



May 2020

NAVY SHIP MAINTENANCE

Evaluating Pilot Program Outcomes Could Inform Decisions to Address Persistent Schedule Challenges

Accessible Version

GAO Highlights

Highlights of [GAO-20-370](#), a report to congressional committees

View [GAO-20-370](#). For more information, contact Shelby S. Oakley at (202) 512-4841 or oakleys@gao.gov.

Why GAO Did This Study

The Navy relies on its fleet of over 150 surface ships to be ready to operate when needed for the defense of the United States. The Navy spends billions annually in maintaining this fleet. In 2015, the Navy changed how it contracts for such maintenance work, aiming to better control costs and improve quality. The new approach, called MAC-MO, generally uses firm-fixed-price contract delivery orders for individual ship availabilities competed among pre-qualified contractors at Navy regional maintenance centers.

House Report 115-676 included a provision for GAO to review the Navy's implementation of the MAC-MO strategy. This report (1) examines outcomes under the strategy; (2) evaluates actions the Navy has taken related to recent lessons learned; and (3) describes contractors' considerations when planning for hiring and facilities. GAO analyzed data on ship repair under MAC-MO; reviewed six case studies involving different availability types, classes of ships, maintenance centers, and contractors; and interviewed Navy officials and contractors.

What GAO Recommends

GAO recommends that the Navy establish an analysis plan for the evaluation of the pilot program. The Navy concurred with GAO's recommendation.

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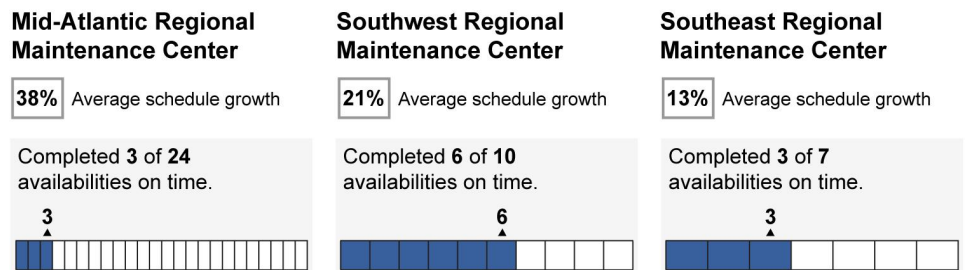
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What GAO Found

Since shifting to the Multiple Award Contract-Multi Order (MAC-MO) contracting approach for ship maintenance work in 2015, the Navy has increased competition opportunities, gained flexibility to ensure quality of work, and limited cost growth, but schedule delays persist. During this period, 21 of 41 ship maintenance periods, called availabilities, for major repair work cost less than initially estimated, and average cost growth across the 41 availabilities was 5 percent. Schedule outcomes were less positive and Navy regional maintenance centers varied in their performance (see figure).

Schedule Performance across Navy Regional Maintenance Centers



Source: GAO analysis of Navy data. | GAO-20-370

To mitigate these delays, the Navy has identified and taken actions to implement lessons learned, including negotiating and funding undefined but expected increases in work at the time of contract award. However, these actions have not resolved the delays that result from the approval process the Navy often must use to obtain funds to complete this maintenance work. Namely, if an availability extends into a new fiscal year and needs more than \$4 million in additional prior-year funding, both Navy and Defense Department approvals are required. GAO found this approval process took between 26 and 189 days based on Defense Department data. In December 2019, Congress established a pilot program that would potentially allow the Navy to avoid this process. Leading practices GAO identified for pilot programs call for development of an analysis plan to track implementation and performance and for evaluating final results. As the Navy moves into implementation of its pilot program, developing an analysis plan would provide it with a means to identify opportunities to evaluate schedule outcomes of pilot program availabilities, as compared to non-pilot program availabilities, and document a process for evaluating lessons learned from the pilot program. Such evaluations would provide information to determine if the pilot approach should expand to help address persistent schedule challenges.

Ship repair contractors now operating in the MAC-MO environment told GAO that two key considerations drive their decisions on workforce and facilities investments: visibility regarding planned workloads within a given port and their assessment of the share of that work they are most likely to win. In recognition of these considerations, Navy officials have begun taking steps to increase predictability of workloads at each port. These officials anticipate that these steps, coupled with increasing workloads at the ports, will help increase contractors' confidence in their ability to forecast their share of future work.

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Abbreviations

CG	Cruisers
CNO	Chief of Naval Operations
CNRMC	Commander, Navy Regional Maintenance Center
DDG	Destroyers
FAR	Federal Acquisition Regulation
FPDS-NG	Federal Procurement Data System-Next Generation
IDIQ	indefinite delivery indefinite quantity
LOE	Level of Effort
MAC-MO	Multiple Award Contract, Multi Order
MARMC	Mid-Atlantic Regional Maintenance Center
MSMO	Multi-Ship, Multi-Option
NAVSEA	Naval Sea Systems Command
OPN	Other Procurement, Navy
P2P	Performance to Plan

RMC	Regional Maintenance Centers
SERMC	Southeast Regional Maintenance Center
SDVG	Small Dollar Value Growth
SURFMEPP	Surface Maintenance Engineering Planning Program
SWRMC	Southwest Regional Maintenance Center
SEA 21	Deputy Commander, Surface Ship Maintenance and Modernization

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May 11, 2020

Congressional Committees

In support of its various missions in defense of the United States, the Navy plans to spend over \$20.7 billion through fiscal year 2024 to maintain its fleet of over 150 surface combatant and amphibious warfare ships. The Navy relies on these non-nuclear surface ships to be ready to operate when needed and to meet their expected service lives. To accomplish this, the Navy sustains these ships using scheduled periods of repair work called availabilities. Our prior work has shown that the Navy has faced persistent challenges in maintaining its fleet, resulting in thousands of days that ships were unavailable for training or operations.¹

The Navy contracts with private shipyards and other firms, which conduct or support ship repair and maintenance availabilities. In 2015, the Navy transitioned to a new contracting strategy with the goals to control costs, increase competition, and improve the quality of work while supporting operational readiness of the fleet. Under this strategy, which we refer to as Multiple Award Contract, Multi Order (MAC-MO), the Navy generally competes orders for individual ship repair availabilities among the shipyards under firm-fixed-price terms, after a third-party contractor plans the repair work.² The Navy uses the MAC-MO strategy for maintenance and repair of six classes of ships, including amphibious ships, cruisers, and destroyers, and plans to include the Littoral Combat Ship in the near future.

In a November 2016 report, we assessed the early implementation of the MAC-MO contracting strategy in response to a provision in House of Representatives Report 114-102, which accompanied the Fiscal Year

¹ GAO, *Navy and Marine Corps: Rebuilding Ship, Submarine, and Aviation Readiness Will Require Time and Sustained Management Attention*, [GAO-19-225T](#) (Washington, D.C.: Dec. 12, 2018). See also GAO, *Navy Readiness: Actions Needed to Address Persistent Maintenance, Training, and Other Challenges Affecting the Fleet*, [GAO-17-798T](#) (Washington, D.C.: Sept 7, 2017) and [GAO-17-809T](#) (Washington, D.C.: Sept. 19, 2017).

² A firm-fixed-price contract provides for a price that is not subject to any adjustment on the basis of the contractor's cost experience in performing the contract. This contract type places maximum risk and full responsibility for all costs—and resulting profit or loss—on the contractor. It therefore provides maximum incentive for the contractor to control costs (FAR § 16.202-1).

2016 National Defense Authorization Act.³ We found that the Navy identified several lessons learned from pilot availabilities it had undertaken to demonstrate MAC-MO. We concluded that the Navy was still learning, and we subsequently recommended that the Navy perform systematic assessments of MAC-MO to harness new lessons learned and effectively implement the strategy. The Navy completed its first such assessment in December 2018 in response to our recommendation. House of Representatives Report 115-676 accompanying the fiscal year 2019 National Defense Authorization Act included a provision for us to review the Navy's more recent progress in implementing the MAC-MO contracting strategy. Specifically, this report (1) examines competition, cost, schedule, and quality outcomes under the strategy; (2) evaluates actions the Navy has taken related to recent lessons learned; and (3) describes considerations informing contractors' plans for future hiring and facilities investments under the MAC-MO contracting strategy.

To examine competition, cost, schedule, and quality outcomes the Navy has achieved under the MAC-MO strategy, we obtained available data on ship repair contract competition, number of offers received, costs, and schedules.⁴ To examine the competition outcomes of the MAC-MO strategy, we obtained Federal Procurement Data System-Next Generation (FPDS-NG) entries for all of the delivery orders associated with MAC-MO contract numbers from the start of the strategy through March 31, 2019. To assess the reliability of the FPDS-NG data, we reviewed documentation, interviewed Navy officials, performed logic checks, and compared the FPDS-NG data to contract documents. We found the FPDS-NG data sufficiently reliable to examine competition outcomes. We reviewed data for the planned cost and schedule of Chief of Naval Operations (CNO) availabilities, as well as the actual cost and schedule for the availabilities that the Navy closed out between February 2, 2011 and January 15, 2019.

To assess the reliability of the cost and schedule data, we (1) gathered information from the Navy's users of the data related to its reliability, (2) compared different snapshots of the data over time to check the consistency of completed entries including the version that the Navy used

³ GAO, *Navy Ship Maintenance: Action Needed to Maximize New Contracting Strategy's Potential Benefits*. [GAO-17-54](#) (Washington, D.C.: Nov 21, 2016).

⁴ We assessed competition consistent with the way it is defined and treated in the Federal Acquisition Regulation.

to publish its first assessment of the MAC-MO strategy, and (3) compared availability documentation from our completed case study CNO availabilities. We found these data sufficiently reliable to examine cost and schedule outcomes. We reviewed contracting documentation for six ship repair availabilities under the MAC-MO contracting strategy, four of which were completed at the time of our review, which we used as case studies. This documentation included availability completion reports that identified work progress along with any quality deficiencies at the conclusion of each availability. We selected these case study availabilities because they provided examples of performance across a mix of different types of availabilities, repair complexity, ship classes, and locations. The case studies are meant to be illustrative and are not generalizable.

To evaluate the actions the Navy has taken related to recent MAC-MO strategy lessons learned, we reviewed documentation of initiatives to improve the MAC-MO contracting approach, the Navy's December 2018 assessment of MAC-MO implementation, and prior GAO work. We reviewed Navy documentation and identification of key lessons learned by Navy officials knowledgeable of MAC-MO implementation. We also reviewed contract files for our six case study availabilities to identify lessons learned.

To describe considerations informing contractors' plans for future hiring and facilities investments under the MAC-MO strategy, we conducted semi-structured interviews with and reviewed questionnaire responses from 11 non-nuclear surface ship repair contractors, including all eight contractors responsible for executing major MAC-MO ship repair work. We also randomly selected a non-generalizable sample of three small business contractors performing noncomplex ship repair work at the three home ports implementing MAC-MO, to obtain the views of small businesses executing MAC-MO contracts. In addition, we obtained information from the Navy on planned future availabilities in home ports where MAC-MO has been implemented.

For each objective, we also interviewed Navy officials responsible for planning, administering, and funding the ship repair contracts, including the offices of the Deputy Commander, Surface Ship Maintenance and Modernization, (SEA 21); Commander, Naval Surface Force, Atlantic; Commander, Naval Surface Force, Pacific; Commander, Navy Regional Maintenance Center; the Mid-Atlantic Regional Maintenance Center (MARMC) in Norfolk, Virginia; the Southwest Regional Maintenance Center (SWRMC) in San Diego, California; and the Southeast Regional Maintenance Center (SERMC) in Mayport, Florida. These are the three

maintenance centers where the Navy is implementing the MAC-MO strategy. See appendix I for more information about our scope and methodology.

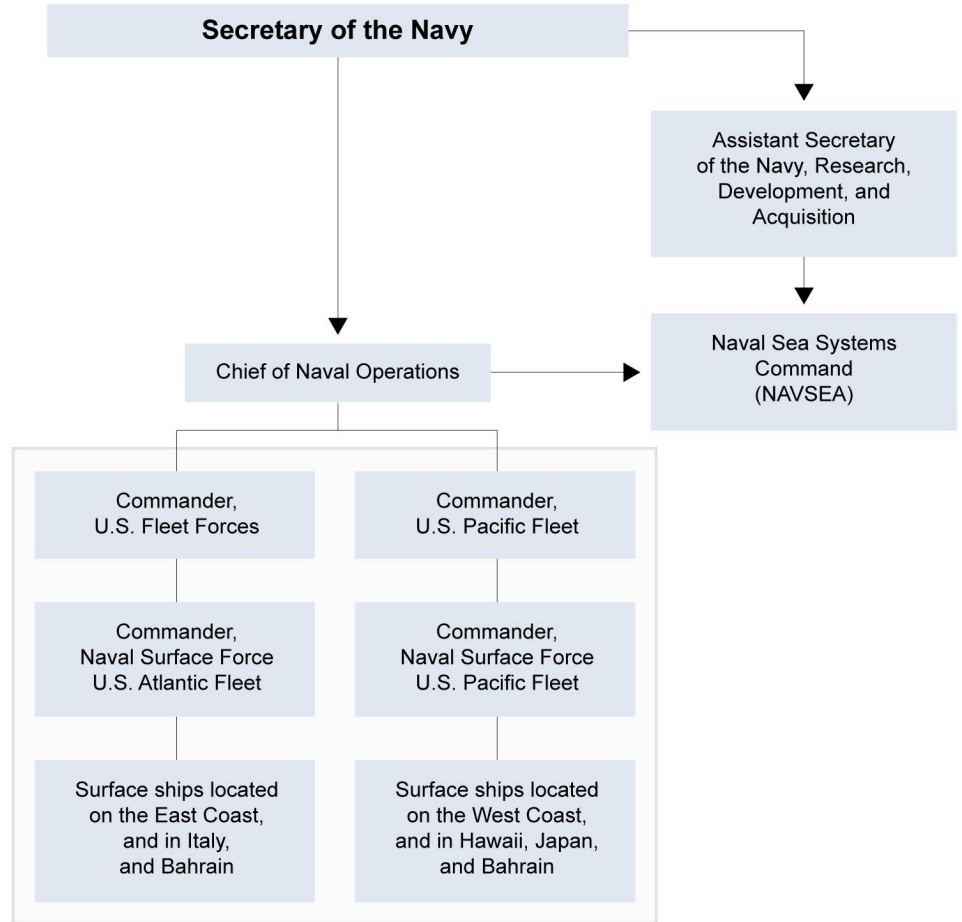
We conducted this performance audit from November 2018 to May 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions 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

The Navy oversees the planning and execution of non-nuclear surface ship repair and maintenance through several organizations (see fig. 1), including the following:

- **The Chief of Naval Operations** is the senior military officer of the Department of the Navy and is responsible to the Secretary of the Navy for the command, utilization of resources, and operating efficiency of the operating forces of the Navy and of the Navy shore activities assigned by the Secretary.
- **The Assistant Secretary of the Navy for Research, Development and Acquisition**, as the Navy Acquisition Executive, has overall authority, responsibility, and accountability for all acquisition and sustainment functions and programs, including surface ship repair and maintenance.
- **Naval Sea Systems Command (NAVSEA)** and its subordinate organizations maintain ships to meet fleet requirements within cost and schedule parameters, among other duties for combat systems design and operation.

Figure 1: Navy Operating Forces and Shore Establishment Responsible for Non-Nuclear Surface Ship Repair and Maintenance



Source: GAO presentation of Navy information. | GAO-20-370

Types of Availabilities for Surface Ship Repair

The Navy contracts with private shipyards and other firms—collectively known as the ship repair industrial base—for the repair and maintenance of non-nuclear surface ships. This work may be performed in either government-owned or contractor-owned facilities, potentially including shipyards with piers, cranes or facilities for pipefitting and valve repair. Certain types of work, such as inspecting, repairing or otherwise maintaining a ship’s hull, might require placing a ship in the ship repair contractor’s dry dock.

Ship repair availabilities can range from a few weeks to years depending on the extent of work required and degree of complexity. The types of availabilities include the following:

- **Chief of Naval Operations (CNO) availabilities** accomplish major repair work.⁵ This includes industrial maintenance requiring complex processes to complete restorative work, such as structural, mechanical, and electrical repairs. These may include modernization work to upgrade a ship's capabilities along with repair work, and can last for over a year. Larger contractors typically execute these types of availabilities rather than small businesses.⁶
- **Continuous Maintenance availabilities (CMAV)** accomplish non-major repair work, which includes routine maintenance work requiring relatively little time compared to CNO availabilities—typically only weeks to a few months in duration. Small business contractors commonly execute CMAVs, and, at some ports, larger companies that have contracts for CNO availabilities also take on this type of work.

