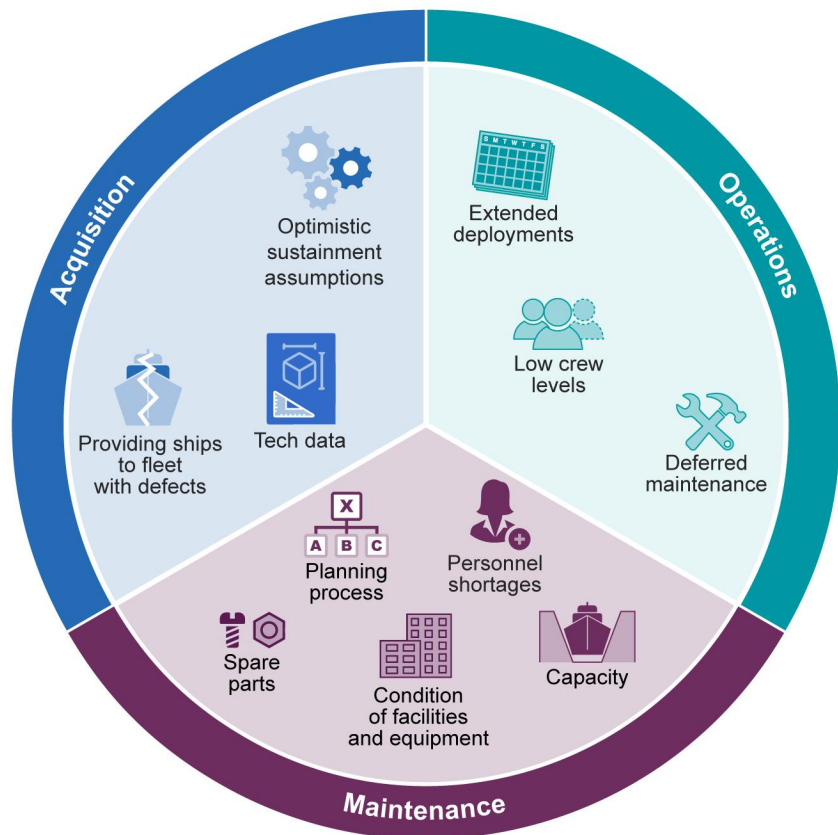
The Navy's ability to successfully maintain its ships—completing all required maintenance on-time and within estimated cost—is affected by numerous factors that occur throughout a ship's lifecycle (see figure 4). Some of these factors involve decisions made during the acquisition phase, years before a ship arrives at a shipyard for maintenance, while others manifest during operational use of the ship or during the maintenance process, as illustrated in figure 4.

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<sup>6</sup>GAO, *Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet*, [GAO-19-229](#) (Washington, D.C.: Nov. 19, 2018).

<sup>7</sup>We calculated the costs in fiscal year 2018 constant dollars. While 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-19-229](#).

Figure 4: Factors Affecting Maintenance Performance



Source: GAO. | GAO-20-257T

These decisions can be interrelated; for example, decisions to increase deployment lengths to meet the Navy's operational demands can result in declining ship conditions and material readiness. The declining condition of the ships can increase the time that ships spend undergoing maintenance at the shipyards. Increased maintenance time at shipyards can lead to decisions to make further operational schedule changes to extend deployment lengths for other ships to compensate for ships experiencing maintenance delays.

### Acquisition Decisions Affect Maintenance Timeliness

While our statement today focuses on factors occurring during operations and the maintenance process, we have previously reported that long-term sustainment costs can be affected by decisions made early in the acquisition process. The decisions made during the acquisition phase of a

weapon system can affect maintenance strategies used throughout the lifecycle, as 80 percent of a program's operating and support costs are fixed at the time a program's requirements are set and the ship is designed.<sup>8</sup> For example, the littoral combat ship (LCS) program initially planned to operate the ship with 40 sailors using contractors to complete all of the onboard maintenance tasks. After challenges with the first LCS deployments, the Navy began revising the ships maintenance strategy, including adding more sailors onboard the ship. In addition, decisions to acquire or not acquire rights to technical data can have far-reaching implications for DOD's ability to sustain the systems and competitively procure parts and services.<sup>9</sup> Furthermore, the Navy has shown a willingness to provide ships to the fleet that still have a number of unresolved construction and quality deficiencies, which add to its maintenance burden.<sup>10</sup> For example, the Navy delivered the USS Somerset amphibious transport dock to the fleet with 52 significant defects, including an electronic system crucial to the ship's mission effectiveness that the fleet had to replace shortly after it received the ship. We have ongoing work on the effect that acquisition decisions can have on maintenance that we expect to issue in early 2020.

## Operational Decisions Affect Maintenance Timeliness

Some causes of delays are created or exacerbated during an operational deployment. Our work has shown that to meet heavy operational demands over the past decade with a smaller fleet, the Navy has increased ship deployment lengths and has reduced or deferred ship maintenance. Decisions to reduce crew sizes between 2003 and 2012 also left crews overburdened and contributed to deferred maintenance. These decisions have resulted in declining ship conditions across the fleet and have increased the amount of time that ships require to complete maintenance in the shipyards. Increased maintenance periods,

<sup>8</sup>GAO, *Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments*, [GAO-18-238SP](#) (Washington, D.C.: June 6, 2018); GAO, *Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality*, [GAO-17-418](#) (Washington, D.C.: July 13, 2017); GAO, *Navy Force Structure: Actions Needed to Ensure Proper Size and Composition of Ship Crews*, [GAO-17-413](#) (Washington, D.C.: May 18, 2017); and GAO, *Best Practices: Setting Requirements Differently Could Reduce Weapon Systems' Total Ownership Costs*, [GAO-03-57](#) (Washington, D.C.: Feb. 11, 2003).

<sup>9</sup>GAO, *Defense Acquisition: DOD Should Clarify Requirements for Assessing and Documenting Technical-Data Needs*, [GAO-11-469](#) (Washington, D.C.: May 11, 2011).

