



## Testimony

Before the Subcommittee on Coast Guard and Maritime Transportation, Committee on Transportation and Infrastructure, House of Representatives

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# COAST GUARD RECAPITALIZATION

## Actions Needed to Better Manage Acquisition Programs and Address Affordability Concerns

Statement of Marie A. Mak, Director,  
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Accessible Version

# GAO Highlights

Highlights of [GAO-23-106948](#), a testimony before the Subcommittee on Coast Guard and Maritime Transportation, Committee on Transportation and Infrastructure, House of Representatives

## Why GAO Did This Study

The U.S. Coast Guard, a component within the Department of Homeland Security, employs a variety of vessels and aircraft, several of which are approaching the end of their intended service lives. Consequently, the Coast Guard plans to invest billions of dollars in two of its highest priority programs—acquiring three heavy icebreakers, known as PSCs, and a fleet of 25 OPCs, which are ships that conduct a variety of missions in offshore waters.

This statement addresses (1) the capabilities provided by the newer Coast Guard surface vessels, (2) the risks and consequences of not establishing sound business cases for two of Coast Guard's highest priority programs—the OPC and PSC, and (3) the overall affordability of the Coast Guard's acquisition portfolio. This statement is largely based on information from GAO from June 2023 and July 2023. Information about the scope and methodology of prior work on which this statement is based can be found in those products.

## What GAO Recommends

GAO made seven recommendations in its 2023 reports on the OPC and PSC to better align the Coast Guard's acquisition policy and the programs' practices with shipbuilding leading practices. DHS and the Coast Guard agreed with five recommendations. Overall, GAO has made 40 recommendations over the past decade, 14 of which remain open. GAO will continue to monitor DHS's and the Coast Guard's progress in addressing these recommendations.

View [GAO-23-106948](#). For more information, contact Marie A. Mak at (202) 512-4841 or [makm@gao.gov](mailto:makm@gao.gov).

July 27, 2023

## COAST GUARD RECAPITALIZATION

### Actions Needed to Better Manage Acquisition Programs and Address Affordability Concerns

#### What GAO Found

The Coast Guard is modernizing its vessels and aircraft, an effort known as recapitalization. Its newest cutters—the Offshore Patrol Cutter (OPC) and Polar Security Cutter (PSC)—are intended to deliver greater capability—such as time a ship can spend at sea—than the legacy assets they will replace.

GAO's prior work shows that successful shipbuilding programs use solid, executable business cases to design and build ships. They attain critical levels of knowledge—such as mature technologies, stable designs, and realistic cost estimates—at key points in the shipbuilding process before making significant investments. The Coast Guard, however, continues to face cost growth and schedule delays in some of its newer acquisitions because it has not obtained the right knowledge at the right time, despite GAO's previous recommendations.

**Immature technologies.** The critical technology of the first four OPCs—the davit (a crane that deploys and retrieves a cutter's small boats)—is still not matured. Without maturing the davit, the Coast Guard risks delays and costly rework.

**Unstable design.** The PSC's design is not yet stable, which risks an extended design phase and contributed to a 3-year schedule delay in the shipyard, with the start of construction of the first cutter now planned for March 2024. Starting ship construction without a stable design risks costly rework.

#### The Coast Guard's Offshore Patrol Cutter and Polar Security Cutter



Source: Eastern Shipbuilding Group (left image); Bollinger Mississippi Shipbuilding (right image). | GAO-23-106948

Combined, these two programs are billions of dollars over their initial cost estimates and are more than 2 years behind schedule, increasing the risk of potential capability gaps and putting cost pressure on the overall portfolio. For example, in June 2023, GAO reported that the Coast Guard projects to have a reduced number of cutters available for operation starting in 2024 and through 2039 due to the OPC's delivery delays. Since 2010, the Coast Guard has invested at least \$850 million to maintain the aging Medium Endurance Cutters and *Polar Star*. The Coast Guard is investing \$250 million to extend the service life for six cutters and \$75 million to extend the service life of the

almost 50-year-old *Polar Star* until the delayed OPCs and PSCs, respectively, are operational.

Chairman Webster, Ranking Member Carbajal, and Members of the Subcommittee:

I am pleased to be here today to discuss key challenges the U.S. Coast Guard continues to face as it acquires new assets—such as vessels and aircraft—an effort referred to as recapitalization, as well as the overall affordability of the Coast Guard’s acquisition portfolio. The U.S. Coast Guard, within the Department of Homeland Security (DHS), is the principal federal agency responsible for maritime safety, security, and environmental stewardship in U.S. ports and waterways, and supports other missions, such as drug and migrant interdiction.