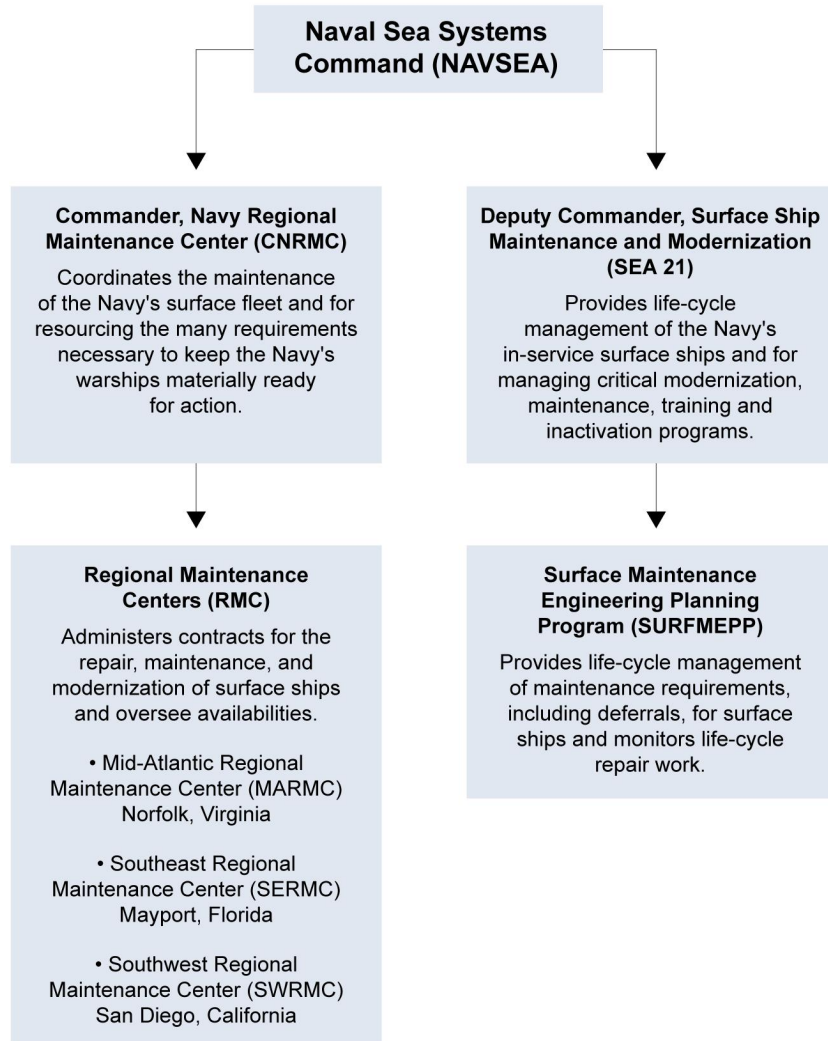
NAVSEA's Oversight of MAC-MO Strategy Implementation

Within NAVSEA, several organizations oversee MAC-MO strategy implementation (see fig. 2), including key functions such as contract administration, program management, and planning for future availabilities.

⁵ CNO availabilities include Selected Restricted Availabilities, Depot Modernization Periods, and Phased Maintenance Availabilities.

⁶ The U.S. Small Business Administration defines a shipbuilding and repairing "small business" as being a company that has 1,250 or fewer employees.

Figure 2: NAVSEA Offices Responsible for Implementation of the MAC-MO Strategy for Surface Ship Repair and Maintenance

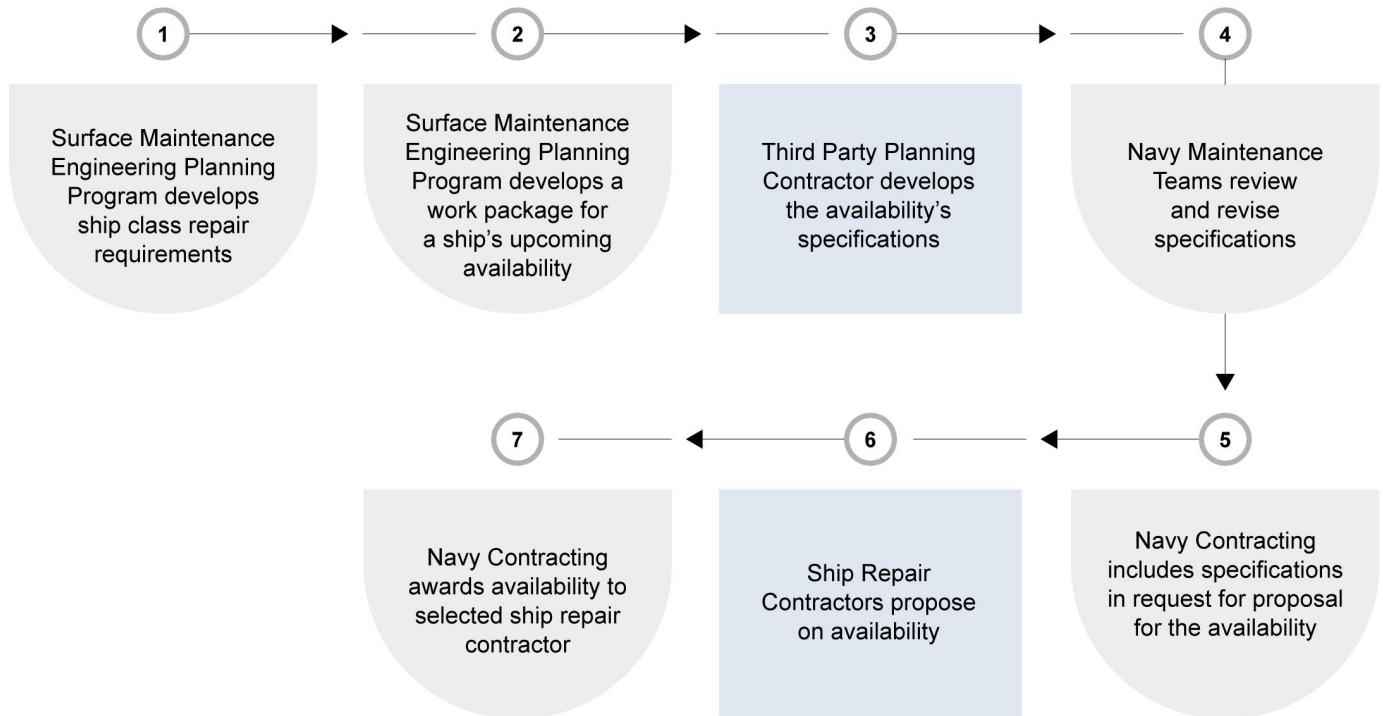


Source: GAO presentation of Navy information. | GAO-20-370

Availability Planning under the MAC-MO Strategy

Prior to awarding a contract for ship repair work under MAC-MO, the Navy plans and defines requirements for upcoming availabilities as depicted in figure 3 below.

Figure 3: Availability Planning Process under the Navy’s Multiple Award Contract, Multi Order Strategy for Ship Repair



Source: GAO presentation of Navy information. | GAO-20-370

Availability Execution under the MAC-MO Strategy

Contracting for availability execution under the MAC-MO strategy differs from that under the Navy’s previous strategy, known as Multi-Ship, Multi-Option (MSMO), in several key ways, including by calling for:

- establishment of fixed contractual prices and completion time frames for an upcoming availability, rather than payment of contractors’ incurred costs;
- use of a third-party planning contractor under a cost-reimbursement contract to define contract specifications, rather than relying on planners employed by ship repair contractors;⁷ and

⁷ SERMC, unlike MARMC and SWRMC, employs government planning staff to draft ship repair specifications for ships homeported in Mayport, Florida, that are not part of a coast-wide availability

- award of indefinite delivery contracts to multiple contractors that can then compete for future availabilities, rather than all availabilities for a particular class of ships going to one contractor.

Under the MAC-MO strategy, the Navy normally places fixed-price orders for availabilities with expected durations of 10 months or less using indefinite delivery/indefinite quantity (IDIQ) contracts. IDIQ contracts do not specify exact times for delivery of supplies or services at contract award; the Navy establishes those via orders placed during contract performance. With MAC-MO, the Navy generally solicits and awards contracts for five-year periods to a set of qualified contractors at specific home ports. These periods include an initial execution year and four additional option years. As a result, several qualified contractors are available to subsequently compete for availabilities in a specific home port under firm-fixed-price availability delivery orders until contract expiration.⁸

Availabilities that the Navy expects to last more than 10 months are not restricted to the ships' home port.⁹ This allows for contractors outside the home port to compete for this work. The Navy then awards contracts for these coast-wide availabilities as stand-alone contracts to a single prime contractor, potentially at a port different from the home port of the ship. Shorter availabilities may be limited to the home port area provided there is adequate competition, which the Navy defines as the presence of two or more qualified bidders. If adequate competition is not available in the home port area, the geographic area for solicitation is expanded equally in all directions until adequate competition exists. Figure 4 below depicts contracting processes used for soliciting and awarding work under the MAC-MO strategy.

⁸ The Navy identifies orders awarded under the MAC-MO contracts as delivery orders. Delivery order means an order for supplies placed against an established contract or with government sources (FAR § 2.101).

⁹ 10 U.S.C. § 8669a.

Figure 4: Contract Award Processes under the Navy’s Multiple Award Contract, Multi Order (MAC-MO) Contracting Strategy for Ship Repair



Source: GAO analysis and representation of the Navy’s acquisition strategy. | GAO-20-370

In November 2016, we reviewed the Navy’s implementation of the MAC-MO strategy through pilot maintenance periods, including its potential benefits and effects on the industrial base.¹⁰ We found MAC-MO had some potential benefits compared to the previous MSMO contracting strategy, including increased opportunities for competition and control of costs through fixed-price contracts. We additionally found that some contractors saw uncertainty associated with

- the need to continually compete for work, which could result in decisions to reduce their workforce and facilities, and

¹⁰ GAO-17-54.

- the stability of ship repair workloads in their ports, irrespective of contract type.

The Navy Has Met Most of Its MAC-MO Goals, but Schedule Delays Persist

The Navy has achieved some, but not all, of the goals it set under the MAC-MO strategy. Among the achievements, the Navy provides more opportunities for competition—and received more offers—under MAC-MO than under the prior strategy. Further, MAC-MO’s fixed-price contracts help enable the Navy to ensure quality of work, and we found no evidence of deficient work at availability completion in our review of four completed case studies. At the same time, the Navy also desired improved availability cost and schedule outcomes under the MAC-MO strategy. The Navy’s results in these two areas have been mixed. Through April 2019, the Navy had completed 41 CNO availabilities under its MAC-MO strategy with, on average, 5 percent cost growth and 30 percent schedule growth. Unplanned work, which can often be unavoidable in ship repair, has detracted from both cost and schedule performance.

MAC-MO Strategy Has Increased Opportunities for Competition and Helps the Navy Ensure Quality Standards Are Met

The MAC-MO strategy has provided more opportunities than MSMO for competition by awarding a delivery order for each ship repair availability. The Navy has competed over 500 delivery orders under the MAC-MO strategy from April 2015 to March 2019. This represents a departure from the MSMO strategy under which a single contract was awarded to one contractor to execute multiple availabilities for a class of ship. The MAC-MO strategy also allows small businesses in Norfolk and San Diego to compete for noncomplex maintenance. Previously, under the MSMO strategy, small businesses said that they were more likely to work as subcontractors for the businesses that held one of the MSMO contracts.¹¹ Navy officials have since stated that small businesses are now acting as prime contractors.

¹¹ [GAO-17-54](#).

The Navy has also achieved competition for soliciting its delivery orders under the MAC-MO strategy. According to our analysis of data from the Federal Procurement Data System-Next Generation (FPDS-NG), from the start of the MAC-MO strategy (April 2015) through March 2019, at least 78 percent (435 of 554) of MAC-MO awards solicited within home ports received two or more offers. Further, in the 18 percent of instances when the Navy awarded a delivery order after receiving only a single offer, it may have attained the benefits of having solicited that delivery order in a competitive environment. Table 1 shows the number of offers for both complex and noncomplex MAC-MO awards through March 2019.

Table 1: Number of Offers for Complex and Noncomplex MAC-MO Delivery Orders from April 2015 through March 2019

Number of Offers	Noncomplex		Complex ^a		Total	
	Number of Delivery Orders	Percentage of Noncomplex Total	Number of Delivery Orders	Percentage of Complex Total	Number of Delivery Orders	Percentage of Total
1	37	11	62	28	99	18
2	49	15	72	32	121	22
3	63	19	89	40	152	27
4	86	26	--	--	86	16
5	43	13	--	--	43	8
6 or more	33	10	--	--	33	6
Unknown ^b	20	6	--	--	20	4
Total	331	100	223	100	554	100

Source: GAO Analysis of FPDS-NG data. | GAO-20-370

Note: Percentages may not add up to 100 due to rounding.

^aComplex delivery orders include both major and some non-major ship repair work.

^bThe number of bids for 20 noncomplex delivery orders was not available in FPDS-NG.

The MAC-MO strategy also gives the Navy flexibility to ensure that a contract’s quality requirements are met under a fixed price by the time of availability completion. The Navy identified improving the quality of workmanship as a goal when it switched from MSMO to MAC-MO. The previous MSMO contracting strategy relied on use of cost-reimbursement contracts, which only require the government to reimburse the contractor its allowable incurred costs, regardless whether the contractor completed the work. The MAC-MO strategy uses firm-fixed-price contracts, which provide for a price that is not subject to any adjustment on the basis of the contractor’s cost experience in performing the contract. This contract type places upon the contractor maximum risk and full responsibility for all costs and performance, including meeting the quality requirements of the contract. NAVSEA officials stated that in the event that the contractor

doesn't meet the quality terms of the contract, the Navy has two options: (1) require the contractor to complete the deficient work, at the contractor's cost, to meet the specifications or (2) reduce the contract price to reflect the reduced value of the services performed and descope the related work requirements from the existing contract for performance on a future availability.¹²

Our review of availability completion reports from the four case study availabilities that were complete at the time of our assessment, out of six total, showed no instances where the Navy accepted quality deficiencies at availability completion. Navy contracting officials stated that in a firm-fixed-price contracting environment, they would not agree to accept deficient work without first obtaining concessions from the performing contractor, which would require modifying the delivery order. In one of these availabilities, we found evidence that the Navy elected to descope a non-option work item and defer it to a future availability. The maintenance team stated that this decision followed poor planning of the work item, which would have caused delays in completing the availability if not deferred. We also discussed these four availabilities with the responsible Navy maintenance teams, and none of those teams reported to us any deficient work at the time each availability completed.