<sup>10</sup>[GAO-17-418](#).

in turn, have compressed the time during which ships are available for training and operations. Specifically, the Navy:

- **Decreased crew levels.** We reported in 2017 that the Navy's effort to reduce crew sizes between 2003 through 2012 corresponded with increases in maintenance costs that outweighed the savings achieved through reduced personnel costs.<sup>11</sup> Navy officials told us that shifts in maintenance workload from the organizational- and intermediate-levels to depot-level maintenance increased overall maintenance costs. This change occurred in part because reduced crew sizes resulted in minor maintenance being deferred, which developed into more costly issues that had to be addressed later at the depot level.
- **Extended deployments.** We have previously reported that Navy decisions to extend deployments can lead to maintenance challenges, as these decisions have resulted in declining ship conditions across the fleet, and have increased the amount of time that ships require to complete maintenance in the shipyards.<sup>12</sup>
- **Deferred maintenance.** We reported in 2015, 2016, and 2017 that maintenance deferred while a ship is deployed can develop into more costly issues that must be addressed later, often during depot-level maintenance.<sup>13</sup> Deferred maintenance can lead to new work at the shipyards, as the degraded ship conditions result in the need for additional maintenance. For example, maintenance officials told us that the focus for ships homeported overseas is on mission readiness, so overseas-homeported ships place priority on the maintenance of combat systems. This means that systems with the potential to reduce ship service life—such as fuel and ballast tanks that require extended in-port periods to properly maintain—can be subject to maintenance deferrals in order to allow the ship to sustain a high operational tempo.

<sup>11</sup>GAO, *Navy Force Structure: Actions Needed to Ensure Proper Size and Composition of Ship Crews*, [GAO-17-413](#) (Washington, D.C.: May 18, 2017.)

<sup>12</sup>[GAO-16-466R](#).

<sup>13</sup>[GAO-17-413](#), [GAO-16-466R](#), and GAO, *Navy Force Structure: Sustainable Plan and Comprehensive Assessment Needed to Mitigate Long-Term Risks to Ships Assigned to Overseas Homeports*, [GAO-15-329](#) (Washington, D.C.: May 29, 2015).

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## Challenges during the Maintenance Process Affect Timeliness

In our prior work, we identified numerous challenges that occur during the Navy's planning and execution of a ship's maintenance period that contribute to delays. For example:

- **Difficulties in adhering to the maintenance planning process.** We reported in 2016 that the Navy must accurately define the work for each ship's maintenance period.<sup>14</sup> To do this, the Navy's maintenance planning process specifies planning milestones intended to ascertain the ship's condition, identify the work needed, and plan for its execution. Missing or meeting planning milestones late can contribute to maintenance delays. However, the Navy does not always adhere to its own maintenance planning process due to high operational tempo, scheduling difficulties, or personnel shortages, among other factors, resulting in shipyards discovering the need for additional repairs after maintenance has begun and adding time to the schedule for planning, contracting, or waiting for parts.
- **Navy shipyards have shortages of skilled personnel.** The Navy has reported a variety of workforce challenges at the four public shipyards such as hiring personnel in a timely manner and providing personnel with the training necessary to gain proficiency in critical skills.<sup>15</sup> 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, we reported in December 2018 that 45 percent of the Puget Sound and 30 percent of the Portsmouth Naval Shipyards' skilled workforce had fewer than 5 years of experience.<sup>16</sup> According to DOD officials, workforce shortages and inexperience contribute to maintenance delays. For example, at Pearl Harbor Naval Shipyard in 2014 and 2015, two submarines were delayed approximately 20 months each, 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. However, we found that neither the depots, their higher-level service

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<sup>14</sup>[GAO-16-466R](#).

<sup>15</sup>GAO, *DOD Depot Workforce: Services Need to Assess the Effectiveness of Their Initiatives to Maintain Critical Skills*, [GAO-19-51](#) (Washington, D.C.: Dec. 14, 2018.)

<sup>16</sup>[GAO-19-51](#).

component commands, nor the services have conducted an assessment to determine the effectiveness of these actions.

- **The condition of facilities and equipment at Navy shipyards is generally poor.** We reported in September 2017 that poor condition of facilities and equipment at the shipyards contributed to maintenance delays for aircraft carriers and submarines, hindering the shipyards' ability to support the Navy.<sup>17</sup> Specifically, we found that the average condition of shipyard facilities was poor and that shipyard equipment was generally past its expected service life. For example, four of the five dry docks at Norfolk Naval Shipyard face flooding threats from extreme high tides and storm swells and average one major flooding event per year. In 2009 a dry dock at Norfolk Naval Shipyard required emergency repairs to prevent flooding while the USS Tennessee (SSBN-734) was undergoing maintenance. According to the Navy's report on the incident, several days of high tides and winds, coupled with multiple leaks in the dry dock's granite block joints, resulted in the dry dock flooding at an estimated rate of 3,000 gallons per minute before workers could repair it. In addition, at Puget Sound Naval Shipyard—located in an area identified by the U. S. Geological Survey as a "High Seismic Hazard Zone"—a 7.0 magnitude or greater earthquake could damage or ruin the only dry dock on the west coast that is capable of performing maintenance on aircraft carriers. We have also previously reported that the Navy shipyards do not track when facility problems leads to maintenance delays.<sup>18</sup>

Furthermore, the average age of equipment at the shipyards is beyond its average expected service life (see table 1). Equipment that is past its expected service life can pose an increased risk for maintenance delays or higher maintenance costs, affecting the depots' ability to conduct work. As we have previously reported, aging equipment can present a number of challenges, such as more frequent breakdowns, less effective or efficient operation, and safety hazards.<sup>19</sup>

<sup>17</sup>GAO, *Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations*, [GAO-17-548](#) Washington, D.C.: Sept. 12, 2017). Facilities are defined as any building, structure, or linear structure (such as a fence or railway). Equipment includes all nonexpendable items needed to outfit or equip an organization; for the depots, that includes items used by depot personnel to conduct depot-level maintenance, such as tools, test equipment, machining equipment, and test stands.

<sup>18</sup>GAO, *Military Depots: Actions Needed to Improve Poor Conditions of Facilities and Equipment that Affect Maintenance Timeliness and Efficiency*, [GAO-19-242](#) (Washington, D.C.: Apr. 29, 2019).

<sup>19</sup>[GAO-19-242](#).