As part of its efforts to modernize its aging fleet of cutters, the Coast Guard is acquiring four new vessels, including Offshore Patrol Cutters (OPC), Polar Security Cutters (PSC), Fast Response Cutters (FRC), and National Security Cutters (NSC). The Coast Guard intends for these new cutters to provide additional capabilities above those offered by the legacy ships. The two more recent acquisition programs—the OPC and PSC—have faced and are continuing to face significant schedule delays and cost increases, spurring concerns about capability and affordability gaps.

My statement today will address (1) the capabilities provided by the newer Coast Guard vessels, (2) the risks and consequences of not establishing sound business cases for two of the Coast Guard’s highest priority programs—the OPC and PSC, and (3) the overall affordability of the Coast Guard’s acquisition portfolio. This statement is based on our extensive body of work examining the Coast Guard’s shipbuilding acquisition efforts spanning the last decade, including our June 2023 report on the OPC and our July 2023 report on the PSC.<sup>1</sup>

For the reports cited in this statement, among other methodologies, we analyzed Coast Guard guidance, data, and documentation, and interviewed Coast Guard officials at its headquarters and field units to determine the extent to which Coast Guard acquisition programs are meeting their cost, schedule, and performance goals. Each of the reports cited in this statement provide further detailed information on our objectives, scope, and methodology for that work.

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<sup>1</sup>GAO, *Coast Guard Acquisitions: Offshore Patrol Cutter Program Needs to Mature Technology and Design*, [GAO-23-105805](#) (Washington, D.C.: June 20, 2023); *Coast Guard Acquisitions: Polar Security Cutter Needs to Stabilize Design Before Starting Construction and Improve Schedule Oversight*, [GAO-23-105949](#) (Washington, D.C.: July 27, 2023).

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## The Coast Guard's Newer Cutters Offer Greater Capability than Its Legacy Fleet

The Coast Guard's newest cutters are intended to deliver greater capability than the legacy assets they will replace. Some examples of capabilities include range and the time a ship can spend at sea. Table 1 details examples of key characteristics of new Coast Guard assets and the respective legacy assets.

**Table 1: Comparison of Coast Guard's Legacy and New Cutters**

Legacy vessels					
	High Endurance Cutter	Medium Endurance Cutter		Island Class Patrol Boat	<i>Polar Star</i>
		210-foot	270-foot		
<b>Number in fleet</b>	12	14	13	49	1
<b>Year first-in class cutter commissioned</b>	1967	1964	1983	1986	1976
<b>Length</b>	378 feet	210 feet	270 feet	110 feet	399 feet
<b>Maximum time at sea without reprovisioning</b>	45 days	21 days	21 days	5 days	80 days
<b>Range</b>	14,000 miles	6,000 miles	9,900 miles	1,900 miles	21,500 miles
<b>Operational tempo</b>	185 days away from home port per year	185 days away from home port per year	185 days away from home port per year	1,800 operational hours per year	185 days away from home port per year
New vessels					
	National Security Cutter	Offshore Patrol Cutter		Fast Response Cutter	Polar Security Cutter
<b>Number in fleet</b>	11 planned (9 operational)	25 planned (not yet operational)		65 planned (51 operational)	3 planned (not yet operational)

	National Security Cutter	Offshore Patrol Cutter	Fast Response Cutter	Polar Security Cutter
<b>Year first-in class cutter commissioned</b>	2008	Planned for 2024	2012	Planned for 2028
<b>Length</b>	418 feet	360 feet	154 feet	460 feet
<b>Maximum time at sea without reprovisioning</b>	60 days	45 to 60 days	5 days	80 days
<b>Range</b>	12,000 miles	8,500 to 9,500 miles	2,500 miles	21,500 miles or more
<b>Operational tempo</b>	185 days away from home port per year	230 days away from home port per year	2,500 operational hours per year	3,300 operational hours per year

Source: GAO presentation of Coast Guard information. | GAO-23-106948

Figure 1 depicts the Coast Guard’s OPC and PSC, which are part of this modernization effort.

Figure 1: The Coast Guard’s Offshore Patrol Cutter and Polar Security Cutter



Source: Eastern Shipbuilding Group (left image); Bollinger Mississippi Shipbuilding (right image). | GAO-23-106948

As I will discuss in my testimony, delays in delivering these vessels have required the Coast Guard to invest hundreds of millions of dollars, if not more, in trying to maintain and extend the life of its legacy fleet. Further delays in these two programs will increase the risk that the Coast Guard

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will not have a sufficient number of vessels available to conduct its missions.