CNO Availabilities Have Experienced Limited Cost Growth under the MAC-MO Strategy, but Schedule Delays and Growth Work Persist

Cost

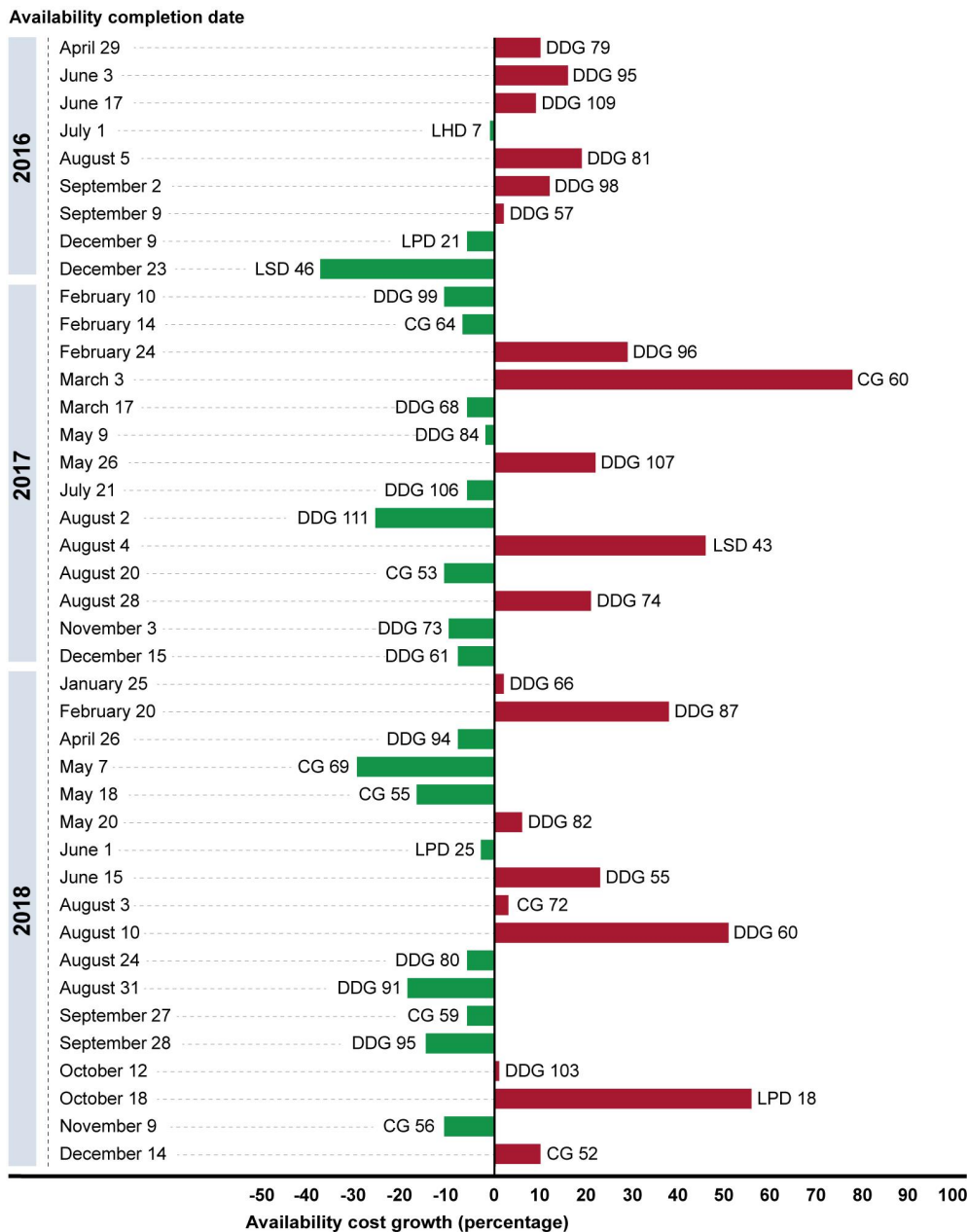
Between April 2015, when the Navy implemented the MAC-MO strategy, and April 2019, the Navy completed 41 CNO availabilities with an average cost growth per availability of 5 percent, or \$1.7 million in fiscal year 2020 dollars.¹³ However, more than half of these availabilities (21 of 41) were completed at a lower cost than the Navy initially estimated. The cost growth of the remaining CNO availabilities (20 of 41) ranged between 1 percent and 78 percent and drove the aggregate average

¹² The Joint Fleet Maintenance Manual indicates that availability completion is dependent on the type commander's judgment that the deficiency does not affect mission capability or the ship's safety or operations.

¹³ Differences in how the availability cost and schedule are estimated between MAC-MO and the prior strategy prevented us from comparing their cost and schedule outcomes.

increase. Figure 5 shows the variation in cost performance, or the actual cost compared to the Navy's estimate, for the 41 CNO availabilities.

Figure 5: Cost Performance for 41 CNO Availabilities under the MAC-MO Strategy, April 2015 to April 2019



DDG = Guided Missile Destroyer, LHD = Amphibious Assault Ship (Multi-purpose), LPD = Amphibious Transport Dock, LSD = Dock Landing Ship, CG = Guided Missile Cruiser
 Source: GAO analysis of Navy data. | GAO-20-370

Data table for Figure 5: Cost Performance for 41 CNO Availabilities under the MAC-MO Strategy, April 2015 to April 2019

year	Ship	Availability cost growth (percentage)
4/29/2016	DDG 79	10
6/3/2016	DDG 95	16
6/17/2016	DDG 109	9
7/1/2016	LHD 7	-1
8/5/2016	DDG 81	19
9/2/2016	DDG 98	12
9/9/2016	DDG 57	2
12/9/2016	LPD 21	-6
12/23/2016	LSD 46	-38
2/10/2017	DDG 99	-11
2/14/2017	CG 64	-7
2/24/2017	DDG 96	29
3/3/2017	CG 60	78
3/17/2017	DDG 68	-6
5/9/2017	DDG 84	-2
5/26/2017	DDG 107	22
7/21/2017	DDG 106	-6
8/2/2017	DDG 111	-26
8/4/2017	LSD 43	46
8/20/2017	CG 53	-11
8/28/2017	DDG 74	21
11/3/2017	DDG 73	-10
12/15/2017	DDG 61	-8
1/25/2018	DDG 66	2
2/20/2018	DDG 87	38
4/26/2018	DDG 94	-8
5/7/2018	CG 69	-30
5/18/2018	CG 55	-17
5/20/2018	DDG 82	6
6/1/2018	LPD 25	-3
6/15/2018	DDG 55	23
8/3/2018	CG 72	3
8/10/2018	DDG 60	51
8/24/2018	DDG 80	-6

year	Ship	Availability cost growth (percentage)
8/31/2018	DDG 91	-19
9/27/2018	CG 59	-6
9/28/2018	DDG 95	-15
10/12/2018	DDG 103	1
10/18/2018	LPD 18	56
11/9/2018	CG 56	-11
12/14/2018	CG 52	10

Note: Costs were adjusted to fiscal year 2020 dollars prior to calculating growth rates.

Figure 6 shows the cost performance, or actual cost compared to the Navy’s estimate, for the 41 CNO availabilities grouped by their location.

Figure 6: MAC-MO Availability Cost Performance at Navy Regional Maintenance Centers

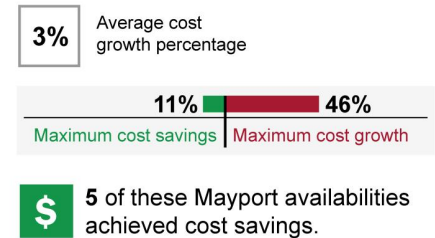
24 Mid-Atlantic Regional Maintenance Center availabilities



10 Southwest Regional Maintenance Center availabilities



7 Southeast Regional Maintenance Center availabilities



Source: GAO analysis of Navy data. | GAO-20-370

Note: Costs were adjusted to fiscal year 2020 dollars prior to calculating growth rates.

Figure 7 shows cost performance, or actual cost compared to the Navy’s estimate, for the 41 CNO availabilities grouped by ship class.

Figure 7: MAC-MO Availability Cost Performance across Ship Classes

26 destroyer availabilities



9 cruiser availabilities



6 availabilities on amphibious ships



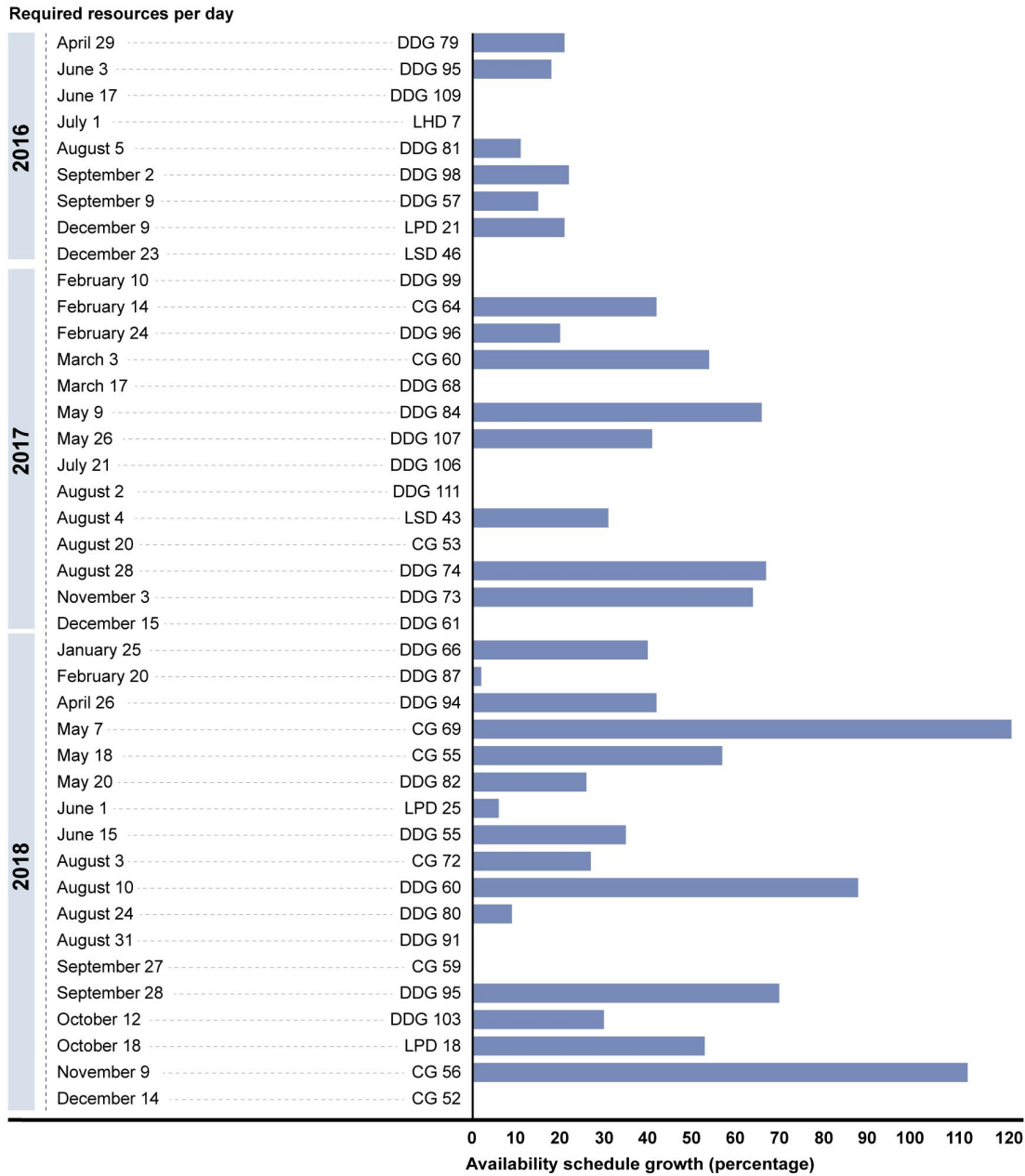
Source: GAO analysis of Navy data. | GAO-20-370

Note: Costs were adjusted to fiscal year 2020 dollars prior to calculating growth rates.

Schedule

Between the start of the MAC-MO strategy in April 2015 and April 2019, the Navy completed 41 CNO MAC-MO ship repair availabilities with an average schedule growth, or actual number of days from availability start to completion, compared to the Navy's estimate, of 30 percent, or 64 days. Twelve of 41 availabilities finished on time, and none finished ahead of schedule. In addition, two availabilities more than doubled in length, with one finishing with 123 percent schedule growth. We discuss some factors that can contribute to schedule growth below. Figure 8 shows the schedule growth for individual CNO availabilities.

Figure 8: Schedule Growth for 41 CNO Availabilities under the MAC-MO Strategy, April 2015 through April 2019



DDG = Guided Missile Destroyer, LHD = Amphibious Assault Ship (Multi-purpose), LPD = Amphibious Transport Dock, LSD = Dock Landing Ship, CG = Guided Missile Cruiser

Source: GAO analysis of Navy data. | GAO-20-370

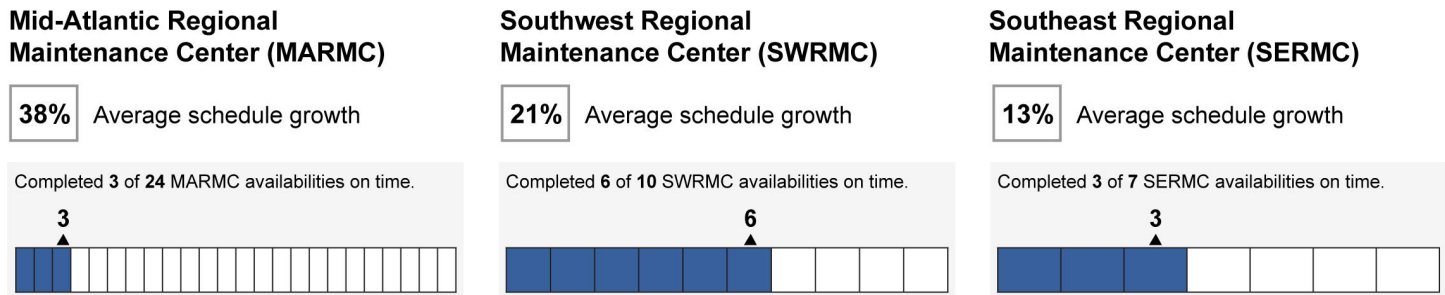
Data table for Figure 8: Schedule Growth for 41 CNO Availabilities under the MAC-MO Strategy, April 2015 through April 2019

year	Ship	Availability schedule growth (percentage)
4/29/2016	DDG 79	21%
6/3/2016	DDG 95	18%
6/17/2016	DDG 109	0%
7/1/2016	LHD 7	0%
8/5/2016	DDG 81	11%
9/2/2016	DDG 98	22%
9/9/2016	DDG 57	15%
12/9/2016	LPD 21	21%
12/23/2016	LSD 46	0%
2/10/2017	DDG 99	0%
2/14/2017	CG 64	42%
2/24/2017	DDG 96	20%
3/3/2017	CG 60	54%
3/17/2017	DDG 68	0%
5/9/2017	DDG 84	66%
5/26/2017	DDG 107	41%
7/21/2017	DDG 106	0%
8/2/2017	DDG 111	0%
8/4/2017	LSD 43	31%
8/20/2017	CG 53	0%
8/28/2017	DDG 74	67%
11/3/2017	DDG 73	64%
12/15/2017	DDG 61	0%
1/25/2018	DDG 66	40%
2/20/2018	DDG 87	2%
4/26/2018	DDG 94	42%
5/7/2018	CG 69	123%
5/18/2018	CG 55	57%
5/20/2018	DDG 82	26%
6/1/2018	LPD 25	6%
6/15/2018	DDG 55	35%
8/3/2018	CG 72	27%
8/10/2018	DDG 60	88%
8/24/2018	DDG 80	9%

year	Ship	Availability schedule growth (percentage)
8/31/2018	DDG 91	0%
9/27/2018	CG 59	0%
9/28/2018	DDG 95	70%
10/12/2018	DDG 103	30%
10/18/2018	LPD 18	53%
11/9/2018	CG 56	113%
12/14/2018	CG 52	0%

Figure 9 shows the schedule growth for the 41 CNO availabilities grouped by location.

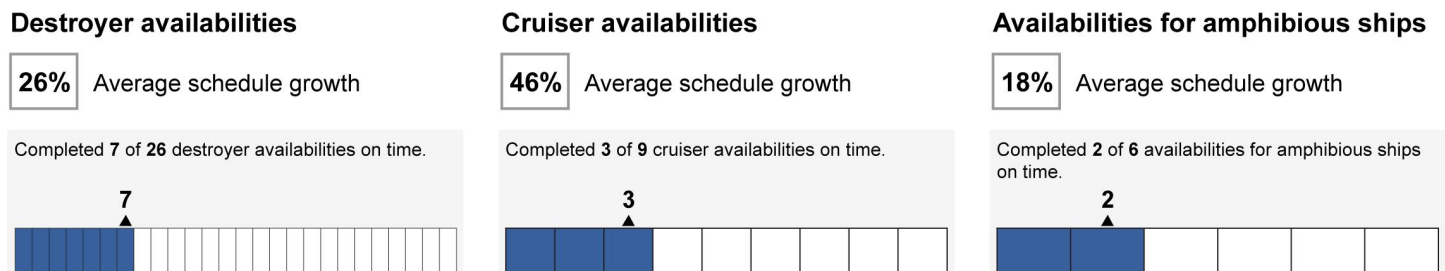
Figure 9: MAC-MO Availability Schedule Performance at Navy Regional Maintenance Centers



Source: GAO analysis of Navy data. | GAO-20-370

Figure 10 shows the schedule growth for the 41 CNO availabilities grouped by ship class.

Figure 10: MAC-MO Availability Schedule Performance across Ship Classes



Source: GAO analysis of Navy data. | GAO-20-370

Navy officials stated that one potential source of delays is unplanned work, which consists of both growth work and new work. The Navy defines growth work as additional work that is identified or authorized

after contract award that is related to a work item included in the original contract. We previously found that growth work contributed to cost and schedule increases, and it remains a contributing factor.¹⁴ Navy officials stated they expect some growth work in availabilities, as officials stated that certain tasks are difficult to fully scope within the original contract.

As an example, one official stated that they cannot fully inspect ballast tanks and accurately write work specifications for their repair until the ship is at the repair yard and the availability has begun. Alternatively, the Navy defines new work as any additional work that is identified or authorized after contract award that is not related to a work item included in the original contract. Maintenance team officials stated that new work can originate when an item that needs repair breaks or the maintenance team first discovers it after the Navy awards the contract. The Navy can also add new work to an availability whenever it sees fit.