**Table 1: Average Age of Equipment at the Navy's Public Shipyards**

Shipyard	Average equipment age (years)	Time past average service life (years)
Norfolk Naval Shipyard	29	15.3
Portsmouth Naval Shipyard	19	3.5
Puget Sound Naval Shipyard	22	5.2
Pearl Harbor Naval Shipyard	15	0.8

Source: [GAO-20-64](#). | GAO-20-257T

- **The Navy shipyards lack the capacity to conduct required maintenance in the future.** We also reported in 2019 that the naval shipyards cannot support 68 of the 218—almost a third—of the maintenance periods that aircraft carriers and submarines will require through 2040, due to a lack of dry dock capacity.<sup>20</sup> Specifically, several of the Navy's 17 dry docks will become obsolete after the Los Angeles-class submarines are retired because they will be too small or lack the appropriate shore-side support for newer classes of submarines. For example, only 14 dry docks can support the early-flight Virginia-class submarines and only 11 dry docks can support the Virginia-class submarines outfitted with the longer Virginia Payload Module.<sup>21</sup> In addition, no dry docks can currently support repairs to the Ford class aircraft carrier, even though the Navy accepted delivery of the first ship of that class in 2017. Private shipyards have told the Navy that they could have some additional capacity to conduct maintenance, but are hesitant to invest in creating this capacity without more certainty from the Navy.

<sup>20</sup>GAO, *Naval Shipyards: Key Actions Remain to Improve Infrastructure to Better Support Navy Operations*, [GAO-20-64](#). (Washington, D.C.: Nov. 25, 2019).

<sup>21</sup>The Virginia Payload Module is an additional mid-body section, approximately 84 feet in length, which contains vertical launch tubes that would be used to store and fire additional Tomahawk cruise missiles and other payloads. The Navy plans to include this module in all of the Virginia-class boats procured in fiscal year 2020 and subsequent years.



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## The Navy Has Taken Some Steps to Address Maintenance Delays, but Corrective Actions Will Take Years to Implement

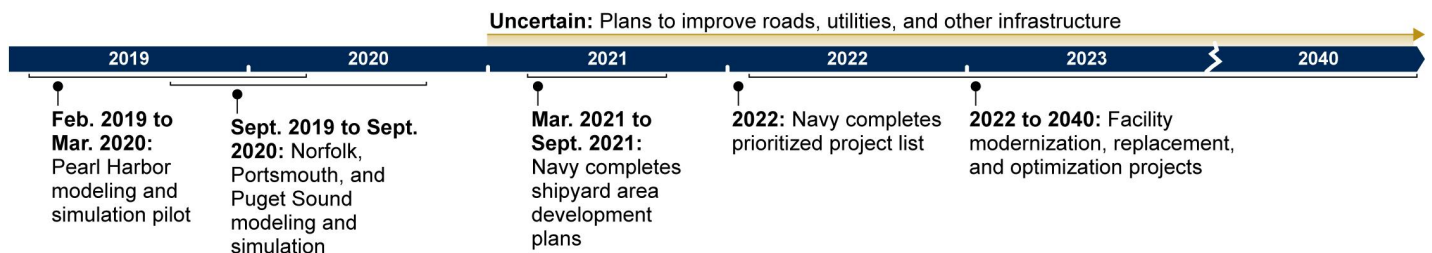
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### The Navy Developed a Shipyard Infrastructure Optimization Plan, but It Will Require Significant Time and Resources to Implement

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The Navy has begun to implement a major effort—the Shipyard Infrastructure Optimization Plan—that is intended to significantly improve the condition of shipyard facilities and equipment, but it will require significant time and resources to implement. This plan is designed to address the bulk of the Navy’s dry-dock capacity issues as well as identify the optimal placement of facilities and major equipment at each public shipyard. The Navy estimates these changes can ultimately increase its maintenance efficiency by reducing the distance that workers and material will have to travel around the shipyards during the maintenance period. According to the Navy, this equates to recovering about 328,000 labor days per year—an amount roughly equal to that of an additional submarine maintenance period annually. In addition, the Navy has created a program office to oversee its shipyard improvement effort, which we believe demonstrates leadership attention and commitment to the effort. However, the Navy estimated that the replacement of the facilities will take 20 years (see figure 5). Further, the Navy estimates that it will take 30 years to bring the average age of its equipment to within industry standards.

**Figure 5: Navy’s Timeline for Optimizing Facilities under the Shipyard Infrastructure Optimization Plan**



Source: GAO analysis of Navy documents and discussions with Navy officials. | GAO-20-257T

Note: The Navy's Shipyard Infrastructure Optimization Plan is designed to identify 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.

The Navy estimated in 2018 that this effort will require \$21 billion over 20 years to implement. However, this \$21 billion estimate does not include inflation and other significant costs, such as those for utilities, roads, or environmental remediation. Our analysis of the Navy's preliminary estimate is that it is understated due to a lack of inflation adjustments, which could add billions to the final cost. Navy officials stated that the \$21 billion estimate is an initial indicator of the scope of the effort and is not intended as a cost estimate in its budget. However, even that \$21 billion estimate would require funding levels beyond what the Navy has requested for shipyard infrastructure in recent years. We recommended in November 2019 that the Navy should prepare more accurate cost estimates using best practices so that the Navy can request accurate funding from Congress and avoid common pitfalls associated with inaccurate estimates such as cost overruns, missed deadlines, and performance shortfalls.<sup>22</sup> We recommended that the Navy take steps to improve its cost estimate prior to the start of its primary facility improvement effort; the Navy has concurred with this recommendation.

### Other Navy Efforts Are in Early Stages and Will Need Additional Time to Produce Results

The Navy has additional efforts underway that should help reduce maintenance delays, though the results of these efforts likely will not be seen for several years. For example:

- **Revising the size of ship crews.** The Navy has taken steps to address some of our recommendations regarding the size of ship crews. Specifically, the Navy has begun reviewing and revising its ship crew

<sup>22</sup>GAO-20-64.

levels—most notably adding 32 crewmembers to its DDG-51 destroyers and 23 crewmembers to its LPD-17 fleet. However, officials noted that the process to update crew levels throughout the fleet would take about 4 years to complete. The Navy will also need to demonstrate that it actually can assign crew members to these ships to meet the higher crew levels. We have ongoing work examining this issue and plan to report on our findings in winter of 2020.