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## Failure to Establish Sound Business Cases and Follow Leading Practices Continue to Result in Significant Schedule Delays and Cost Increases

Our prior work has found that successful programs start out with solid, executable business cases before setting program baselines and committing resources.<sup>2</sup> For the Coast Guard, this would be when a program sets its initial program baseline that establishes cost, schedule, and performance goals. A sound business case requires balance between the concept selected to satisfy user needs and the resources—technologies, design knowledge, funding, and time—needed to transform the concept into a product. At the heart of a robust business case is a knowledge-based approach.

For shipbuilding programs in particular, we have found that successful programs attain critical levels of knowledge at key points in the shipbuilding process before significant investments are made. We found that key enablers of a good business case include mature technologies and plans for a stable design, reliable cost estimates, and realistic schedule targets, among other things.<sup>3</sup> Figure 2 depicts a leading practice of developing technology and maturing design prior to construction—as

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<sup>2</sup>GAO, *Weapon System Requirements: Detailed Systems Engineering Prior to Product Development Positions Programs for Success*, [GAO-17-77](#) (Washington, D.C.: Nov. 17, 2016); *Best Practices: High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding*, [GAO-09-322](#) (Washington, D.C.: May 13, 2009); and *Defense Acquisitions: Realistic Business Cases Needed to Execute Navy Shipbuilding Programs*, [GAO-07-943T](#) (Washington, D.C.: July 24, 2007).

<sup>3</sup>For the purposes of that review, we did not assess the extent to which the PSC's requirements are firm and feasible. In April 2018, we found that prior to setting program baselines for the PSC, DHS and the Coast Guard revised the program's operational requirements document—a key acquisition document that provides the key performance parameters the program must meet—to make the heavy polar icebreakers more affordable, and the revisions included adjusting the range of operating temperatures; reducing science and survey requirements; and adding space, weight, and power reservations for Navy equipment. GAO, *Coast Guard Acquisitions: Status of Coast Guard's Heavy Polar Icebreaker Acquisition*, [GAO-18-385R](#) (Washington, D.C.: Apr. 13, 2018).

part of a sound business case—and the increased risks for not maintaining a sound business case throughout the acquisition life cycle.

**Figure 2: A Sound Business Case Reduces Risk in Acquisition Programs**

**Sound business case leading practice: Minimal concurrency facilitates a stable design**



**Unsound business case: Significant concurrency leads to an unstable design**



Source: GAO depiction of notional acquisition process. | GAO-23-106948

The Coast Guard’s shipbuilding programs—specifically the OPC and PSC programs—have struggled with achieving elements for a good business case. As a result of neither maturing technologies nor achieving design stability when called for by leading practices, both programs are well behind schedule. In addition, both program’s cost estimates have increased by billions of dollars for several reasons, including that their initial estimates were either not comprehensive or not well-informed.

**Technology maturity and design stability.** The Coast Guard’s OPC and PSC programs did not follow shipbuilding leading practices with regards to conducting, demonstrating, and achieving technology readiness and design stability. Shipbuilding leading practices state that critical technologies should be proven prior to the award of the detail design and construction contract.<sup>4</sup> Shipbuilding leading practices also state that programs should not proceed with construction with immature technology and design instability. When programs proceed into construction without maturing and addressing outstanding technology and design challenges, they increase the risk of completing out-of-sequence

<sup>4</sup>In the case of OPC, the detail design contract award is the point when the Coast Guard down-selected to one shipbuilder. Generally, detail design is a further iteration on preliminary design, and it includes generating work instructions that show detailed system information and also guidance for subcontractors and suppliers needed to support construction, including installation drawings, schedules, material lists, and lists of prefabricated materials and parts.



construction and rework, which can result in increased costs and schedule delays.

Years after we first identified these deficiencies with the OPC and PSC programs, the Coast Guard still has not gained the requisite knowledge for its technologies and designs:

- **OPC:** In October 2020, we found that the Coast Guard did not mature a critical technology—the davit, a crane that lowers and raises a cutter’s small boats—before starting construction.<sup>5</sup> We recommended that the Coast Guard stabilize the OPC’s design, including that it mature the davit to a technology readiness level (TRL) of 7—demonstrating it in a realistic environment—prior to the start of construction on OPC 3, and the Coast Guard concurred.<sup>6</sup> However, the Coast Guard has since started construction on OPC 3 and OPC 4 without maturing the technology, and as of June 2023, the davit remains immature and unproven.<sup>7</sup>

In October 2020, we also found that the Coast Guard failed to complete basic and functional design prior to the start of lead ship construction, contrary to leading practices.<sup>8</sup> We recommended that program complete basic and functional design prior to the start of construction on OPC 3, and update its acquisition policy to follow shipbuilding leading practices. However, in June 2023, we found that the Coast Guard had not sufficiently updated its acquisition policy, and the OPC program still had not completed functional design prior to the start of construction on OPC 4.<sup>9</sup> Further, we found that

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<sup>5</sup>GAO, *Coast Guard Acquisitions: Opportunities Exist to Reduce Risk for the Offshore Patrol Cutter Program*, [GAO-21-9](#) (Washington, D.C.: Oct. 28, 2020).