In our six case study availabilities, we found that five added growth work, including examples of growth items that the Navy considered unavoidable. Our analysis of RMC data showed that the USS Stout (DDG 55) CNO Availability had 60 instances of growth work that the Navy considered unidentifiable prior to the start of the availability, including welding for the fuel tanks and repair to the bulkheads. The maintenance team did not consider these growth items to be unusual. Some non-CNO availabilities, like Continuous Maintenance availabilities, are smaller in scope and less susceptible to growth work. Maintenance team officials at SERMC consequently stated that they can often complete CMAVs on schedule. We found that the Navy completed one of our case study availabilities, the USS Iwo Jima CMAV, on schedule, and maintenance team officials stated they had time to add three new work items to the availability.

Figure 11 describes the USS Stout (DDG 55) case study.

¹⁴ GAO, *Military Readiness: Progress and Challenges in Implementing the Navy's Optimized Fleet Response Plan*, [GAO-16-466R](#) (Washington, D.C.: May 2, 2016) and GAO, *Navy Ship Maintenance: Actions Needed to Address Maintenance Delays for Surface Ships Based Overseas*, [GAO-20-86](#) (Washington, D.C.: Feb. 26, 2020).

Figure 11: USS Stout (DDG 55) Case Study



Ship: USS Stout (DDG 55)
Availability: Chief of Naval Operations (CNO)
Location and contractor: Norfolk | General Dynamics NASSCO
Planned cost: \$18.4 million
Final cost: \$22.7 million
Cost growth: \$4.3 million | 23 percent
Start date: November 13, 2017
Original planned completion date: April 20, 2018
Actual completion date: June 15, 2018
Schedule growth: 56 days | 35 percent

Costs are in fiscal year 2020 dollars.

The USS Stout CNO availability experienced both growth and new work items that contributed to cost and schedule growth. The Navy considered the growth work on the availability routine, with many requests for contract changes due to work that the Navy could not identify prior to the availability. Maintenance officials stated that negotiating these changes in a fixed price environment added to schedule delays. In addition, the Navy added 25 new work items after the availability started, causing the Navy to give the contractor relief on schedule milestones throughout the availability. The Navy took several lessons learned from this availability, including the need to avoid adding new work items after the availability starts and to maintain schedule milestones.

Source: Mass Communication Specialist 3rd Class Ryan U. Kledzik (U.S. Navy photo); GAO analysis of Navy information (text). | GAO-20-370

Text for Figure 11: USS Stout (DDG 55) Case Study

Ship: USS Stout (DDG 55)
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Figure 12 describes the USS Iwo Jima (LHD 7) case study.

Figure 12: USS Iwo Jima (LHD 7) Case Study



Ship: USS Iwo Jima (LHD 7)

Availability: Continuous Maintenance Availability (CMAV)

Location and contractor: Mayport | General Dynamics NASSCO

Award amount: \$2 million

Final cost: \$2.6 million

Start date: December 18, 2017

Completion date: February 1, 2018

Costs are in fiscal year 2020 dollars.

The USS Iwo Jima CMAV was a routine maintenance availability completed to prepare for a scheduled Chief of Naval Operations availability. Maintenance officials stated that CMAVs generally contain routine repair work and go according to plan, and that the USS Iwo Jima's was no exception. The Navy verified all of the work items, including three new work items that officials stated the Navy added during the availability, as 100 percent complete, and officials stated that the availability finished on schedule.

Source: Mass Communication Specialist 2nd Class Lyle Wilkie (U.S. Navy photo); GAO analysis of Navy information (text). | GAO-20-370

Text for Figure 12: USS Iwo Jima (LHD 7) Case Study

Ship: USS Iwo Jima (LHD 7)

Availability: Continuous Maintenance Availability (CMAV)

Location and contractor: Mayport | General Dynamics NASSCO

Award amount: \$2 million

Final cost: \$2.6 million

Start date: December 18, 2017

Completion date: February 1, 2018

Costs are in fiscal year 2020 dollars.

The USS Iwo Jima CMAV was a routine maintenance availability completed to prepare for a scheduled Chief of Naval Operations

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Note: The Navy does not maintain cost and schedule data in the same way for CMAVs, so we presented information from contract documentation and interviews.

According to Navy officials, managing growth work under firm-fixed-price contracts has contributed to schedule delays. In our November 2016 report on the Navy's transition to the MAC-MO strategy, we described the importance of contractors and RMC staff negotiating contract changes and agreeing on costs in a timely manner in order to minimize schedule impact.¹⁵ In our current review, Navy officials stated that negotiating change orders for unplanned work under MAC-MO is more difficult and time consuming than under the prior MSMO strategy because the Navy can no longer direct the contractor to continue to work without agreeing on the cost. In one of our case study availabilities, the USS Whidbey Island (LSD 41) CNO Availability, the maintenance team officials stated that they had difficulties negotiating contract changes. As a result, the officials stated that the Navy used unilateral modifications to direct the contractor to execute growth work items and avoid further schedule disruptions. See Figure 13 below for more detail on the USS Whidbey Island (LSD 41) case study.

¹⁵ [GAO-17-54](#).

Figure 13: USS Whidbey Island (LSD 41) Case Study



Ship: USS Whidbey Island (LSD 41)

Availability: Chief of Naval Operations (CNO)

Location and contractor: Norfolk | Marine Hydraulics International

Planned cost: \$42.5 million

Start date: August 21, 2017

Original planned completion date: May 11, 2018

Costs are in fiscal year 2020 dollars.

Adding growth work and new work contributed to delaying the USS Whidbey Island CNO availability. Maintenance team officials stated that the third-party planner wrote the specifications as it would have under the old strategy, which did not use fixed-price contracts. According to Navy maintenance officials, use of fixed-price contracts necessitates that the specifications be less open-ended and provide the contractor with more details to complete the work. In addition, the Navy added new work items to the contract, including work on the boat davit, which had been deferred from an earlier availability. Lastly, the maintenance team said that negotiating over 800 requests for contract changes with the contractor contributed to delays.

Source: Mass Communication Specialist 2nd Class Nathan R. McDonald (U.S. Navy photo); GAO analysis of Navy information (text). | GAO-20-370

Text for Figure 13: USS Whidbey Island (LSD 41) Case Study

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Note: The availability was ongoing at the time of our analysis. Navy officials have since stated that it completed on December 18, 2019.

The Navy Has Taken Action to Respond to MAC-MO Lessons Learned, but Funding Process Continues to Contribute to Delays

The Navy recognizes the negative schedule outcomes it currently faces with MAC-MO strategy implementation and has worked to mitigate them. It has implemented new contracting provisions and is moving key availability milestones to earlier in the process in an effort to better plan availabilities and facilitate their on-time completion. The Navy has also tried to better coordinate with the third-party planner to plan for availabilities and improve schedule performance. Statutory requirements and their implementation, however, have hindered the Navy's ability to further mitigate schedule delays. Specifically, the Navy must obtain approval from the Under Secretary of Defense (Comptroller) before funding growth work that occurs in subsequent fiscal years and exceeds \$4 million—an amount established under a 1990 law.¹⁶ Late last year, Congress established a pilot program in fiscal year 2020 that affords the Navy the ability to use procurement funds for availabilities, and these funds remain available for obligation for three years. A congressional statement accompanying the appropriations law that established the pilot program states that the Navy is to submit quarterly reports on the execution of ship availabilities funded through the pilot program.

The Navy Has Taken Action to Address Key Lessons Learned with MAC-MO Implementation

In our November 2016 report, we identified several key lessons learned stemming from MAC-MO pilot maintenance availabilities.¹⁷ When we revisited these lessons learned during interviews with Navy officials, they discussed two persistent MAC-MO strategy attributes that remain points of emphasis for lessons learned from 2016. These strategy attributes, namely the use of firm-fixed-price contracts and the use of a third-party planner, led to two new key lessons learned and another ongoing lesson learned from our 2016 report. Most of these center on the importance of

¹⁶ 31 U.S.C. § 1553.

¹⁷ [GAO-17-54](#).

the Navy accurately planning for and anticipating needs during availabilities in order to avoid schedule delays—a theme that was also evident in our November 2016 report.

According to NAVSEA leadership officials, the Navy primarily relies on two activities to determine lessons learned and identify actions that NAVSEA needs to take to improve ship repair maintenance, including under the MAC-MO strategy.

- **Surface Team One** compiles lessons learned that the individual RMCs recommend and reviews the implementation and status of actions to address those lessons learned.
- **Performance to Plan (P2P)** is a data-centric, analytical approach the Navy uses for a variety of improvement initiatives, including ship maintenance, to clearly characterize availability performance goals and develop solutions to improve availability duration outcomes.¹⁸

As shown in Table 2 below, the Navy has developed new contracting provisions and milestones to respond to lessons learned the Navy has identified. Additional information on each action follows the table.

Table 2: Multiple Award Contract, Multi Order (MAC-MO) Lessons Learned Since 2016 and Implementation Status

MAC-MO strategy attribute	Related lesson learned	Navy action	GAO assessment
Use of firm-fixed price contracts	Need for strategies to reduce the impact of changes to work requirements after contract award to prevent schedule delays	Beginning in November 2018, implemented the Small Dollar Value Growth initiative for new availabilities to cut down on negotiation times and address schedule delays due to contract changes that cost less than \$25,000.	Complete
	Need for strategies to reduce the impact of changes to work requirements after contract award to prevent schedule delays	Beginning in November 2018, implemented a level of effort to completion initiative to provide a predetermined amount of material and labor-hour funding on the base contract, based on historical data on growth work	Complete

¹⁸ P2P has, to date, focused on DDG 51 class destroyers. Our review of the schedule growth drivers that P2P has assessed and corresponding Navy actions show that these appear applicable to the other ship classes covered under the MAC-MO strategy.

	Need for processes to ensure long lead-time material is funded on time and is ready thirty days before the availability begins	Beginning in August 2019, shift contract award date to 120 days before availability start for all new availabilities, in order to improve the supply system's ability to provide materials on time.	Complete
Use of third-party planners	Need for better coordination between third-party planning contractor and regional maintenance centers during availability planning	Beginning in 2016, co-located third-party planning contractor and Navy planning staffs in Norfolk and San Diego.	Partially Complete

Source: GAO analysis of Navy documentation. | GAO-20-370

Note: For our methodology for assessing the extent to which the Navy has taken actions, we developed the following 3-point scale:

- Not Complete—The Navy has not taken any action to respond to identified lessons learned.
- Partially Complete—The Navy has taken some action to respond to the identified lessons learned, but has not completed the action needed to address the identified risk.
- Complete—The Navy has completed the action needed to address the identified lesson learned.

The Navy Has Recently Implemented New Contract Provisions and Revised Milestones Based on Lessons Learned to Reduce Disruptive Effects from Growth Work

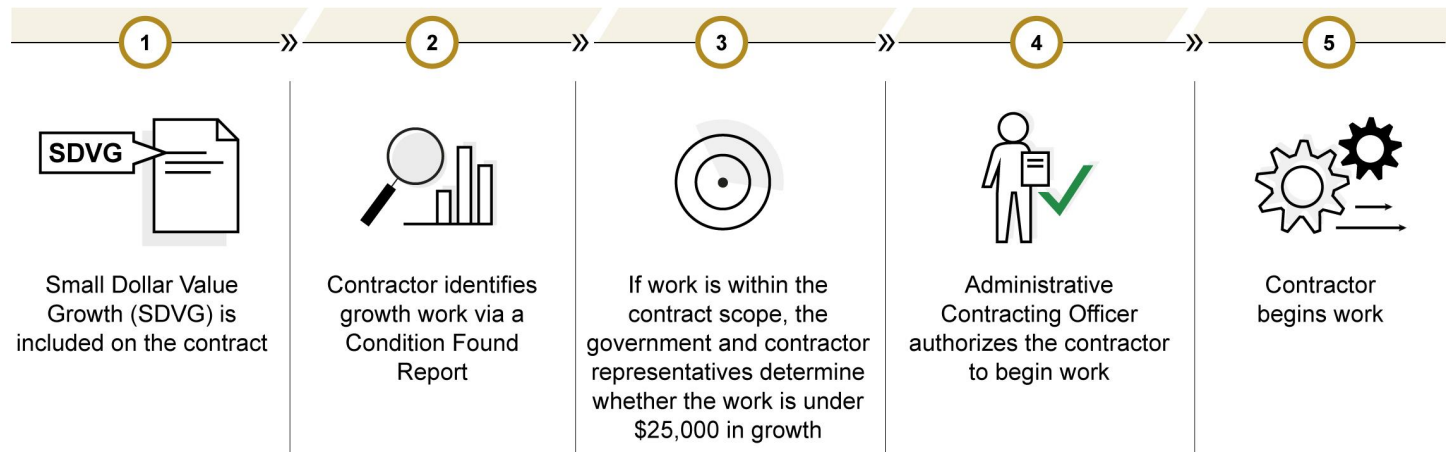
In 2018, the Navy began implementing two new contract provisions originating from lessons learned regarding the MAC-MO strategy—Small Dollar Value Growth and Level of Effort to Completion—in an effort to mitigate schedule delays typically associated with growth work.

Small Dollar Value Growth (SDVG)

The November 2018 SDVG provision specifically addressed schedule delays due to growth items that cost \$25,000 or less. Under SDVG, during availability planning the Navy and contractor agree on a set price to be used anytime a growth work item equal to or under the \$25,000 threshold is added to the work specification. This provision eliminates the need for the Navy and the contractor to engage in time-consuming negotiations on small dollar items during the availability. According to the Navy's 2018 biennial assessment, small dollar growth work negotiations accounted for around 70 percent of all contract changes. According to Navy documentation, contract negotiations for small dollar growth work caused delays of up to a week. In our discussion with officials from the USS Whidbey Island maintenance team, they reported that the availability required 972 contract changes, which they suggested SDVG would have helped expedite. The Navy's SDVG policy memo states that in using

SDVG, the contractor can now typically begin work on the growth item 24 hours after discovery. Figure 14 describes the SDVG process.

Figure 14: Notional Depiction of Small Dollar Value Growth Process



Source: GAO analysis of Navy documentation. | GAO-20-370

While it can expedite work on smaller dollar value items, the use of SDVG carries cost risk for the Navy and the executing contractors, which RMC leadership officials and contractor representatives acknowledged. According to these officials, under SDVG the Navy, at times, will likely pay more for growth items than it would if it devoted increased time to negotiate prices, with the same being true for the contractors. For example, the Navy awarded a contract delivery order for the USS Bulkeley (DDG 84) availability in February 2019 that included SDVG. The SDVG line item provided for up to 291 changes for growth during that availability at a firm-fixed-price of \$7,144 per change based on historical needs of similar availabilities. This meant that the Navy could use SDVG up to 291 times during the availability, and each of those growth items would cost the Navy \$7,144 regardless of whether the actual cost to the contractor underran or exceeded that amount. After the contractor identifies the in-scope growth item, the Navy only must determine that the cost is equal to or less than the \$25,000 threshold in the contract. Nonetheless, Navy officials expressed that the benefit of significantly decreased negotiation time outweighs the potential cost risk.

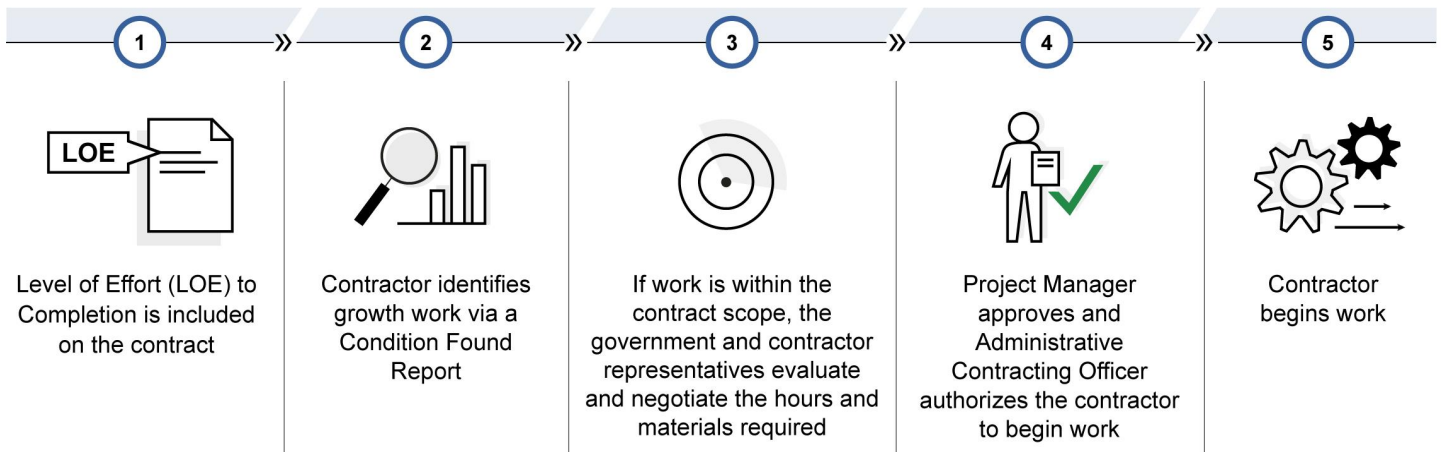
Level of Effort (LOE) to Completion

As reflected in table 2, the Navy implemented a second new contract change process, known as LOE to Completion, in November 2018. This

process is used for growth work items when the price exceeds the SDVG threshold of \$25,000. LOE to Completion allows the Navy, within the already awarded contract for the availability, to fund growth work that contractors regularly discover during availability execution without having to separately negotiate each item. Through LOE to Completion, RMC leadership officials stated they have decreased negotiations and schedule delays during availability execution.