- **Hiring additional workers at shipyards.** Shipyards have increased hiring, going from about 30,600 workers in fiscal year 2014 to about 37,400 workers in fiscal year 2019. However, Navy officials have stated that it takes several years for workers to reach full productivity. In the past, officials expected that new hires would take about 5 years to become fully productive, although the Navy has testified that they hope to reduce that time through new training techniques.
- **Performance to Plan.** The Navy has begun an analytical effort to better understand maintenance challenges and its capacity needs for the future, called “Performance to Plan.” According to Navy officials and plans, this effort is intended to help the Navy improve full and timely completion of maintenance, including for aviation, surface ships, and submarines. For example, the effort for surface ship maintenance currently involves a pilot program looking at how to better plan and execute maintenance periods for DDG 51-class destroyers, including examining how to improve the accuracy of forecasted maintenance requirements and duration and better adhere to planning milestones, among other outcomes. We are encouraged by this effort, but note that it remains in the early stages, and it is not clear whether or when the pilot effort will be extended to examine the entire surface fleet.

In sum, the Navy faces significant challenges in maintaining its current fleet and reaping full benefit of the ships it has in its inventory today due to persistent and substantial maintenance delays. The Navy has made progress identifying the causes of their maintenance challenges and has begun efforts to address them. However, delays continue to persist and these challenges will require years of continued management attention and substantial investment to be resolved.

As part of this sustained management attention, the Navy would benefit from a continued focus on implementing our prior recommendations. Since 2015, we have made 17 recommendations to the Navy to address various concerns we identified with its maintenance process. The Navy agreed with 14 of those recommendations, partially concurred with 1

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recommendation, and disagreed with 2 recommendations.<sup>23</sup> However, as of November 2019, the Navy had fully implemented 6 of these recommendations. While the Navy has taken some additional action on the 11 remaining unimplemented recommendations, taking additional steps to fully address these recommendations could help the Navy address its maintenance challenges and better position it to sustain the current and future fleet.

Looking to the future, the Navy is seeking to grow the fleet over the next 15 years. However, if it increases the size of the fleet before addressing its maintenance challenges, it is likely that the Navy will be faced with a growing number of both maintenance delays and ships that are unavailable for use. Even assuming the Navy's efforts to improve shipyard operations succeed, it will be years before the Navy can maintain a significantly larger fleet.

Chairmen Perdue 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.

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## GAO Contact and Staff Acknowledgments

If you or your staff have questions about this testimony, please contact Diana Maurer, Director, Defense Capabilities and Management at (202) 512-9627 or [maurerd@gao.gov](mailto:maurerd@gao.gov).

Contacts 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), James Lackey (Analyst-in-Charge), A. S. Bagley, Chris Cronin, Amie Lesser, Felicia Lopez, Tobin McMurdie, Carol Petersen, Clarice Ransom, Matt Thompson, and Sally Williamson.

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<sup>23</sup>We discuss our prior recommendations on Navy maintenance challenges and the Navy's progress in addressing them in detail in appendix I.

# Appendix I: Implementation Status of Prior GAO Recommendations Related to Ship and Submarine Maintenance

In recent years, we have issued a number of reports related to ship and submarine maintenance. Table 1 summarizes the recommendations in these reports.<sup>1</sup> The Department of Defense (DOD) concurred with most of the 17 recommendations; however, to date DOD has fully implemented 6 of the recommendations.<sup>2</sup> For each of the reports, the specific recommendations and any progress made in implementing them are summarized in tables 2 through 9.

**Table 1a: Status of Select Recommendations GAO Has Made to the Department of Defense (DOD) Since 2012 on Navy Ship and Submarine Maintenance, as of November 2019**

Product date	Product title and number	Number of recommendations to the Navy (open)	Number of recommendations to the Navy (implemented)
April 29, 2019	Military Depots: Actions Needed to Improve Poor Conditions of Facilities and Equipment That Affect Maintenance Timeliness and Efficiency. ( <a href="#">GAO-19-242</a> )	2	
December 14, 2018	DOD Depot Workforce: Services Need to Assess the Effectiveness of Their Initiative to Maintain Critical Skills. ( <a href="#">GAO-19-51</a> )	1	
November 19, 2018	Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet. ( <a href="#">GAO-19-229</a> ).	0	1 <sup>a</sup>
September 12, 2017	Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations. ( <a href="#">GAO-17-548</a> )	3	

<sup>1</sup>This 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, Department of the Air Force, or Department of the Army.

<sup>2</sup>The recommendation status provided in this appendix is current as of November 2019.

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Product date	Product title and number	Number of recommendations to the Navy (open)	Number of recommendations to the Navy (implemented)
Subtotal		6	1

**Table 1b: Status of Select Recommendations GAO Has Made to the Department of Defense (DOD) Since 2012 on Navy Ship and Submarine Maintenance, as of November 2019**

Product date	Product title and number	Number of recommendations to DOD components in coordination with Navy (open)	Number of recommendations to DOD components in coordination with Navy (implemented)
July 13, 2017	Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality. ( <a href="#">GAO-17-418</a> )	3	1
May 18, 2017	Navy Force Structure: Actions Needed to Ensure Proper Size and Composition of Ship Crews. ( <a href="#">GAO-17-413</a> )	1	3
May 29, 2015	Navy Force Structure: Sustainable Plan and Comprehensive Assessment Needed to Mitigate Long-Term Risks to Ships Assigned to Overseas Homeports. ( <a href="#">GAO-15-329</a> )	1	1
Subtotal		5	5
<b>Total</b>		<b>11</b>	<b>6</b>

Source: GAO analysis. | GAO-20-257T

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, Department of the Air Force, or Department of the Army.

<sup>a</sup>[GAO-19-229](#) is an unclassified version of a GAO-19-192C that included three additional classified recommendations to Navy leadership that are not included in this table.

**Table 2: Status of Recommendations from Military Depots: Actions Needed to Improve Poor Conditions of Facilities and Equipment That Affect Maintenance Timeliness and Efficiency ([GAO-19-242](#))**

Recommendation	Recommendation (additional information)
<b>Recommendation #1:</b> The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers establish measures for their depots to track facility or equipment conditions that lead to maintenance delays.	<b>Status:</b> Open
<b>Recommendation #1:</b> The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers establish measures for their depots to track facility or equipment conditions that lead to maintenance delays.	<b>Concurrence:</b> Yes
<b>Recommendation #1:</b> The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers establish measures for their depots to track facility or equipment conditions that lead to maintenance delays.	<b>Comments:</b> Department of Defense officials have stated that the Navy will take steps to address this recommendation and will provide a status update in December 2019.