<sup>6</sup>A TRL is a measurement of maturity for each critical technology, numbered 1 through 9 from least to most mature based on demonstrations of increasing fidelity and complexity.

<sup>7</sup>[GAO-23-105805](#).

<sup>8</sup>Basic design includes establishing the hull form, general arrangements of compartments, and outlining significant ship steel structure. Some routing of major equipment and related major distributive systems, including electricity, water, and other utilities is done. It also ensures the ship will meet the performance specifications, informs overall ship cost, facilitates shipbuilders’ development of responsive proposals, and identifies major equipment and components that must be purchased in advance. Functional design includes providing a further iteration of the basic design, such as size and positioning of structural components, information on the positioning of major piping and other distributive systems, and outfitting in each block—or basic building unit for a ship. See [GAO-23-105805](#).

<sup>9</sup>[GAO-23-105805](#).

significant portions of the design related to distributive systems—systems like water, heating, and cooling that affect multiple zones of the ship—still remained incomplete.

We made a second recommendation that the Coast Guard update its policy in this area—specifically in relation to completing the design of distributive systems prior to construction—so that programs follow shipbuilding leading practices for stabilizing design.<sup>10</sup> The Coast Guard has not fully implemented this recommendation. We also went further to recommend that the Coast Guard complete the routing of distributive systems prior to starting construction on stage 2 ships. While the Coast Guard concurred with our June 2023 recommendation to update its policy, it did not concur with our recommendation to apply this leading practice to the OPC program.

- **PSC:** In September 2018, we found that the Coast Guard did not conduct a technology readiness assessment of PSC’s key technologies, nor did it hold a preliminary design review, prior to approving its program baselines.<sup>11</sup> Coast Guard officials said that a technology readiness assessment was not necessary because the technologies they plan to employ had been proven on other ships. However, according to leading practices, such technologies can still pose risks when applied to a different program or operational environment. The program subsequently conducted a technology readiness assessment and established revised baselines in May 2021 after holding its preliminary design review in response to our recommendations.

As of March 2023, the PSC program reported that the functional design was considerably below the desired levels that officials expect to inform a decision to proceed with construction. As of April 2023, program officials said they anticipate holding the production readiness reviews to evaluate design maturity by March 2024. However, since September 2021, with about 49 percent functional design completed, our analysis indicated that the shipyard is completing, on average, approximately three percent of functional design every 6 months. This means that it would take the shipyard approximately 8 years to complete 100 percent of functional design. Therefore, to reach the program’s goal of completing functional design completed prior to March 2024, the shipyard would need to increase its design

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<sup>10</sup>[GAO-23-105805](#).

<sup>11</sup>GAO, *Coast Guard Acquisitions: Polar Icebreaker Program Needs to Address Risks before Committing Resources*, [GAO-18-600](#) (Washington, D.C.: Sept. 4, 2018).

completion rate significantly. Coast Guard officials said that design completion is further along than the metrics show because the metrics do not factor in progress made on design components that are not complete.

We also found that the program is experiencing challenges with the design.<sup>12</sup> According to program officials, the design challenges are related to (1) U.S. industry's general lack of experience designing and building icebreakers, (2) the complexity of PSC's design, and (3) significant changes from the original design, among other things. Given that there are still portions of the design that are immature, we recommended that the Coast Guard complete functional design prior to approving construction for the lead ship, in line with our recommendation to OPC and Coast Guard policy, as a whole. The Coast Guard concurred with the recommendations, and we will monitor its progress in addressing them.

**Cost.** Both the OPC and PSC have incurred cost growth above their initial estimates, in part because the programs initially underestimated costs.