LOE to Completion allows the Navy to obligate funding for labor-hours and material costs for estimated growth work at the time of award, rather than having to obtain appropriate funds after repair work begins. The Navy can then use those labor-hours and materials for individual growth work items over the course of the availability. According to RMC leadership officials, this provision allows them to avoid incurring additional delays. To establish the amounts of funding, the Navy reviews historical cost for growth work by class type and whether the availability is a docking or non-docking availability. For example, the Navy provided up to 134,002 work hours and \$1.4 million for materials under the LOE to Completion contract process for the USS Bulkeley (DDG 84) availability. Figure 15 describes the LOE to Completion process.

Figure 15: Level of Effort to Completion Process



Source: GAO analysis of Navy documentation. | GAO-20-370

Because the Navy just recently implemented this process in November 2018, it has collected only limited data to date on its effectiveness. However, as described in figure 16, an availability involving complex ship repair work for the USS Princeton (CG 59) included contract terms that Navy officials described as a precursor to LOE to Completion.

Figure 16: USS Princeton (CG 59) Case Study



Ship: USS Princeton (CG 59)
Availability: Chief of Naval Operations (CNO) Availability
Location and contractor: San Diego | BAE Systems
Planned cost: \$30.7 million
Final cost: \$28.9 million
Cost savings: \$1.8 million | 6 percent
Start date: March 5, 2018
Original planned completion date: September 27, 2018
Actual completion date: September 27, 2018

Costs are in fiscal year 2020 dollars.

The USS Princeton maintenance team used contractual provisions to complete the availability on schedule. Maintenance officials stated that, with only five operational cruisers at the time, returning the Princeton to operational status was a priority. When a change order was needed, the team used unpriced change orders with a “not to exceed” clause, to limit risk while allowing the contractor to continue to work as the price was finalized. The maintenance team also told GAO that rather than wait for the maintenance team to discover unknown but common growth items, they added these items onto the contract. The maintenance team described these contractual items as early versions of the Level of Effort to Completion contracting provisions the Navy is now implementing across MAC-MO delivery orders.

Source: Mass Communication Specialist Seaman Jose Madrigal (U.S. Navy photo); GAO analysis of Navy information (text). | GAO-20-370

Text of Figure 16: USS Princeton (CG 59) Case Study

Ship: USS Princeton (CG 59)
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Revised Availability Milestones

In August 2019, the Navy began targeting award of delivery orders for individual availabilities 120 days prior to the scheduled work start date. Previously, the Navy awarded these delivery orders 60 days prior to the scheduled work start date. According to Navy supply officials, awarding the delivery orders 120 days prior to the start of scheduled work allows the officials involved in the planning process to procure long lead-time materials early enough so that material delays do not impact schedule—a challenge they cited under the 60-day schedule. Figure 17 shows how the change awarding delivery order 120 days before work is scheduled to begin will affect availability milestones.

Figure 17: Revised Milestones for Ship Repair Availabilities

Original milestones (in days)



Revised milestones (in days)



Source: GAO analysis of Navy documentation. | GAO-20-370

Text for Figure 17: Revised Milestones for Ship Repair Availabilities

	Original milestones Days	Revised milestones Days
Planning starts	540	540
Work requirements finalized, long lead time material identified and ordering process started	170	365
Planning complete	155	350
Award	60	120
Start of work	--	--

As reflected in figure 17, another change is that long lead time materials are now ordered 365 days ahead of the start of work, as opposed to the prior schedule of 170 days ahead. Navy supply officials said that some materials require lead times from 1 year to 18 months. Consequently, ordering these materials 170 days before an availability begins increased the likelihood that they would arrive too late to fulfill the Navy’s stated goal of procuring all materials 30 days prior to the start of repair work. Unless repair work requiring these materials is nonessential and can be deferred to a future availability, these material delays can delay completion of availabilities by several months. Several ship repair contractor

representatives we interviewed with pointed to long lead-time materials as drivers for schedule growth.

While noting the potentially positive effects of shifting award date to 120 days before the availability begins, Navy officials also raised some challenges. They said that locking ship repair requirements almost a full year before an availability actually begins means that the Navy could finalize a ship's upcoming availability work specifications before a ship even begins its next deployment. During this deployment, equipment breakages or other deficiencies not anticipated and subsequently not included in the work package could arise on the ship, all of which would likely become growth work during the availability.

This new time frame for delivery orders has only recently been implemented. The first MAC-MO delivery order awarded 120 days prior to the start of work occurred in January 2020, with another awarded since then. The Navy was scheduled to award availabilities 120 days prior to the start of work in November 2019, but, according to Navy officials, lacked necessary funds to award several availabilities due to the continuing resolution in place at the time. The Navy is not yet certain whether awarding delivery orders earlier will improve the Navy's ability to provide long lead-time materials on time.

The Navy Has Taken Action to Address Availability Planning Lessons Learned, but Views Are Mixed on the Results

Both the Navy and the third-party planner recognize the need for the two parties to work closely together to produce the best specifications and work packages possible under MAC-MO. As within the Navy, third party planner staff also seek to identify lessons learned, in order to improve the quality of ship repair specifications they produce.

According to third-party planning contractor representatives, they monitor contract changes involving growth work, assess whether that growth is due to planning deficiencies or other causes, and then identify lessons learned, which they use to improve their specification writing process. For example, contractor representatives stated that they used lessons learned during the USS Bainbridge (DDG 96) availability to create a template for a section of the forecastle deck plate. This template could be used on future availabilities for ships of the same destroyer class, providing potential cost savings to future availabilities.

However, RMC officials across the three ports implementing the MAC-MO strategy expressed concerns over the quality of third-party planning contractor specifications used in ship repair availability solicitations and contracts. They stated that the specifications developed by the third-party planning contractors have frequently included errors and discrepancies. As a result, the maintenance teams have had to work with the third-party planning contractor to resolve the issues prior to award.

According to RMC officials, maintenance teams within a given port have their own preferences with regard to how the third-party planning contractor writes specifications. Consequently, a specification written and approved in one RMC is sometimes deemed inadequate within another RMC. Figure 18 describes how specification deficiencies and other events affected a USS Roosevelt (DDG 80) availability.

Figure 18: USS Roosevelt (DDG 80) Case Study

Ship: USS Roosevelt (DDG 80)
Availability: Chief of Naval Operations (CNO) Availability
Location and contractor: Mayport | BAE Systems
Planned cost: \$41.6 million
Final cost: \$39 million
Cost savings: \$2.6 million | 6 percent
Start date: April 17, 2017
Original planned completion date: July 13, 2018
Actual completion date: August 24, 2018
Schedule growth: 42 Days | 9 percent

Costs are in fiscal year 2020 dollars.

The Navy solicited the USS Roosevelt availability coast-wide because the availability was expected to last more than 10 months. Although the USS Roosevelt availability took place at Mayport, which maintains its own planning capability, the Navy's third-party planner performed the planning in this case. According to NAVSEA contracting specialists, this was to test the third-party planning contractor's ability to write specifications at SERMC. Maintenance officials stated that Mayport's planning capability enabled them to correct issues with the third-party planner's specifications, a process that took time. According to the maintenance team, the third-party planner provided poor specifications throughout the planning process. In the end, however, the maintenance team felt they were able to help the third-party planning contractor develop a good planning product. Maintenance officials attributed delays to reasons not related to maintenance; specifically, Hurricane Irma caused a work stoppage in September 2017 and unsafe winds caused another work stoppage in October 2017.

Source: Mass Communication Specialist 2nd Class Austin Ingram (U.S. Navy photo); GAO analysis of Navy information (text). | GAO-20-370

Text of Figure 18: USS Roosevelt (DDG 80) Case Study

Ship: USS Roosevelt (DDG 80)

Availability: Chief of Naval Operations (CNO) Availability

Location and contractor: Mayport | BAE Systems

Planned cost: \$41.6 million

Final cost: \$39 million

Cost savings: \$2.6 million | 6 percent

Start date: April 17, 2017

Original planned completion date: July 13, 2018

Actual completion date: August 24, 2018

Schedule growth: 42 Days | 9 percent

Costs are in fiscal year 2020 dollars.

The Navy solicited the USS Roosevelt availability coast-wide because the availability was expected to last more than 10 months. Although the USS Roosevelt availability took place at Mayport, which maintains its own planning capability, the Navy's third-party planner performed the planning in this case. According to NAVSEA contracting specialists, this was to test the third-party planning contractor's ability to write specifications at SERMC. Maintenance officials stated that Mayport's planning capability enabled them to correct issues with the third-party planner's specifications, a process that took time. According to the maintenance team, the third-party planner provided poor specifications throughout the planning process. In the end, however, the maintenance team felt they were able to help the third-party planning contractor develop a good planning product. Maintenance officials attributed delays to reasons not related to maintenance; specifically, Hurricane Irma caused a work stoppage in September 2017 and unsafe winds caused another work stoppage in October 2017.

Even with the issues that Navy maintenance teams have encountered with third-party planner-developed specifications, RMC officials stated that they continue to find ways to enhance their coordination with the third-party planning contractor.¹⁹ For instance, according to MARMC officials, they found that when availability maintenance teams physically worked alongside third-party planning contractor staff, the planning process went much more smoothly. After SWRMC officials learned of this practice, SWRMC's maintenance teams were co-located with the third-party planning contractor staff in an effort to improve its process as well. According to RMC staff, they found that having all parties coordinating

¹⁹ This was specifically important for MARMC and SWRMC, which rely on the third-party planning contractor to write specifications for all surface ship availabilities. SERMC, alternatively, uses its own in-house planners to write availability specifications.

closely in the planning process to be an effective way to mitigate some of the specification writing issues.

In contrast to RMC officials, from NAVSEA leadership officials' perspective, the third-party planning contractor is currently accomplishing the goals the Navy has set forth and has provided accurate enough specifications to earn the incentive fees outlined in its contract. The NAVSEA officials noted that the contractor has also received annual incentive fees for providing recommendations to the Master Specification Catalog utilized by the Navy to incorporate lessons learned and improve specifications written at all RMCs.

Congressional Action Offers Relief to the Navy's Lengthy Funding Approval Processes, but Navy Does Not Have Plans to Assess Results

Historically the Navy has used its operation and maintenance account to pay for ship repair. By law, those funds have generally only been available for new obligations for one fiscal year—which corresponds with the fiscal year in which the availability contract is awarded— after which the funds expire. In order for the Navy to use any remaining expired funds in the subsequent fiscal year for an in-scope contract change, the executing RMC must request what is called an upward obligation. The Navy can request an upward obligation at the fleet level as long as the request for a specific availability is less than \$4 million. RMC officials stated this type of request involves a short process. However, if the upward obligations request exceeds \$4 million for an availability, the executing RMC must receive approval from the Office of the Under Secretary of Defense (OUSD) Comptroller. According to RMC leadership officials, this process can take several months. We found that the Navy has requested upward obligations from the OUSD Comptroller 25 times across 14 ship repair availabilities since implementing the MAC-MO strategy in April 2015.

In November 2016, we reported that the Navy identified the need for training for staff on how to obtain upward obligations funding.²⁰ In our interviews with RMC leadership officials and Navy financial officials, some said they now had experience with upward obligations because of their

²⁰ [GAO-17-54](#).

regular need to obtain funding for ship availabilities that crossed fiscal years.

Nonetheless, in our discussions with the RMC commanding officers, they described the upward obligations process to obtain OUSD Comptroller approval for upward obligations as cumbersome and unnecessarily complicated. Other Navy officials and contractors echoed these views and highlighted the upward obligations request process as a significant impediment to schedule performance. According to the RMC commanders, it requires several months to successfully execute and complete the upward obligations process for many availabilities because of reviews required within the Navy and the Office of the Secretary of Defense before approval is granted. Navy officials said the process also results in significant delays to the availabilities, as work cannot proceed without funding. For example, of six availabilities for which the Navy provided data, the shortest upward obligations request took 26 days, with the longest request spanning 189 days. Figure 19 describes how for one of our case studies, the USS Chosin (CG 65), the Navy experienced several months of schedule delay due in part to the upward obligations process.

Figure 19: USS Chosin (CG 65) Case Study



Ship: USS Chosin (CG 65)

Availability: Chief of Naval Operations (CNO) Availability

Location and contractor: San Diego | Continental Maritime of San Diego

Planned cost: \$5.4 million

Start date: August 14, 2017

Original planned completion date: April 20, 2018

Costs are in fiscal year 2020 dollars.

The USS Chosin was an ongoing maintenance availability at the time of our analysis, which immediately transitioned into a modernization availability upon the maintenance availability's completion. According to the maintenance team, the availability added some routine work items because the contractor found more work when maintenance began and it could inspect all parts of this ship. These additions contributed to the availability's cost growth. The maintenance team also reported that several factors, such as poor specifications and the delayed ordering of long lead-time materials, contributed to schedule delays. A subsequent request for upward obligations resulted in another 5 months of schedule delays because the Navy was unsure of its process for funding this request. The availability's continued need for particularly complex work, including structural repairs to deck plates that require skilled welding, further exacerbated delays.

Source: Mass Communication Specialist 2nd Class Jon Dasbach (U.S. Navy photo); GAO analysis of Navy information (text). | GAO-20-370

Text of Figure 19: USS Chosin (CG 65) Case Study

Ship: USS Chosin (CG 65)

Availability: Chief of Naval Operations (CNO) Availability

Location and contractor: San Diego | Continental Maritime of San Diego

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Start date: August 14, 2017

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months of schedule delays because the Navy was unsure of their process for funding this request. The availability's continued need for particularly complex work, including structural repairs to deck plates that require skilled welding, further exacerbated delays.

Note: The availability was ongoing at the time of our analysis. Navy officials have since stated that it completed on January 3, 2020.

Navy officials stated they have attempted to identify legislative solutions to reduce the frequency under which they must obtain upward obligations, given the negative schedule effects this process precipitates. In 2018, the Office of the Assistant Secretary of the Navy (Financial Management and Comptroller), in conjunction with the Office of the Under Secretary of Defense (Comptroller), proposed two legislative initiatives to Congress intended to accomplish this goal.

The first of these proposals seeks to raise the legal threshold for ship repair upward obligations requiring Navy and Defense Comptroller approval from \$4 million to \$10 million. The proposal also provides for a pilot ship availability with these new thresholds, which would allow the Navy to determine the proposal's effectiveness before fully implementing the new threshold. According to Navy and DOD comptroller officials, this proposal holds merit on several levels. First, the upward obligations threshold has not changed since 1990, when the law implementing the process first passed. The proposed increase to the threshold would account for inflation and subsequent increases in the cost of ship repair over the last 30 years. For example, the average maintenance availability for a DDG 51 Arleigh Burke class destroyer cost \$6 million in 1991, but costs \$36 million when the Navy proposed the legislative change. Additionally, the scope of the Operations and Maintenance, Navy (O&M) budget has increased by a factor of 2.5 since the law's 1990 passage. Navy officials believe that increasing the threshold to \$10 million would potentially raise this amount to a level corresponding to increases in Navy ship repair budgets since that time.

The second proposal would permit Navy O&M funds—which the Navy uses to fund ship repair, among other sustainment-related activities—to be available for the Navy to obligate for up to 2 fiscal years following their appropriation by Congress. Currently, these funds are available to be obligated by the Navy for only 1 year. According to Navy financial officials, since most ship repairs extend into a second year, this proposal would allow ship availabilities to avoid using upward obligations. A senior official with the Office of the Under Secretary of Defense (Comptroller) said that the threshold change was more logical, as the thresholds are no longer practical, and that the logistics of implementing 2-year funding

were likely to be more complicated because of the various DOD software systems that would be affected.