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Recommendation	Recommendation (additional information)
<b>Recommendation #2:</b> The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers implement tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Navy depot.	<b>Status:</b> Open
<b>Recommendation #2:</b> The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers implement tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Navy depot.	<b>Concurrence:</b> Yes
<b>Recommendation #2:</b> The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers implement tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Navy depot.	<b>Comments:</b> Department of Defense officials have stated that the Navy will take steps to address this recommendation and will provide a status update in December 2019.

Source: GAO analysis of recommendations made in [GAO-19-242](#). | GAO-20-257T

Note: This table does not include recommendations made to the Secretary of Defense, Secretary of the Army, Commandant of the Marine Corps, and Secretary of the Air Force.

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**Table 3: Status of Recommendation from DOD Depot Workforce: Services Need to Assess the Effectiveness of Their Initiatives to Maintain Critical Skills. (GAO-19-51)**

Recommendation	Recommendation (additional information)
<b>Recommendation #1:</b> The Secretary of the Navy, in conjunction with the Naval Sea Systems Command and Naval Air Systems Command, should assess the effectiveness of the Navy's shipyards' and fleet readiness centers' hiring, training, and retention programs.	<b>Status:</b> Open
<b>Recommendation #1:</b> The Secretary of the Navy, in conjunction with the Naval Sea Systems Command and Naval Air Systems Command, should assess the effectiveness of the Navy's shipyards' and fleet readiness centers' hiring, training, and retention programs.	<b>Concurrence:</b> Yes
<b>Recommendation #1:</b> The Secretary of the Navy, in conjunction with the Naval Sea Systems Command and Naval Air Systems Command, should assess the effectiveness of the Navy's shipyards' and fleet readiness centers' hiring, training, and retention programs.	Comments: As of November 2019, the Navy is in the process of collecting information to assess the effectiveness of these programs and considers these efforts ongoing. For example, in FY 2019, the Navy implemented Advanced Skills Management (ASM) across the Navy's Fleet Readiness Centers that will provide consistency across the Fleet Readiness Centers in tracking qualifications, certifications and licenses, and includes functionality for course and class management, individual development plans and identifying skills gaps. The timeline for completion of this effort is the first quarter of FY2020. In addition, the Navy is in the process of assessing and evaluating overtime as well as workload growth, and changing skill sets with emerging technologies, and plans to implement corrective actions to address these issues. This analysis is ongoing and will focus on critical skills within the artisan community over a 3-year period and use predictive modeling to assess skill sets for future workload.

Source: GAO analysis of recommendations made in [GAO-19-51](#). | GAO-20-257T

Note: This table does not include recommendations made to the Secretary of the Army, Commandant of the Marine Corps, and the Secretary of the Air Force.



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**Table 4: Status of Recommendation from Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet. (GAO-19-229)**

Recommendation	Recommendation (additional information)
<b>Recommendation #1:</b> 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.	<b>Status:</b> Implemented
<b>Recommendation #1:</b> 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.	<b>Concurrence:</b> Yes
<b>Recommendation #1:</b> 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.	<b>Comments:</b> The Department of Defense concurred with this recommendation. In December 2018, the Navy issued a 5-year submarine maintenance plan citing our report and stating that the Navy will take several actions to reduce submarine idle time and maintenance delays that address our findings. These actions include moving two additional attack submarine maintenance availabilities to the private shipyards, with the possibility of moving additional availabilities to the private sector over the next five years.

Source: GAO analysis of recommendations made in GAO-19-229. | GAO-20-257T

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

**Table 5: Status of Recommendations from Naval Shipyards: Actions Needed to Improve Poor Conditions That Affect Operations. (GAO-17-548)**

Recommendation	Recommendation (additional information)
<b>Recommendation #1:</b> 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.	<b>Status:</b> Open
<b>Recommendation #1:</b> 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.	<b>Concurrence:</b> Yes

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Recommendation	Recommendation (additional information)
<p><b>Recommendation #1:</b> 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.</p>	<p><b>Comments:</b> Naval Sea Systems Command produced a Shipyard Infrastructure Optimization Plan in February 2018 to guide the overhaul and improvement of the naval shipyards. This plan includes some of the recommended elements but not others.</p> <ol style="list-style-type: none"> <li>1. The plan includes some goals for the desired shipyard condition and capabilities including to: recover almost 70 maintenance periods over the next 20 years, modernize capital equipment to industry standards, optimize facilities, and reduce travel time. Navy officials stated the program office is in the process of creating digital maps of the yards to use in modeling facility layouts to identify the optimal layout. The Navy states that the optimal layout will recover 328,000 man days per year, a 65 percent reduction of travel and movement.</li> <li>2. The report includes a preliminary cost estimate, but work is under way to determine the full costs to address all relevant requirements, risk factors, and planning costs. The plan identifies risks that could increase costs, but does not identify solutions to address those risks. Program officials said they will develop plans to address the risks in subsequent phases of the planning effort. The risks Navy officials identified included historical preservation, environmental regulations, and the need for extra capacity.</li> <li>3. The plan did not include metrics for assessing progress toward meeting each of the goals. Navy officials stated that they intend to develop metrics to meet this element during a second phase that will be complete in fiscal year 2020.</li> </ol> <p>To fully implement this recommendation, the Navy should complete its optimization plan, develop a reliable cost estimate addressing all relevant requirements, risks, and planning costs, and develop metrics to help it assess progress towards meeting its goal that include measuring the effectiveness of capital investments.</p>
<p><b>Recommendation #2:</b> 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.</p>	<p><b>Status:</b> Open</p>
<p><b>Recommendation #2:</b> 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.</p>	<p><b>Concurrence:</b> Yes</p>

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Recommendation	Recommendation (additional information)
<p><b>Recommendation #2:</b> 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.</p>	<p><b>Comments:</b> To address this recommendation, the Navy issued NAVSEA Notice 5450 in June 2018. This notice 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 and toward implementing our recommendation to conduct regular management reviews. In addition, the Assistant Secretary of the Navy for Research, Development, and Acquisition, in September 2018, required this new program office to provide regular updates to an Executive Oversight Council. These updates could serve as a foundation to address this recommendation.</p> <p>However, as of August 2019, the Navy has faced challenges involving all the relevant stakeholders in the plan's implementation, namely the shipyards. In the absence of clear direction, the shipyards have worked with the program office to develop several informal collaboration mechanisms. For example, the program office and the shipyards have begun several shipyard-specific working groups and hold regular telephone calls. However, until the shipyards are formally involved in the implementation and assessment of the plan, the Navy will be unable to fully meet the direction of this recommendation to involve "all relevant stakeholders."</p>
<p><b>Recommendation #3:</b> 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.</p>	<p><b>Status:</b> Open</p>
<p><b>Recommendation #3:</b> 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.</p>	<p><b>Concurrence:</b> Yes</p>