- **OPC:** OPC's acquisition cost estimate increase increased from \$12.5 billion to \$17.6 billion between the program's 2012 and 2022 life-cycle cost estimates. The Coast Guard attributes the increase to many factors, including restructuring the stage 1 contract—for OPCs 1 through 4—and recompeting the requirement for stage 2—OPCs 5 through 25—in response to a disruption caused by Hurricane Michael, and increased infrastructure costs for homeports and facilities, among other things.<sup>13</sup> While there are instances of unforeseen costs, there were some costs that were either based on unrealistic assumptions or not fully accounted for in the Coast Guard's initial cost estimate. Specifically, OPC's facilities acquisition cost estimate—including homeports and shore facilities—increased from \$431 million to \$1.4 billion from 2012 to 2022 because Coast Guard officials said they originally assumed that the Coast Guard could utilize existing Navy

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<sup>12</sup>[GAO-23-105949](#).-p

<sup>13</sup>Following significant disruption caused by Hurricane Michael in October 2018, the Acting Secretary of Homeland Security determined that the OPC is essential to the national defense and authorized up to \$659 million in extraordinary contractual relief to the shipbuilder pursuant to Public Law 85-804 for the design and construction of up to four OPCs, an effort the Coast Guard refers to as stage 1. As part of this determination, the Acting Secretary also directed the Coast Guard to recompete the requirement for the remaining 21 cutters.

bases to homeport the OPC, which did not come to fruition.<sup>14</sup> In addition, the OPC's initial acquisition cost estimate increased by about \$1 billion, most of which happened after the program settled which Navy-provided combat system equipment would go on the OPC. Lastly, the OPC's initial acquisition cost estimate did not include costs for some outfitting and post-delivery work that includes the sensitive compartmented information facility on the cutter, the Combat System Equipment Guide, and technical manuals. The sensitive compartmented information facility accounted for about 98 percent of a \$1 billion increase in the estimate for outfitting and post-delivery work.

- **PSC:** From 2018 to 2021, the program's total life-cycle cost estimate increased by about 35 percent, from \$9.8 billion to \$13.3 billion. Most of the cost increase was driven by increased operations and maintenance costs, resulting from the increased ship size and use of additional historical data to reevaluate projected annual maintenance costs in the later estimate. The program's additional analysis of historical maintenance costs in its January 2021 cost estimate addressed, in part, a recommendation we made in 2018 to update the cost estimate in accordance with leading practices in cost estimating. Specifically, in September 2018, we found that the PSC's life-cycle cost estimate that informed the program's \$9.8 billion cost baseline substantially met GAO's leading practices for being comprehensive, well-documented, and accurate, but only partially met leading practices for being credible.<sup>15</sup> The cost estimate did not quantify the range of possible costs over the entire life of the program. As a result, the cost estimate was not fully reliable and may have underestimated the cost. Consequently, the Coast Guard may have provided decision makers with incomplete data to make a decision on total funding needed for the program.

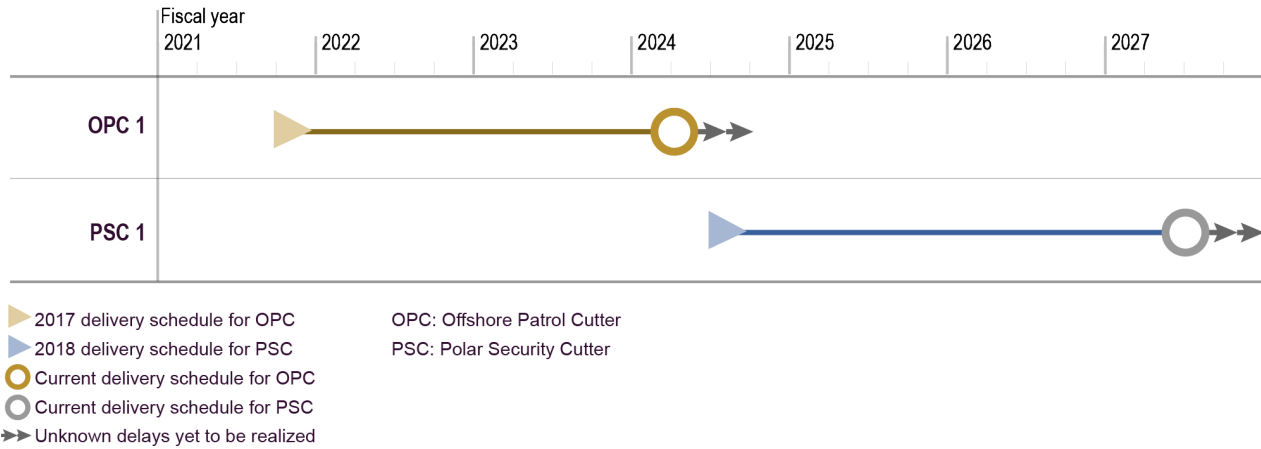
**Schedule.** The Coast Guard relied on optimistic schedules for both the PSC and OPC programs, and both have experienced schedule delays of 2 years or more (see fig. 3). The two programs' schedule challenges have been exacerbated by a lack of reliable schedule data from the contractors responsible for building these ships.