In December 2019, Congress and the President enacted legislation that—although differing from the Navy’s legislative proposals—is responsive to the Navy’s concerns relating to the process of approving upward obligations more than \$4 million in its MAC-MO availabilities. In the Fiscal Year 2020 Consolidated Appropriations Act, Congress established a pilot program that allows the Navy to use the Other Procurement, Navy (OPN) account to fund Pacific fleet surface ship repair availabilities for 2020. Our review of Navy budget documentation shows that the Navy plans to execute 16 pilot availabilities using fiscal year 2020 OPN funds, and it has requested funding for another 26 pilot availabilities in fiscal year 2021.²¹ Unlike the Operations and Maintenance, Navy account, which the Navy typically uses to fund ship repair availabilities in 1-year increments, the OPN account provides the Navy with funding that will not expire for 3 years. Consequently, for availabilities the Navy funds through the pilot program, any growth work that necessitates an availability stretching into a second or even third year will avoid upward obligations and the related approval processes, provided sufficient funding remains in the OPN appropriation to cover the work.

The joint explanatory statement accompanying the enacted legislation further stated that the Secretary of the Navy is to provide quarterly reports to Congress on the execution of ship availabilities funded through the pilot program in the OPN account. In these quarterly reports, the Navy is to report on the estimated or actual start or end dates of pilot availabilities, as well as the actual funded amount and estimate to complete.²²

The Navy already completes systematic, biennial assessments of MAC-MO implementation, in response to our November 2016 report. While the Navy recognized upward obligations as an issue in its 2018 biennial assessment, the Navy did not examine potential solutions to the schedule delays that these obligations cause. Further, according to NAVSEA officials, the Navy has yet to determine whether it will address schedule

²¹ Pilot availabilities include 11 MAC-MO availabilities in fiscal year 2020 and 21 MAC-MO availabilities in fiscal year 2021.

²² The quarterly update is also to include an execution review of the funding under the Operation and Maintenance, Navy funding line to correspond with the transfer of appropriations from that account to fund the pilot program.

outcomes and lessons learned from its pilot program availabilities within future biennial assessments.

Our prior work identified leading practices for designing a well-developed and documented pilot program. These leading practices include the following:

- Establish well-defined, appropriate, clear, and measurable objectives
- Clearly articulate assessment methodology and data gathering strategy that addresses all components of the pilot program and includes key features of a sound plan
- Identify criteria or standards for identifying lessons about the pilot to inform decisions about scalability and whether, how, and when to integrate pilot activities into overall efforts
- Develop a detailed data-analysis plan to track the pilot program's implementation and performance and evaluate the final results of the project and draw conclusions on whether, how, and when to integrate pilot activities into overall efforts
- Ensure appropriate two-way stakeholder communication and input at all stages of the pilot project, including design, implementation, data gathering, and assessment

These practices enhance the quality, credibility, and usefulness of evaluations and help ensure that time and resources are used effectively.

As the Navy moves into implementation of the OPN-funded pilot program, establishing a plan for analysis of the pilot program would provide a means to identify opportunities to take the data on availability schedules, which Congress directed, and compare it to the schedule performance the Navy has attained in its other non-pilot, MAC-MO availabilities. Such evaluations would provide information to the Navy and Congress to determine if the pilot approach should be expanded to help address persistent schedule challenges. In addition, similar to the lessons the Navy has learned in implementing the MAC-MO strategy, the Navy is likely to learn lessons from its OPN-funded pilot availabilities, including ones that relate to schedule drivers currently overshadowed by delays cast by the upward obligations process. Unless the Navy documents within an analysis plan a process for evaluating lessons learned, it runs the risk of missing opportunities to improve its overall performance outcomes across availabilities executed under the MAC-MO strategy.

Navy Has Taken Action to Enhance the Predictability of Increasing Maintenance Workloads in Response to Contractor Concerns

Representatives of private ship repair contractors that the Navy relies on to execute availabilities under the MAC-MO strategy told us that their workforce and facilities investment decisions are driven by two key considerations. First, the contractors seek visibility on planned workload within a given port, which, under current law, the Navy must publicly report on a quarterly basis. Second, the contractors assess that planned workload to determine what share of the work they are most likely to receive. This assessment affects whether a contractor hires more or fewer people, recapitalizes or expands facilities, and, ultimately, elects to remain part of the Navy's industrial base for ship repair. In recognition of these considerations, the Navy has taken recent steps to increase predictability of workloads at each port, for example by bundling contracts for both sequential and concurrent availabilities. The Navy anticipates that these steps will help further increase contractors' confidence in their ability to forecast their share of future workloads.

Navy Forecasted Port Workloads Continue to Fluctuate but Are Expected to Exceed Ports' Capacities in the Near-term

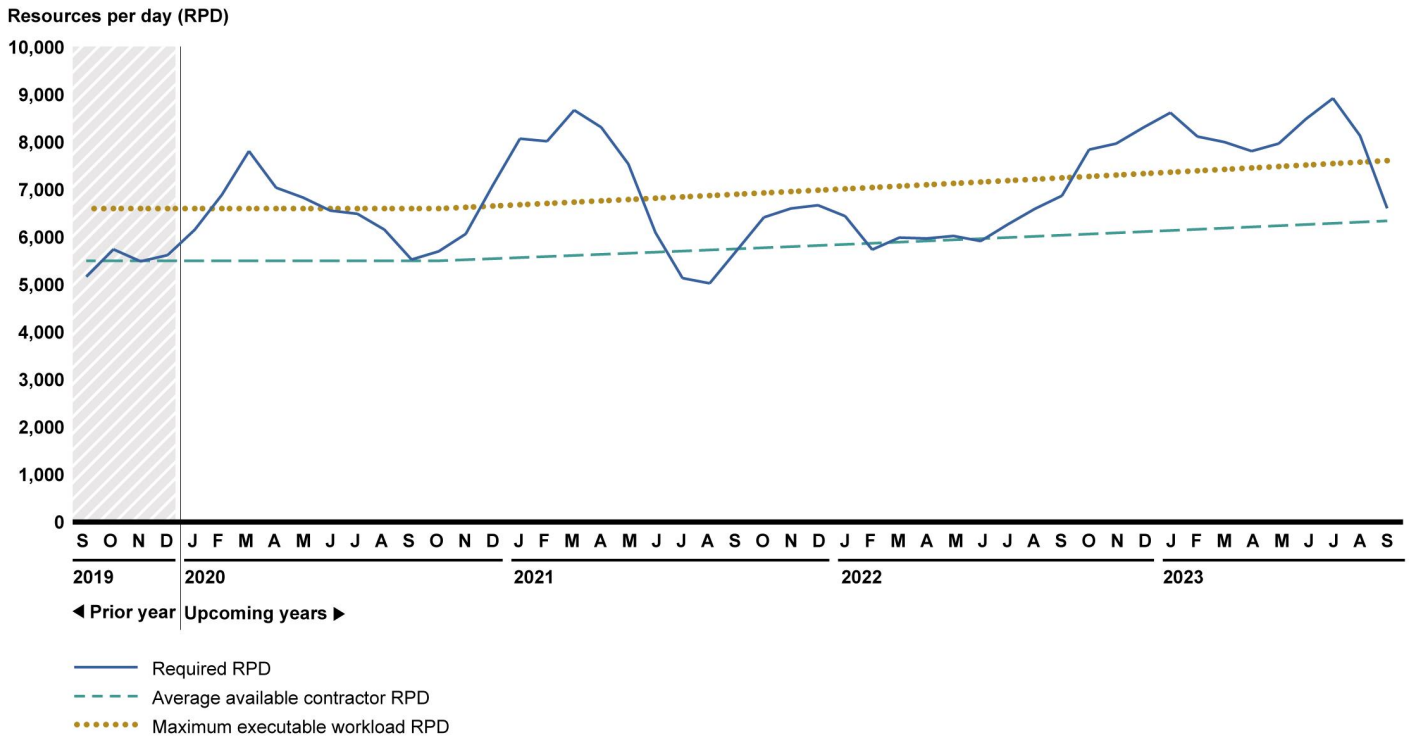
As we found in our November 2016 report, various factors regarding the Navy's level of demand for maintenance and repair work at each of the three home ports implementing MAC-MO, including the deployment of ships, can affect the demand for work in each of the home ports.²³ Based on our analysis of Navy data, this workload remains cyclical in nature, and at times fluctuates above and below what port capacities ordinarily support, as it was under the prior contracting strategy.

In May 2016, we found that wide swings in port workload can have a negative effect on the private-sector industrial base, and various factors

²³ [GAO-17-54](#).

can affect those workloads.²⁴ Subsequent to that report, Congress required the Navy to publicly release on a quarterly basis workload projections covering the three ports implementing MAC-MO.²⁵ Navy's forecasts indicate that ports implementing MAC-MO will, at times during the next 3 years, be assigned workloads beyond their current capacity, particularly for the Southeast Regional Maintenance Center in Mayport, Florida.²⁶ Figures 20, 21, and 22 identify the Navy's port workload projections for each of the three ports as of December 2019.

Figure 20: Historical and Forecasted Maintenance Navy Workload for Mid-Atlantic Regional Maintenance Center, Norfolk, Virginia, Fiscal Years 2019-2023



Source: GAO presentation of Navy data. | GAO-20-370

²⁴ GAO-16-466R.

²⁵ National Defense Authorization Act for Fiscal Year 2017, Public Law 114-328, § 325 (2016).

²⁶ Commander, Navy Regional Maintenance Center, *Total Private Sector Workload Estimate, Industry Version* (December 1, 2019).

Data table for Figure 20: Historical and Forecasted Maintenance Navy Workload for Mid-Atlantic Regional Maintenance Center, Norfolk, Virginia, Fiscal Years 2019-2023

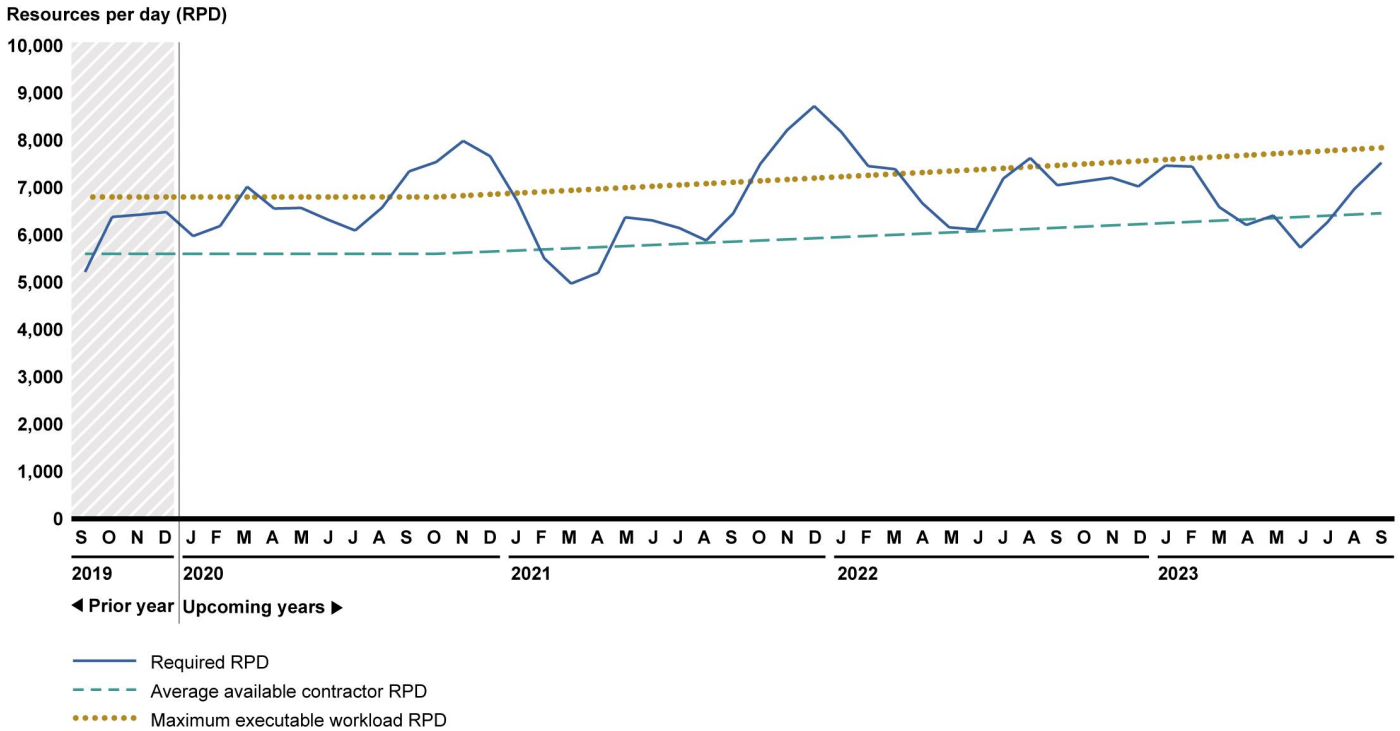
Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Sep-19	5166.432	5500	6600	MARMC
Oct-19	5741.351	5500	6600	MARMC
Nov-19	5488.782	5500	6600	MARMC
Dec-19	5619.943	5500	6600	MARMC
Jan-20	6154.492	5500	6600	MARMC
Feb-20	6889.363	5500	6600	MARMC
Mar-20	7809.924	5500	6600	MARMC
Apr-20	7040.728	5500	6600	MARMC
May-20	6831.085	5500	6600	MARMC
Jun-20	6557.134	5500	6600	MARMC
Jul-20	6490.236	5500	6600	MARMC
Aug-20	6155.376	5500	6600	MARMC
Sep-20	5526.36	5500	6600	MARMC
Oct-20	5698.572	5500	6600	MARMC
Nov-20	6066.706	5522.408	6626.889	MARMC
Dec-20	7091.917	5544.907	6653.888	MARMC
Jan-21	8071.933	5567.497	6680.997	MARMC
Feb-21	8017.61	5590.18	6708.216	MARMC
Mar-21	8672.801	5612.955	6735.546	MARMC
Apr-21	8311.029	5635.823	6762.988	MARMC
May-21	7538.68	5658.784	6790.541	MARMC
Jun-21	6094.251	5681.839	6818.206	MARMC
Jul-21	5135.139	5704.987	6845.984	MARMC
Aug-21	5025.802	5728.23	6873.876	MARMC
Sep-21	5717.797	5751.567	6901.881	MARMC
Oct-21	6415.175	5775	6930	MARMC
Nov-21	6602.672	5798.528	6958.234	MARMC
Dec-21	6670.075	5822.152	6986.582	MARMC
Jan-22	6440.382	5845.872	7015.047	MARMC
Feb-22	5735.512	5869.689	7043.627	MARMC
Mar-22	5988.838	5893.603	7072.323	MARMC
Apr-22	5970.693	5917.614	7101.137	MARMC
May-22	6023.417	5941.723	7130.068	MARMC

Letter

Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Jun-22	5915.095	5965.93	7159.117	MARMC
Jul-22	6266.012	5990.236	7188.284	MARMC
Aug-22	6594.427	6014.641	7217.57	MARMC
Sep-22	6870.889	6039.146	7246.975	MARMC
Oct-22	7841.488	6063.621	7276.345	MARMC
Nov-22	7968.443	6088.314	7305.977	MARMC
Dec-22	8305.473	6113.108	7335.729	MARMC
Jan-23	8618.89	6138.002	7365.603	MARMC
Feb-23	8116.9	6162.998	7395.598	MARMC
Mar-23	7999.926	6188.096	7425.716	MARMC
Apr-23	7809.742	6213.296	7455.956	MARMC
May-23	7969.171	6238.599	7486.319	MARMC
Jun-23	8485.205	6264.005	7516.806	MARMC
Jul-23	8921.625	6289.514	7547.417	MARMC
Aug-23	8133.879	6315.127	7578.152	MARMC
Sep-23	6606.493	6340.844	7609.013	MARMC

Note: Resources per day are derived from the Navy's estimate of total mandays budgeted for each availability, which is then summarized to provide an estimated forecast of a port's entire workload. This forecast does not include an estimate of the resources per day needed to execute anticipated coast-wide competed availabilities.