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Recommendation	Recommendation (additional information)
<b>Recommendation #3:</b> 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.	<b>Comments:</b> DOD officials stated in October 2018 that the Shipyard Infrastructure Optimization Plan, 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, the Navy has already made clear that it sees the shipyard optimization process as a 20-year effort. Given that, regular reporting on progress cannot be achieved with a single disclosure at the beginning of the effort. Both Congress and DOD decision makers need to receive regular updates on the implementation of the shipyard optimization plan, and 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, and as of August 2019, no progress reporting had begun.

Source: GAO analysis of recommendations made in [GAO-17-548](#). | GAO-20-257T

**Table 6: Status of Recommendations from Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality. (GAO-17-418)**

Recommendation	Recommendation (additional information)
<p><b>Recommendation #1:</b> The Secretary of Defense should direct the Secretary of the Navy to 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 (OWLD)). In doing so, the Navy should clearly define what constitutes a complete ship and when that should be achieved.</p>	<p><b>Status:</b> Open</p>
<p><b>Recommendation #1:</b> The Secretary of Defense should direct the Secretary of the Navy to 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 (OWLD)). In doing so, the Navy should clearly define what constitutes a complete ship and when that should be achieved.</p>	<p><b>Concurrence:</b> No</p>
<p><b>Recommendation #1:</b> The Secretary of Defense should direct the Secretary of the Navy to 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 (OWLD)). In doing so, the Navy should clearly define what constitutes a complete ship and when that should be achieved.</p>	<p><b>Comments:</b> The Department of Defense (DOD) disagreed with our recommendation to clarify the Navy's ship delivery policy, and stated that other existing policies help ensure the completion and capability of ships at delivery. However, 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 had 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. 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 fiscal year 2019 National Defense Authorization Act which stipulated that the Navy could no longer count ships towards its battle force at commissioning, which occurs shortly after delivery. Instead, Congress directed that ships could only be counted in the battle force once they were both commissioned and capable of contributing to the Navy's missions. 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 and should be revised in line with our recommendation. Nonetheless, as of July 2019, DOD officials confirmed that the Navy does not intend to revise its ship delivery policy. 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>

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Recommendation	Recommendation (additional information)
<b>Recommendation #2:</b> The Secretary of Defense should direct the Secretary of the Navy to reconcile policy with practice to support INSURV'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 an INSURV assessment prior to providing ships to the fleet.	<b>Status:</b> Open
<b>Recommendation #2:</b> The Secretary of Defense should direct the Secretary of the Navy to reconcile policy with practice to support INSURV'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 an INSURV assessment prior to providing ships to the fleet.	<b>Concurrence:</b> No
<b>Recommendation #2:</b> The Secretary of Defense should direct the Secretary of the Navy to reconcile policy with practice to support INSURV'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 an INSURV assessment prior to providing ships to the fleet.	Comments: DOD did not concur with this recommendation, noting that the current timing of Navy Board of Inspection and Survey (INSURV) 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 INSURV 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, therefore, INSURV 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 re-assess the timing of its post-delivery trials in support of INSURV's responsibility to make recommendations for fleet introduction. As of July 2019, DOD officials confirmed that the Navy does not plan to reassess the timing of INSURV's post-delivery assessments. Until this occurs, the Navy will continue to be at risk of providing ships to the fleet with significant deficiencies.
<b>Recommendation #3:</b> The Secretary of Defense should direct the Secretary of the Navy to reflect additional ship milestones in Selected Acquisition Reports to Congress, including OWLD and readiness to deploy.	<b>Status:</b> Open
<b>Recommendation #3:</b> The Secretary of Defense should direct the Secretary of the Navy to reflect additional ship milestones in Selected Acquisition Reports to Congress, including OWLD and readiness to deploy.	<b>Concurrence:</b> Partial

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Recommendation	Recommendation (additional information)
<b>Recommendation #3:</b> The Secretary of Defense should direct the Secretary of the Navy to reflect additional ship milestones in Selected Acquisition Reports to Congress, including OWLD and readiness to deploy.	<b>Comments:</b> DOD partially concurred with this recommendation. The department agreed to report obligation work limiting dates (OWLD) in its Selected Acquisition Reports to Congress, and, as of December 2018, has implemented this portion of the recommendation. The department added the OWLDs for all ships that have yet to achieve this milestone to its Selected Acquisition Reports and plans to continue reporting this information in all subsequent Selected Acquisition Reports. 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.
<b>Recommendation #4:</b> The Secretary of Defense should direct the Secretary of the Navy to, in Selected Acquisition Reports to Congress, ensure that the criteria used to declare IOC aligns with DOD guidance, and reflect the definition of this milestone in the reports.	<b>Status:</b> Implemented
<b>Recommendation #4:</b> The Secretary of Defense should direct the Secretary of the Navy to, in Selected Acquisition Reports to Congress, ensure that the criteria used to declare IOC aligns with DOD guidance, and reflect the definition of this milestone in the reports.	<b>Concurrence:</b> Yes
<b>Recommendation #4:</b> The Secretary of Defense should direct the Secretary of the Navy to, in Selected Acquisition Reports to Congress, ensure that the criteria used to declare IOC aligns with DOD guidance, and reflect the definition of this milestone in the reports.	<b>Comments:</b> DOD concurred with this recommendation. For shipbuilding programs that have not yet achieved initial operational capability (IOC), the Navy will include the IOC definition in its Selected Acquisition Reports to Congress and, as of December 2018, has begun reporting this information for some programs. The department does not plan to revisit existing IOC definitions, as these definitions have already been approved by department leadership. However, for new shipbuilding programs going forward, the department plans to develop improved IOC definitions in line with the findings of our report, as it has done for its new guided missile frigate program. The IOC definitions for these new programs will be focused on ships' demonstrated operational capability, rather than the achievement of schedule milestones. We have determined that these actions meet the intent of our recommendation.