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<sup>14</sup>Facilities acquisition costs are funded by the Coast Guard's Major Acquisition Systems Infrastructure Program and the Office of Civil Engineering.

<sup>15</sup>[GAO-18-600](#).

**Figure 3: Delivery Delays with the Lead Ship in the Polar Security Cutter and Offshore Patrol Cutter Programs, as of 2023**



Source: GAO analysis of U.S. Coast Guard and Department of Homeland Security documentation. | GAO-23-106948

- OPC:** In October 2020, we found that prior to the construction award for OPC 1, the OPC contractor’s schedule contained significant deficiencies that were contrary to GAO-identified leading practices for developing schedules. Further, we found the revised post-hurricane delivery dates for the first four OPCs were optimistic and did not fully incorporate schedule risks, increasing the likelihood that the OPCs will not be delivered when promised. In a review of the shipbuilder’s schedule, the Defense Contract Management Agency and the Coast Guard found deficiencies, such as that the shipbuilder could not produce a valid critical path—or the path of longest duration through the sequence of activities. We recommended that the Coast Guard fully address the deficiencies identified in the contractor’s schedule. As of July 2023, the recommendation remains open. In June 2023, we found that the schedule is still optimistic given that the program is still addressing a manufacturing issue with shafting and delays with development of the davit.<sup>16</sup> In total, the program is experiencing at least a 2.5-year delay in delivery of the lead ship.
- PSC:** In September 2018, we found that the PSC’s planned delivery dates were not informed by a realistic assessment of shipbuilding activities. Instead, the schedule was driven by the potential gap in icebreaking capabilities once the Coast Guard’s only operating heavy polar icebreaker—the *Polar Star*—reaches the end of its service life.<sup>17</sup>

<sup>16</sup>GAO-23-105805.

<sup>17</sup>GAO-18-600.

We recommended that the program develop a schedule in accordance with leading practices for project schedules to set realistic schedule goals for all three PSCs before the lead ship contract option was awarded. However, we closed the recommendation as not implemented because the program proceeded with the award in April 2019 without developing a realistic schedule. In July 2023, we found the program had yet to establish a realistic schedule.<sup>18</sup> The program's current schedule estimates that delivery of the lead ship will occur in 2027, which is 3 years later than its previous estimate, but this could further slip after the contractor reassesses and revises its schedule.

Without a sound business case, acquisition programs are at risk of breaching the cost, schedule, and performance baselines set when the program was initiated—in other words, experiencing cost growth, schedule delays, and reduced capabilities. Even after a program has established its acquisition program baseline, information about the soundness of a program's business case is helpful for Congress as the Coast Guard requests funding through the acquisition life cycle.

#### Schedule Delays Increase the Risk of Capability Gaps and Affordability Concerns

The delays in the OPC and PSC programs have increased the likelihood of operational capability gaps. Further, it has forced the Coast Guard to invest at least \$325 million to extend the life of its legacy assets, the Medium Endurance Cutters (MEC) and the *Polar Star*, in addition to the \$850 million it has spent to maintain them over the last decade.<sup>19</sup> Further, the Coast Guard is confronted with a costly backlog of shore infrastructure projects—such as piers, docks, boat stations, air stations, and housing units—but has requested funding that falls short of its estimated infrastructure needs. The affordability of the Coast Guard's surface fleet is in jeopardy, given the increasing costs to maintain legacy assets, costs for the OPC and PSC acquisition programs, and the overall infrastructure needs to support Coast Guard assets.

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<sup>18</sup>[GAO-23-105949](#).

<sup>19</sup>These expenditures include Medium Endurance Cutter depot-level maintenance costs from 2010 through 2021, and depot-level maintenance costs for the *Polar Star* from 2014 through 2017. The *Polar Star*'s expenditures are calculated from 2014 to 2017 since it was in a reactivation period prior to 2014 and was not operational, and we have not reported on depot-level maintenance expenditures since 2017.

## Capability Gaps Are Exacerbated by Delays in Acquisition Programs

Since April 2017, we have reported that full operational capability dates have been delayed for several Coast Guard acquisition programs. For example, the OPC’s full operational capability (FOC) date has been delayed until at least 2039 due to the ongoing issues with design and construction. See table 2 for initial FOC dates for the Coast Guard’s recapitalization programs, 2017 updates, and current estimates.