Figure 21: Historical and Forecasted Maintenance Navy Workload for Southwest Regional Maintenance Center, San Diego, California, Fiscal Years 2019-2023



Source: GAO presentation of Navy data. | GAO-20-370

Data Table for Figure 21: Historical and Forecasted Maintenance Navy Workload for Southwest Regional Maintenance Center, San Diego, California, Fiscal Years 2019-2023

Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Sep-19	5216.341	5600	6800	SWRMC
Oct-19	6377.899	5600	6800	SWRMC
Nov-19	6424.436	5600	6800	SWRMC
Dec-19	6482.723	5600	6800	SWRMC
Jan-20	5974.037	5600	6800	SWRMC
Feb-20	6186.139	5600	6800	SWRMC
Mar-20	7016.714	5600	6800	SWRMC
Apr-20	6555.098	5600	6800	SWRMC
May-20	6568.906	5600	6800	SWRMC
Jun-20	6319.14	5600	6800	SWRMC
Jul-20	6092.223	5600	6800	SWRMC

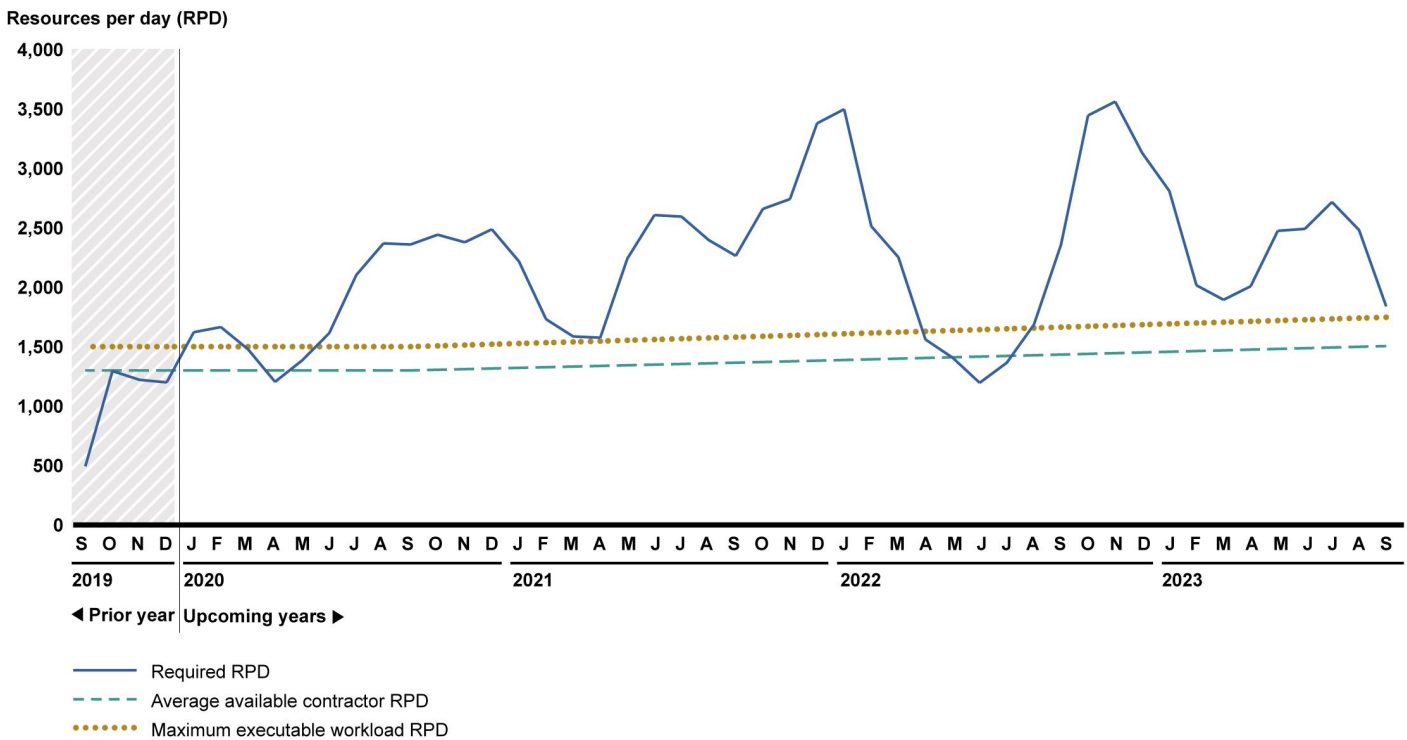
Letter

Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Aug-20	6577.782	5600	6800	SWRMC
Sep-20	7341.516	5600	6800	SWRMC
Oct-20	7538.943	5600	6800	SWRMC
Nov-20	7985.08	5622.815	6827.704	SWRMC
Dec-20	7661.296	5645.723	6855.521	SWRMC
Jan-21	6718.326	5668.725	6883.451	SWRMC
Feb-21	5505.162	5691.82	6911.495	SWRMC
Mar-21	4969.574	5715.009	6939.654	SWRMC
Apr-21	5199.56	5738.292	6967.927	SWRMC
May-21	6370.133	5761.671	6996.315	SWRMC
Jun-21	6305.477	5785.145	7024.819	SWRMC
Jul-21	6144.368	5808.714	7053.439	SWRMC
Aug-21	5881.197	5832.38	7082.175	SWRMC
Sep-21	6453.585	5856.141	7111.029	SWRMC
Oct-21	7496.661	5880	7140	SWRMC
Nov-21	8215.388	5903.956	7169.089	SWRMC
Dec-21	8720.815	5928.009	7198.297	SWRMC
Jan-22	8175.818	5952.161	7227.624	SWRMC
Feb-22	7452.658	5976.411	7257.07	SWRMC
Mar-22	7387.625	6000.759	7286.636	SWRMC
Apr-22	6670.19	6025.207	7316.323	SWRMC
May-22	6157.283	6049.754	7346.13	SWRMC
Jun-22	6112.528	6074.402	7376.059	SWRMC
Jul-22	7189.652	6099.15	7406.11	SWRMC
Aug-22	7622.905	6123.998	7436.284	SWRMC
Sep-22	7048.598	6148.948	7466.58	SWRMC
Oct-22	7129.449	6174.059	7497.071	SWRMC
Nov-22	7208.667	6199.218	7527.621	SWRMC
Dec-22	7023.345	6224.479	7558.296	SWRMC
Jan-23	7462.476	6249.843	7589.095	SWRMC
Feb-23	7442.849	6275.311	7620.02	SWRMC
Mar-23	6585.708	6300.882	7651.071	SWRMC
Apr-23	6208.896	6326.558	7682.249	SWRMC
May-23	6408.704	6352.338	7713.553	SWRMC
Jun-23	5729.967	6378.223	7744.985	SWRMC
Jul-23	6264.614	6404.214	7776.545	SWRMC

Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Aug-23	6967.684	6430.311	7808.234	SWRMC
Sep-23	7524.308	6456.514	7840.052	SWRMC

Note: Resources per day are derived from the Navy's estimate of total mandays budgeted for each availability, which is then summarized to provide an estimated forecast of a port's entire workload. This forecast does not include an estimate of the resources per day needed to execute anticipated coast-wide competed availabilities.

Figure 22: Historical and Forecasted Maintenance Navy Workload for Southeast Regional Maintenance Center, Mayport, Florida, Fiscal Years 2019-2023



Source: GAO presentation of Navy data. | GAO-20-370

Data Table for Figure 22: Historical and Forecasted Maintenance Navy Workload for Southeast Regional Maintenance Center, Mayport, Florida, Fiscal Years 2019-2023

Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Sep-19	493.3206	1300	1500	SERMC
Oct-19	1294.747	1300	1500	SERMC
Nov-19	1220.681	1300	1500	SERMC
Dec-19	1199.468	1300	1500	SERMC

Letter

Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Jan-20	1621.54	1300	1500	SERMC
Feb-20	1664.794	1300	1500	SERMC
Mar-20	1478.425	1300	1500	SERMC
Apr-20	1203.906	1300	1500	SERMC
May-20	1384.44	1300	1500	SERMC
Jun-20	1614.137	1300	1500	SERMC
Jul-20	2103.538	1300	1500	SERMC
Aug-20	2369.002	1300	1500	SERMC
Sep-20	2359.518	1300	1500	SERMC
Oct-20	2441.762	1305.417	1506.667	SERMC
Nov-20	2378.455	1310.833	1513.333	SERMC
Dec-20	2487.389	1316.25	1520	SERMC
Jan-21	2217.227	1321.667	1526.667	SERMC
Feb-21	1730.783	1327.083	1533.333	SERMC
Mar-21	1585.655	1332.5	1540	SERMC
Apr-21	1575.557	1337.917	1546.667	SERMC
May-21	2241.126	1343.333	1553.333	SERMC
Jun-21	2607.188	1348.75	1560	SERMC
Jul-21	2594.068	1354.167	1566.667	SERMC
Aug-21	2397.069	1359.583	1573.333	SERMC
Sep-21	2264.1	1365	1580	SERMC
Oct-21	2659	1370.688	1587	SERMC
Nov-21	2741.576	1376.375	1594	SERMC
Dec-21	3378.947	1382.063	1601	SERMC
Jan-22	3497.729	1387.75	1608	SERMC
Feb-22	2513.489	1393.438	1615	SERMC
Mar-22	2252.425	1399.125	1622	SERMC
Apr-22	1560.115	1404.813	1629	SERMC
May-22	1407.458	1410.5	1636	SERMC
Jun-22	1195.641	1416.188	1643	SERMC
Jul-22	1364.585	1421.875	1650	SERMC
Aug-22	1684.275	1427.563	1657	SERMC
Sep-22	2356.55	1433.25	1664	SERMC
Oct-22	3445.118	1439.221	1670.933	SERMC
Nov-22	3561.696	1445.192	1677.867	SERMC
Dec-22	3128.495	1451.163	1684.8	SERMC

Hull	Total Resources per day (RPD)	Average available contractor RPD	Maximum executable workload RPD	Port
Jan-23	2809.653	1457.133	1691.733	SERMC
Feb-23	2016.032	1463.104	1698.667	SERMC
Mar-23	1894.355	1469.075	1705.6	SERMC
Apr-23	2007.878	1475.046	1712.533	SERMC
May-23	2474.328	1481.017	1719.467	SERMC
Jun-23	2491.191	1486.988	1726.4	SERMC
Jul-23	2716.979	1492.958	1733.333	SERMC
Aug-23	2480.993	1498.929	1740.267	SERMC
Sep-23	1839.34	1504.9	1747.2	SERMC

Note: Resources per day are derived from the Navy's estimate of total mandays budgeted for each availability, which is then summarized to provide an estimated forecast of a port's entire workload. This forecast does not include an estimate of the resources per day needed to execute anticipated coast-wide competed availabilities.

Large Contractors Offered Mixed Views on Workforce and Facilities Investment Planning under MAC-MO

Although the Navy projects that overall workload at the ports implementing MAC-MO will fluctuate with periodic increases, lack of certainty about company-specific workload is driving mixed views among contractors on their willingness to make facility and workforce investments. Multiple contractor representatives we interviewed stated they have always worked within an environment of peaks and valleys of workload regardless of the Navy's contracting strategy. Representatives of large ship repair contractors we interviewed commented on challenges and changes they have made to remain competitive in the MAC-MO strategy's competitive, firm-fixed-price contracting environment. Under MAC-MO, which requires competition for every availability within a home port, large contractor representatives stated that they do not have a high level of confidence or visibility into future work that the Navy will award to their companies. They have noted that this uncertainty has affected their planning for hiring and facilities investments. Specifically, contractor representatives cited the following:

- Of the eight large MAC-MO contractors in our review, four reported that they have increased their full-time workforce and the other four have reported a decreased workforce since 2015.
- Representatives of three contractors selected in our review noted that they have had to rely more heavily on temporary labor to conduct

work on Navy availabilities because of inability to predict workloads. For example, a representative of one large contractor noted that their company retains a permanent core workforce, which it then supplements with temporary labor, as needed, depending on the number of contracts it is awarded by the Navy. Representatives of another large contractor noted that the company recently reinstated a training program for new ship repair workers. A representative from the third contractor stated that the company is considering reinstating its equivalent training program based on workload forecasts and confidence in their amount of workload, which underpins investments in workforce training.

- Representatives of multiple large contractors in our review also stated that they increasingly rely on their subcontractors to execute ship repair work. For example, a representative from one noted that although the company reduced its full time workforce, it is still able to execute availabilities through their use of subcontractor labor. A representative of another large contractor noted that their company staffed a recent availability with about 70 percent subcontracted labor, in part to help the contractor work within the contract's price as agreed to with the Navy and to help the company make a profit. Representatives of another large contractor stated their company's preference is to use subcontractors rather than to surge its permanent staff, especially given the contractor's uncertainty about its portion of future Navy ship repair and maintenance workloads.
- Representatives of three of the large contractors we interviewed also stated that unstable workloads have limited their plans for significant capital investments in new or expanded facilities. However, representatives of two large contractors reported making new investments in facilities due to high volume of work at their ports. For example, representatives of one large contractor noted that their parent company invested \$100 million into building a new dry dock as part of the company's commitment to win new availabilities and complete them on schedule. The company reported that it was willing to make this investment, in part, because Navy forecasts show an increase in ships being homeported at that location. These contractor representatives further stated their company is considering additional facilities investments.

Apart from the considerations that affect their hiring and facilities investments, representatives from all of the large companies we interviewed told us that they plan to continue competing for Navy ship repair work under the MAC-MO strategy. For seven out of the eight of these contractors, the Navy is their primary customer. A representative of

one large contractor noted their company's preference for the MAC-MO strategy, as compared to earlier Navy contracting strategies, especially as a means to increase its ability to propose on and compete for availabilities. Representatives of two additional large contractors also echoed the positive effect of increased opportunities to propose on Navy ship repair and maintenance contracts as a means to potentially grow their workloads.

Representatives of Selected Small Business Contractors Report Expanded Hiring and Facility Investments under MAC-MO

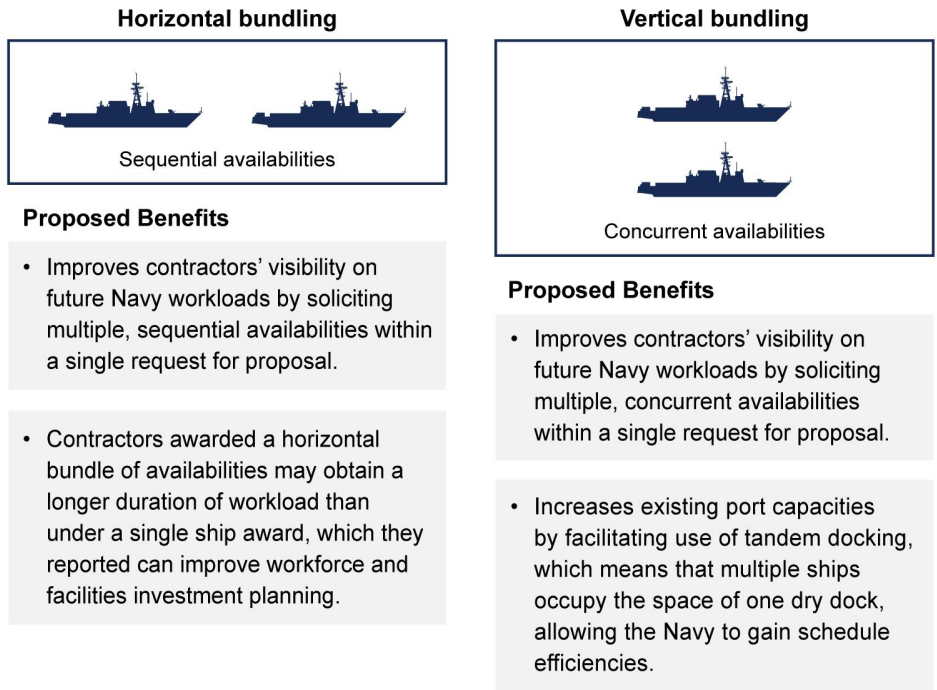
Representatives of the three small business contractors we interviewed told us that they have each increased their workforces since 2015, when the Navy began implementing the MAC-MO strategy. Under this strategy, small businesses are able to compete for noncomplex ship repair work as prime contractors. Overall, these small business contractor representatives stated they intend to further grow their workforces and facilities, correspondent with the amounts of ship repair work they receive. Specifically, representatives of these small business contractors told us the following:

- Representatives of one small business prime contractor reported that their company grew its workforce from 625 to 982 between December 2015 and March 2019 as they stated that MAC-MO provided additional opportunities to propose on ship repair contracts.
- A representative of another small business prime contractor we interviewed estimated that their company hired an additional 100 personnel at two locations because of new, increased workloads related to MAC-MO's implementation.
- One small business prime contractor included in our review completed a major facilities expansion, including the addition of a dry dock intended to serve all lines of business, including commercial business customers.
- A representative of one small business prime contractor stated that their company is considering significant infrastructure upgrades and plans to aggressively compete for noncomplex Navy ship repair and maintenance work.