Source: GAO analysis of recommendations made in [GAO-17-418](#). | [GAO-20-257T](#)



**Table 7: Status of Recommendations from Navy Force Structure: Actions Needed to Ensure Proper Size and Composition of Ship Crews. (GAO-17-413)**

Recommendation	Recommendation (additional information)
<b>Recommendation #1:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy identify personnel needs and costs associated with the planned larger Navy fleet size, including consideration of the updated manpower factors and requirements.	<b>Status:</b> Open
<b>Recommendation #1:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy identify personnel needs and costs associated with the planned larger Navy fleet size, including consideration of the updated manpower factors and requirements.	<b>Concurrence:</b> Yes
<b>Recommendation #1:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy identify personnel needs and costs associated with the planned larger Navy fleet size, including consideration of the updated manpower factors and requirements.	Comments: The Department of Defense (DOD) concurred with our recommendation, citing its commitment to ensuring that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet. As of November 2019, Navy officials confirmed the development of an improved manpower and inventory projection tool intended to capture all facets of personnel needs and costs. This tool 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. This recommendation will remain open until more ship manning documents are updated and the new Force Structure Assessment is completed.
<b>Recommendation #2:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to 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.	<b>Status:</b> Implemented
<b>Recommendation #2:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to 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.	<b>Concurrence:</b> Yes

**Appendix I: Implementation Status of Prior  
GAO Recommendations Related to Ship and  
Submarine Maintenance**

Recommendation	Recommendation (additional information)
<p><b>Recommendation #2:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to 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.</p>	<p>Comments: DOD concurred with our recommendation, citing its commitment to ensuring that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet. As of November 2019, the Navy has updated ship manning documents for the DDG-51 and LPD-17 classes. The Navy is projected to update all surface ship manning documents by FY 2024. The Navy Total Force Manpower and Procedure Directive (OPNAVINST 1000.16L) has also been revised to direct manpower requirements to incorporate in-port workload in determining crew size.</p>
<p><b>Recommendation #3:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy conduct a comprehensive reassessment of the Navy standard workweek and make any necessary adjustments.</p>	<p><b>Status:</b> Implemented</p>
<p><b>Recommendation #3:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy conduct a comprehensive reassessment of the Navy standard workweek and make any necessary adjustments.</p>	<p><b>Concurrence:</b> Yes</p>
<p><b>Recommendation #3:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy conduct a comprehensive reassessment of the Navy standard workweek and make any necessary adjustments.</p>	<p>Comments: DOD concurred with our recommendation, citing its commitment to ensuring that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet. In November 2018, the Navy completed its Operational Afloat Workload Study Final Report, conducted by the Navy Manpower Analysis Center. The study comprehensively reassessed workload and time for productive work, training, service diversion activities, sleep, personal activities, messing, and other components of a 168-hour week across the fleet. The final report recommended changes to the afloat workweek. For example, it recommended a readjustment of the productive work factor, the creation of a new individual training component, and an increased allotment for service diversion activities in the workweek. All these changes better account for workload and how sailors spend their time when aboard their ships. In January 2019, the Navy codified these changes in a revision to Navy instruction (OPNAV 1000.16L), establishing a mandatory baseline to use in developing updated ship manpower requirements. These changes will allow the Navy to more accurately calculate the size and composition of its ship crews, and allow crews to more safely and effectively execute their workload. The Navy has used these and other updated factors, to recalculate the manpower requirements for the DDG 51 destroyer class, leading to a required crew size increase of about 10 percent (an additional 32 crew members) and for the LPD 17 amphibious transport dock class, leading to a required crew size increases of about 6 percent, or 23 additional crew members.</p>

**Appendix I: Implementation Status of Prior  
GAO Recommendations Related to Ship and  
Submarine Maintenance**

Recommendation	Recommendation (additional information)
<b>Recommendation #4:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy develop criteria and update guidance for reassessing the factors used to calculate manpower requirements periodically or when conditions change.	<b>Status:</b> Implemented
<b>Recommendation #4:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy develop criteria and update guidance for reassessing the factors used to calculate manpower requirements periodically or when conditions change.	<b>Concurrence:</b> Yes
<b>Recommendation #4:</b> To ensure that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet, the Under Secretary of Defense for Personnel and Readiness should direct the Secretary of the Navy to have the Navy develop criteria and update guidance for reassessing the factors used to calculate manpower requirements periodically or when conditions change.	Comments: DOD concurred with our recommendation, citing its commitment to ensuring that the Navy's manpower requirements are current and analytically based and will meet the needs of the existing and future surface fleet. In response, the Navy released guidance for updating these factors in a March 2018 memorandum. The Navy has been reassessing and updating these factors since the release of <a href="#">GAO-17-413</a> . Additionally, the January 2019 revision of OPNAVINST 1000.16L codified the process by which these standards should be revised. The revised instruction further includes criteria and triggers that necessitate the updating of manpower requirements. These criteria are both condition- and time-based, and include compliance with current allowances and approved staffing standards. The Navy expects these changes to keep factors current and accurate, thereby leading to more accurate and properly sized ship crews.

Source: GAO analysis of recommendations made in [GAO-17-413](#). | GAO-20-257T

**Table 8: Status of Recommendation 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	Recommendation (additional information)
<b>Recommendation #1:</b> To balance combatant commanders' demands for forward presence with the Navy's needs to sustain a ready force over the long term and identify and mitigate risks consistent with Federal Standards for Internal Control, the Secretary of Defense should direct the Secretary of the Navy to, to fully implement its optimized fleet response plan, develop and implement a sustainable operational schedule for all ships homeported overseas.	<b>Status:</b> Open
<b>Recommendation #1:</b> To balance combatant commanders' demands for forward presence with the Navy's needs to sustain a ready force over the long term and identify and mitigate risks consistent with Federal Standards for Internal Control, the Secretary of Defense should direct the Secretary of the Navy to, to fully implement its optimized fleet response plan, develop and implement a sustainable operational schedule for all ships homeported overseas.	<b>Concurrence:</b> Yes