**Table 2: Delays in Full Operational Capability (FOC) of Coast Guard Recapitalization Programs**

	Initial DHS-approved FOC date	FOC date (as of January 2017)	Current FOC date <sup>a</sup>
Offshore Patrol Cutter	2034	2035	2039
Fast Response Cutter	2022	2027	2027
National Security Cutter	2016	2020	TBD
Polar Security Cutter	2029	N/A	2031
Waterways Commerce Cutter <sup>c</sup>	N/A	N/A	2032
Medium Range Surveillance Aircraft (HC-144A/C-27J)	2020	2025	2032
Long Range Surveillance Aircraft (HC-130J)	2017	2027	2030 <sup>b</sup>
Medium Range Recovery Helicopter (MH-60T) <sup>c</sup>	N/A	N/A	TBD
Short Range Helicopter (H-65)	2020	2020	2024

Source: GAO presentation of Coast Guard information. | GAO-23-106948

Legend: DHS = Department of Homeland Security; TBD = to be determined; N/A = not applicable

<sup>a</sup>All dates are program estimates. The FOC date for the Offshore Patrol Cutter is as of June 2023. FOC dates for the Waterways Commerce Cutter, Medium Range Surveillance Aircraft, Long Range Surveillance Aircraft, and MH-60T Aircraft are as of April 2023. The FOC date for the Polar Security Cutter is as of December 2022. FOC dates for the Fast Response Cutter, National Security Cutter, and H-65 Aircraft are as of March 2022.

<sup>b</sup>The Long Range Surveillance Aircraft program’s acquisition program baseline specifies a full operational capability date of 2033. However, according to program officials, the program was able to receive funding 3 years ahead of schedule, which has allowed for an accelerated schedule.

<sup>c</sup>As of April 2023, the Waterways Commerce Cutter program and MH-60T program did not have official DHS approved baselines.

Specifically, with the surface assets, the risk of having an operational gap increases as the new ships are delayed because the legacy ships they are replacing continue to age and face increasing risk of mechanical failure. For example, in June 2023, we reported that given the delays in delivery of the OPC, the Coast Guard projects to have a reduction in

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asset availability—or a reduction in the number of cutters available for operations—starting in 2024 and through 2039.<sup>20</sup> This operational gap is at risk of increasing if the OPC delivery delays are realized and pushed further to the right.

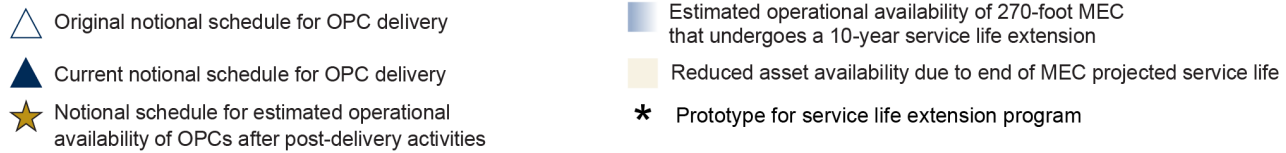
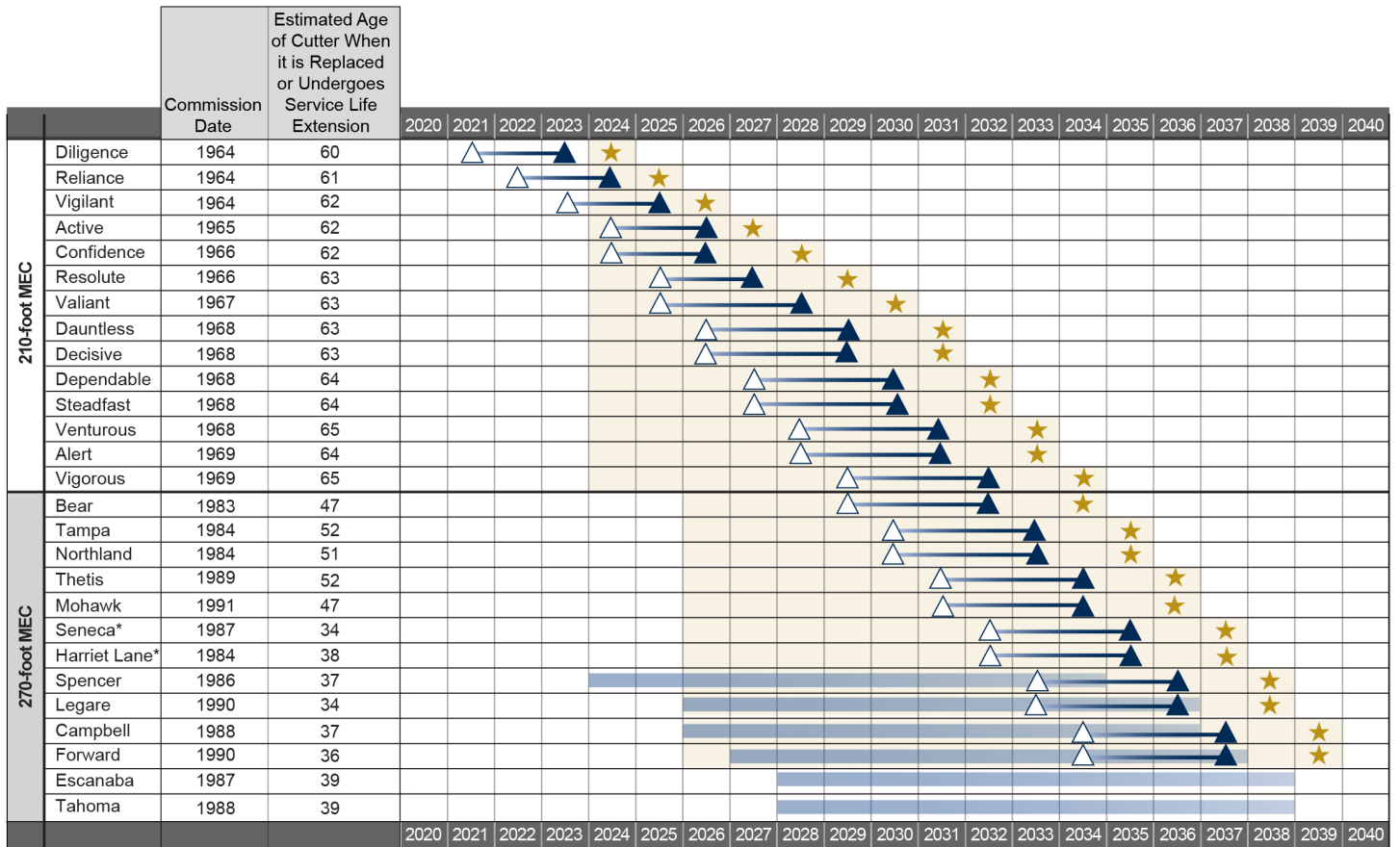
See figure 4 for the Coast Guard’s notional estimated decommissioning dates for the MECs based on commissioning date compared with the current OPC delivery schedule. While the MECs may not be decommissioned in the order depicted depending on the condition of each ship at the time, this figure helps depict the sequence of commissioning of the OPCs and decommissioning of the MECs.