The Navy Is Taking Steps to Increase Predictability of Future Workloads

The Navy has recently begun implementing two new contractual approaches—horizontal and vertical contract bundling—within its MAC-MO strategy, but has not yet had sufficient time to collect or assess results. These approaches are intended to increase contractors’ visibility into and confidence regarding future ship repair workloads. Navy leadership officials stated that by awarding multiple availabilities, industry receives a body of work that creates confidence in hiring and retaining a skilled workforce and investment in infrastructure. These approaches provide for contractors to propose on multiple ship repair availabilities that the Navy has bundled within a single request for proposal. Figure 23 illustrates these new contractual approaches.

Figure 23: Proposed Benefits of Navy Availability Bundling



Source: GAO analysis of Navy data. | GAO-20-370

- Horizontal Contract Bundling:** Navy leadership officials testified to Congress in October 2019 that horizontal bundling helps them decide where to direct ship repair and maintenance work, especially as a means to not surpass capacity at a given port. A representative of one

large contractor told us the company anticipates positive effects from horizontal bundling to include being awarded two availabilities from one proposal process and guarantees of work for a longer period than one availability. Another large business contractor representative noted that horizontal bundling would help in stabilizing workloads over a longer period of time, which would also help with its hiring planning. The Navy awarded its first horizontally bundled availabilities in September 2019, and the contractor is expected to complete work on the two ships at its shipyard in Seattle, Washington in June 2021 and May 2022, respectively. NAVSEA leadership officials noted that Navy intends to implement horizontal contract bundling at all of its ports in the future.

- **Vertical Contract Bundling:** This contract bundling approach has the potential to allow contractors to increase their workload through only one proposal process, as they may then have the possibility to work on two availabilities at one time. The Navy awarded its first vertically bundled availabilities in February 2019 to three contractors. The second award, in September 2019, resulted in one contractor receiving two simultaneous availabilities.

Additionally, NAVSEA leadership officials state they are undertaking other initiatives intended to avoid (1) large fluctuations in ship repair work at individual ports, and (2) the need for contractor workforce layoffs and surge hiring. These initiatives are outlined in further detail below:

- **Attempting to Level Port Workloads:** Through its P2P initiative, the Navy intends to use historical timelines from recent availabilities to more accurately plan and forecast future availability time frames. This effort is using computer modeling to avoid either underutilizing or exceeding the available port loading capacity of the industrial base in any given timeframe. On average, NAVSEA leadership stated that they intend to lengthen planned availability timeframes by 56 days to more accurately reflect completion times. The officials assessed that this strategy will help ship repair contractors better manage their workforce planning. They further stated that if contractors have increased visibility in port loading, they will be more likely to hire an increased number of permanent staff in key ship repair trades. According to NAVSEA leadership officials, this could then allow for increased workload capacity at a given port, as those permanent—rather than temporary—staff would become more skilled over time and therefore would require less on-the-job training.
- **Contractor Workforce Capacity Reporting:** NAVSEA leadership officials also noted that the Navy is considering options for including

language in future ship repair contracts requiring contractors to identify their workforce capacity, including by trade and skill set. NAVSEA leadership officials noted that the intention of such an initiative would be to obtain better workforce capacity data to better plan future port workloads.

Conclusions

Although the MAC-MO strategy appears to have stabilized the cost and quality components, completing maintenance availabilities within allotted schedules continues to elude the Navy. The Navy has taken steps to more readily accommodate growth work needs as they emerge, however these likely cannot completely eliminate the Navy's need for upward obligations. The Navy has pointed to the low cost threshold and upward obligations approval process, as provided for in statute, as not providing it with the agility it needs to fund growth work on a schedule that minimizes disruption to an availability. Recently, Congress enacted legislation, signed into law by the President, which establishes an OPN-funded pilot program and provides the Navy a platform to potentially demonstrate that it can meet its MAC-MO schedule goals when freed from the time intensive process of upward obligations. Nonetheless, every pilot program should be thought out before it starts, including consideration of what data need to be collected and how the data will be analyzed. Otherwise, the pilot could be poorly run or could miss opportunities to gain information and lessons learned. Such planning for the OPN-funded pilot could enhance the quality, credibility, and usefulness of the pilot program.

Recommendation for Executive Action

The Secretary of the Navy should establish an analysis plan for the evaluation of OPN-funded pilot program availabilities, based on the leading practices for pilot programs. This analysis plan should identify opportunities to evaluate schedule outcomes of pilot program availabilities as compared to non-pilot program availabilities and document a process for evaluating lessons learned from the pilot program (Recommendation 1).

Agency Comments

We provided a draft of this report to the Navy for review and comment. In written comments provided by the Navy (reproduced in appendix II), the Navy concurred with our recommendation.

We are sending copies of this report to the appropriate congressional committees; the Secretary of Defense; and the Secretary of the Navy. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

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



Shelby S. Oakley
Director, Contracting and
National Security Acquisitions

List of Committees

The Honorable James M. Inhofe
Chairman

The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Adam Smith
Chairman

The Honorable Mac Thornberry
Ranking Member
Committee on Armed Services
House of Representatives

Appendix I: Objectives, Scope, and Methodology

In 2015, the Navy transitioned to the Multiple Award Contract, Multi Order (MAC-MO) contract strategy for the maintenance and modernization of surface ships. This report (1) examines competition, cost, schedule, and quality outcomes under the strategy; (2) evaluates actions the Navy has taken related to recent lessons learned; and (3) describes considerations informing contractors' plans for future hiring and facilities investments.

Outcomes of the Strategy

To examine the competition outcomes of the MAC-MO strategy, as well as number of offers received, we analyzed delivery orders for all of the MAC-MO availabilities in Norfolk, Mayport, and San Diego from the start of the strategy in April 2015 through March 2019. Navy provided a list of MAC-MO Indefinite Delivery, Indefinite Quantity contracts and identified which were complex and noncomplex. We used the Federal Procurement Data System – Next Generation (FPDS-NG) to identify the delivery orders associated with these contracts, and the number of offers received for each order. To assess the reliability of the FPDS-NG data, we reviewed documentation, interviewed Navy officials, performed logic checks, and compared the FPDS-NG data to contract documents. To confirm that we had correctly identified orders related to MAC-MO availabilities, we reviewed the order description in FPDS-NG to confirm that it was a valid ship repair availability and the type of availability. For cases in which the FPDS-NG description did not contain the availability type, we obtained the contract to confirm that it was a valid ship repair availability. To assess the reliability of the number of offers, we performed a logic check to confirm the number of offers received for the delivery order was generally different from the number of offers received for the base contract. Documents reviewed included the FPDS-NG data dictionary, FPDS-NG data validation rules, and Fiscal Year 2013-2018 Federal Procurement Data Quality Summary, which contains results of agency testing of selected fields in FPDS-NG. We determined the FPDS-NG data were reliable for the purpose of assessing the competition outcomes of the MAC-MO strategy.

To assess the quality outcomes of MAC-MO availabilities, we reviewed Federal Acquisition Regulations to identify differences between fixed-price and cost reimbursement contract types, and interviewed Navy officials regarding the steps the Navy takes to manage quality in a fixed-price environment.

To examine the cost and schedule outcomes of the MAC-MO strategy, we collected ship maintenance availability data from NAVSEA and the Commander, Navy Regional Maintenance Center (CNRMC). This data contained the planned cost and schedule of Chief of Naval Operations (CNO) availabilities, as well as the actual cost and schedule for the availabilities that the Navy closed out between February 2, 2011 and January 15, 2019. While we were directed to assess the MAC-MO outcomes against the Multi-Ship, Multi-Option outcomes, differences in how the availability cost and schedule are estimated between the two strategies prevented us from comparing their cost and schedule outcomes. To assess the reliability of the data, we (1) gathered information from the Navy's users of the data related to its reliability, (2) compared different snapshots of the data over time to check the consistency of completed entries, including the version that the Navy used to publish its first assessment of the MAC-MO strategy, and (3) compared availability documentation from our completed case study CNO availabilities. We determined the data were reliable for the purpose of assessing cost and schedule outcomes.

To narrow our sample, we filtered the data to the ship classes and locations covered under the MAC-MO strategy and eliminated availabilities that had yet to report final cost and schedule entries. This yielded 41 closed out CNO availabilities since the start of the MAC-MO strategy in April 2015. We then adjusted all dollar values for inflation to fiscal year 2020 dollars by using the deflators for Operations and Maintenance funding found in table 5-9 of the Department of Defense budget estimates for fiscal year 2020. To calculate cost and schedule change, we determined the difference between the final cost and completion date, and the planned cost and completion date. The planned cost and schedule represents the Navy's estimate at the time the Navy awarded the contract. We then calculated the average cost and schedule change for all 41 availabilities, as well as the availabilities at each of the three maintenance centers and classes of ships.

To help examine the cost, schedule, and quality outcomes of the MAC-MO strategy, as well as to identify lessons learned, we selected six availabilities as non-generalizable case studies, four of which were

completed at the time of our review. To select the availabilities, we used a list of MAC-MO Indefinite Delivery, Indefinite Quantity (IDIQ) contract numbers provided by the Naval Sea Systems Command. We used the Federal Procurement Data System, Next Generation (FPDS-NG) to collect the descriptions of contract actions to determine the ship and availability type, estimated cost, estimated completion dates, contractor, and place of performance. We selected a combination of six availabilities that provided a variety of the following characteristics:

- We selected two availabilities of each class of ship under the MAC-MO strategy, including destroyers, cruisers, and amphibious ships.
- We selected two availabilities from each maintenance center executing the strategy: Mid-Atlantic Regional Maintenance Center, Southeast Regional Maintenance Center, and Southwest Regional Maintenance Center.
- We selected availabilities awarded to a variety of ship repair contractors, including two from BAE Systems, two from General Dynamics NASSCO, one from Marine Hydraulics International, and one from Huntington Ingalls Industries.
- We selected a variety of availability types to describe different types of ship repair work, including two Selected Restricted Availabilities, a Special Selected Restricted Availability, Depot Modernization Period, Phased Maintenance Availability, and a Continuous Maintenance availability.

For each of the case study availabilities, we collected and reviewed Navy availability documentation including the delivery order, correspondence between the maintenance teams and contractors, availability completion reports, weighted progress reports at the time of completion, and briefings containing lessons learned following completion of the availability. We reviewed the documents to: 1) confirm our selection criteria, 2) identify any deficiencies in quality of work and contract changes as a result, 3) identify the presence of growth work items, new work items, or deferred work items, 4) corroborate interview statements, and 5) identify any other issues during the availability and solutions that could be lessons learned for future availabilities.

Actions Taken Related to Lessons Learned

To evaluate the actions the Navy has taken related to recent MAC-MO strategy lessons learned, we analyzed Navy documentation containing lessons learned that aim to improve the Navy's implementation of MAC-

MO. We identified a total of three lessons learned as key based on our assessment of the Navy's documentation of the MAC-MO contracting strategy. These three lessons learned were also identified as such in one or more interviews with NAVSEA officials knowledgeable about the challenges associated with MAC-MO implementation and the steps the Navy has taken to fix those issues. To evaluate the Navy's progress in taking actions to address potential challenges posed by the key lessons learned, we reviewed Navy documents, including Navy assessments of the contracting strategy's effectiveness, documents implementing revised planning milestones and contracting processes, strategy and planning documents, documents from availability completion meetings, case study contract file documents and other documentation related to lessons learned. To assess the extent to which the Navy has taken actions, we developed the following three-point scale:

- Not Complete—The Navy has not taken any action to respond to identified lessons learned.
- Partially Complete—The Navy has taken some action to respond to the identified lessons learned, but has not completed the action needed to address the identified risk.
- Complete—The Navy has completed the action needed to address the identified lesson learned.

Considerations Informing Contractors' Plans for Hiring and Facilities Investments

To describe considerations informing ship repair contractors' plans for future hiring and facilities investments under the MAC-MO strategy, we conducted semi-structured interviews with and reviewed questionnaire responses from 11 non-nuclear surface ship repair contractors. This included all eight contractors responsible for executing major ship repair work under this strategy at the three home ports implementing it, including Mayport, Florida, Norfolk, Virginia and San Diego, California. We randomly selected a non-generalizable sample of three small business contractors performing noncomplex ship repair work at the three home ports implementing MAC-MO, to obtain the views of small businesses executing MAC-MO contracts. We used FPDS -NG data to identify those small businesses that have been awarded MAC-MO delivery orders.

Further, we used a data collection instrument to gather information from each of the selected 11 contractors on their facilities, workforce, and sources of revenue. For example, we collected contractor-reported information on what types of facilities the contractor owned, such as a dry dock or a pier, the number of the contractor's full-time staff, and the percentage of revenue from entities other than from the Navy.

To identify the Navy's projected workload for non-nuclear surface ships where the MAC-MO strategy is implemented, we obtained data from the Navy from fiscal years 2019 through the end of 2023. Since the purpose of our analysis was to show the Navy's projections in anticipated port workload, we did not conduct our own assessment of the accuracy of this data.

We also interviewed key Navy officials and reviewed statements from testimonies to Senate subcommittees, including of the NAVSEA Commander and of the Assistant Secretary of the Navy for Research, Development, and Acquisition, on their approaches to provide increased visibility and avoid large fluctuations of workloads at Navy ports, including the three home ports implementing the MAC-MO strategy. We collected documentation on these approaches, such as for the Performance to Plan initiative on how the Navy intends to use computer modeling to more accurately plan and forecast future availability timeframes, leveraging Navy historical datasets to provide more accurate and realistic planning forecasts.

In addition, for all three objectives, we interviewed officials responsible for overseeing, planning, administering, and funding the Navy's ship repair contracts, including representatives of the Office of the Under Secretary of Defense (Comptroller); Office of the Assistant Secretary of the Navy (Financial Management and Comptroller); the Office of the Chief of Naval Operations; Commander, Navy Regional Maintenance Center (CNRMC) and Deputy Commander, Surface Ship Maintenance and Modernization (SEA 21); Surface Maintenance Engineering Planning Program (SURFMEPP); Commander, Naval Surface Force, Atlantic; Commander, Naval Surface Force, Pacific; Mid-Atlantic Regional Maintenance Center (MARMC) in Norfolk, Virginia; the Southwest Regional Maintenance Center (SWRMC) in San Diego, California; and the Southeast Regional Maintenance Center (SERMC) in Mayport, Florida. We additionally interviewed management representatives of 11 ship repair contractors included in our review and the third party planning contractor.

**Appendix I: Objectives, Scope, and
Methodology**

We conducted this performance audit from November 2018 to May 2020 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.

Appendix II: Comments from the Department of the Navy



THE ASSISTANT SECRETARY OF THE NAVY

Research, Development and Acquisition
1000 Navy Pentagon
Washington DC 20350-1000

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

Dear Ms. Oakley:

Enclosed is the Department of Defense (DoD) response to the GAO Draft Report, GAO-20-370, "NAVY SHIP MAINTENANCE: Evaluating Pilot Program Outcomes Could Inform Decisions to Address Persistent Schedule Challenges," dated February 24, 2020 (GAO Code 103171). The draft report is unclassified and cleared for open publication.

Sincerely,

GEURTS.JAME Digitally signed by
GEURTS.JAMES.F. 1034185286
S.F.1034185286 Date: 2020.04.23 13:54:07 -0400

James F. Geurts

Attachments:
As Stated

**GAO DRAFT REPORT DATED FEBRUARY 24, 2020
GAO-20-370 (GAO CODE 103171)**

**“NAVY SHIP MAINTENANCE: EVALUATING PILOT PROGRAM OUTCOMES
COULD INFORM DECISIONS TO ADDRESS PERSISTENT SCHEDULE
CHALLENGES”**

**DEPARTMENT OF NAVY COMMENTS
TO THE GAO RECOMMENDATIONS**

GAO recommends that the Secretary of Navy complete the following action:

RECOMMENDATION 1: Establish an analysis plan for evaluating OPN-funded pilot program availabilities, based on the leading practices for pilot programs. This analysis plan should identify opportunities to evaluate schedule outcomes of pilot program availabilities as compared to non-pilot program availabilities and document a process for evaluating lessons learned from the pilot program.

DoD RESPONSE 1: Concur. The Navy will establish an analysis plan for evaluating the OPN-funded pilot program availabilities.

Text of Appendix II: Comments from the Department of the Navy

Page 1

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Director, Contracting and National Security Acquisitions

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Page 2

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Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Shelby S. Oakley at (202) 512-4841 or OakleyS@gao.gov

Staff Acknowledgments

In addition to the contact named above, GAO staff who made key contributions to this report include Christopher R. Durbin (Assistant Director); Sean Seales (Analyst-in-Charge); Pete Anderson; Sonja Bensen, Lorraine Ettaro; Lori Fields; Suellen Foth, Kurt Gurka; Cale Jones; Ethan Kennedy; Sophia Payind; and Carol Petersen.

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