**Appendix I: Implementation Status of Prior  
GAO Recommendations Related to Ship and  
Submarine Maintenance**

Recommendation	Recommendation (additional information)
<p><b>Recommendation #1:</b> To balance combatant commanders' demands for forward presence with the Navy's needs to sustain a ready force over the long term and identify and mitigate risks consistent with Federal Standards for Internal Control, the Secretary of Defense should direct the Secretary of the Navy to, to fully implement its optimized fleet response plan, develop and implement a sustainable operational schedule for all ships homeported overseas.</p>	<p><b>Comments:</b> The Department of Defense (DOD) concurred with this recommendation. In August 2015, the Navy reported that it had approved and implemented revised optimized fleet response plan schedules for all ships homeported overseas-six different operational schedules for various naval forces homeported in different overseas locations. We closed the recommendation as implemented in 2015. In 2017, the Navy suffered four significant mishaps at sea resulting in serious damage to its ships and the loss of 17 sailors. 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, GAO re-opened this recommendation. As of August 2019, the Navy had developed a change to the operational schedule for ships homeported in Japan and is expecting to codify this revised schedule in 2019. The Navy also established Commander, Naval Surface Group, Western Pacific (CNSGWP) to oversee surface ship maintenance, training, and certification for ships based in Japan. Due to continuing heavy operational demands, GAO will continue to monitor the Navy's adherence to the revised schedules before it closes this recommendation as implemented.</p>
<p><b>Recommendation #2:</b> To balance combatant commanders' demands for forward presence with the Navy's needs to sustain a ready force over the long term and identify and mitigate risks consistent with Federal Standards for Internal Control, the Secretary of Defense should direct the Secretary of the Navy to develop a comprehensive assessment of the long-term costs and risks to the Navy's surface and amphibious fleet associated with its increasing reliance on overseas homeporting to meet presence requirements, make any necessary adjustments to its overseas presence based on this assessment, and reassess these risks when making future overseas homeporting decisions and developing future strategic laydown plans.</p>	<p><b>Status:</b> Implemented</p>
<p><b>Recommendation #2:</b> To balance combatant commanders' demands for forward presence with the Navy's needs to sustain a ready force over the long term and identify and mitigate risks consistent with Federal Standards for Internal Control, the Secretary of Defense should direct the Secretary of the Navy to develop a comprehensive assessment of the long-term costs and risks to the Navy's surface and amphibious fleet associated with its increasing reliance on overseas homeporting to meet presence requirements, make any necessary adjustments to its overseas presence based on this assessment, and reassess these risks when making future overseas homeporting decisions and developing future strategic laydown plans.</p>	<p><b>Concurrence:</b> Yes</p>

Appendix I: Implementation Status of Prior  
GAO Recommendations Related to Ship and  
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Recommendation	Recommendation (additional information)
<b>Recommendation #2:</b> To balance combatant commanders' demands for forward presence with the Navy's needs to sustain a ready force over the long term and identify and mitigate risks consistent with Federal Standards for Internal Control, the Secretary of Defense should direct the Secretary of the Navy to develop a comprehensive assessment of the long-term costs and risks to the Navy's surface and amphibious fleet associated with its increasing reliance on overseas homeporting to meet presence requirements, make any necessary adjustments to its overseas presence based on this assessment, and reassess these risks when making future overseas homeporting decisions and developing future strategic laydown plans.	Comments: DOD concurred with this recommendation. In February 2019, the Office of the Chief of Naval Operations Assessments Division completed an assessment of the long-term costs and risks to the Navy's fleet associated with its increasing reliance on overseas homeporting. The assessment resulted in several changes to the Navy's process for making homeporting decisions focused on fully evaluating and considering long-term costs, material condition, and training risks when making homeporting decisions.

Source: GAO analysis of recommendations made in [GAO-15-329](#). | GAO-20-257T

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*Military Depots: Actions Needed to Improve Poor Conditions of Facilities and Equipment that Affect Maintenance Timeliness and Efficiency.* [GAO-19-242](#). Washington, D.C.: April 29, 2019.

*DOD Depot Workforce: Services Need to Assess the Effectiveness of Their Initiatives to Maintain Critical Skills.* [GAO-19-51](#). Washington, D.C.: December 14, 2018.

*Navy and Marine Corps: Rebuilding Ship, Submarine, and Aviation Readiness Will Require Time and Sustained Management Attention.* [GAO-19-225T](#). Washington, D.C.: December 12, 2018.

*Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet.* [GAO-19-229](#). Washington, D.C.: November 19, 2018.

*Navy Readiness: Actions Needed to Address Costly Maintenance Delays Affecting the Attack Submarine Fleet.* [GAO-19-192C](#). Washington, D.C.: October 31, 2018.

*Military Readiness: Update on DOD's Progress in Developing a Readiness Rebuilding Plan.* [GAO-18-441RC](#). Washington, D.C.: August 10, 2018. (SECRET)

*Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments.* [GAO-18-238SP](#). Washington, D.C.: June 6, 2018.

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*Weapon Systems Annual Assessment: Knowledge Gaps Pose Risks to Sustaining Recent Positive Trends.* [GAO-18-360SP](#). Washington, D.C.: April 25, 2018.

*Columbia Class Submarine: Immature Technologies Present Risks to Achieving Cost Schedule and Performance Goals.* [GAO-18-158](#). Washington, D.C.: December 21, 2017.

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

*Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations.* [GAO-17-548](#). Washington, D.C.: September 12, 2017.

*Navy Readiness: Actions Needed to Address Persistent Maintenance, Training, and Other Challenges Facing the Fleet.* [GAO-17-798T](#). Washington, D.C.: September 7, 2017.

*Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality.* [GAO-17-418](#). Washington, D.C.: July 13, 2017.

*Department of Defense: Actions Needed to Address Five Key Mission Challenges.* [GAO-17-369](#). Washington, D.C.: June 13, 2017.

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

*Military Readiness: DOD's Readiness Rebuilding Efforts May Be at Risk without a Comprehensive Plan.* [GAO-16-841](#). Washington, D.C.: September 7, 2016.

*Navy and Marine Corps: Services Face Challenges to Rebuilding Readiness.* [GAO-16-481RC](#). Washington, D.C.: May 25, 2016.  
(SECRET//NOFORN)

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

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Related GAO Products

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*Navy Force Structure: Sustainable Plan and Comprehensive Assessment Needed to Mitigate Long-Term Risks to Ships Assigned to Overseas Homeports.* [GAO-15-329](#). Washington, D.C.: May 29, 2015.



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