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<sup>20</sup>[GAO-23-105805](#).



**Figure 4: U.S. Coast Guard’s Estimated Medium Endurance Cutter (MEC) Service Life Dates Compared with Offshore Patrol Cutter (OPC) Delivery**



Source: GAO analysis of Coast Guard documents. | GAO-23-106948

The reduction of asset availability could be further exacerbated if the Coast Guard does not effectively mitigate OPC schedule risks:

- **Design and manufacturing issues for OPC stage 1.** The program is experiencing ongoing delays due to a propeller shafting manufacturing issue that requires remanufacturing of some of these shafts.

- **Delays in the award of OPC stage 2.** The program will delay delivery of OPC stage 2 ships by at least 6 months due to the delays of the contract award and subsequent bid protest. The stage 2 shipbuilder also needs to complete a detail design for the stage 2 ships, and the Coast Guard needs to approve the design, before the shipbuilder can begin construction.<sup>21</sup>

Given these challenges, the Coast Guard will likely need to further maintain and keep the MECs in service longer or otherwise face a reduction of assets. Coast Guard officials told us that they do not anticipate the need to employ alternative options to meet mission requirements. However, officials stated that if the Coast Guard needs to decommission cutters earlier than planned, they could reallocate cutters to support emergent needs, employ other cutters to support missions previously handled by MECs, or extend the date for other planned decommissions to support continued operations.

Similarly, as noted earlier, according to the PSC program schedule, the delivery of the lead ship is now delayed until at least 2027—3 years behind the original plan in its 2018 schedule—and all three ships are expected to be operational by at least 2031.<sup>22</sup> In April 2023, a Coast Guard fleet mix analysis indicated that the service in fact needed a mix of eight or nine heavy and medium polar icebreakers to meet its projected requirements. The Coast Guard currently only has one heavy polar icebreaker, the *Polar Star*, and one medium polar icebreaker, the *Healy*, and therefore already has an operational gap. The *Polar Star* is well beyond its planned operational service life and has become more complicated and costly to maintain as it ages, and is currently only able to execute one mission to Antarctica each year. Based off the Coast Guard's fleet mix analysis, its icebreaker fleet will remain in a deficit even after all three PSCs on the current contract are delivered.

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<sup>21</sup>Generally, detail design includes generating work instructions that show detailed system information and also guidance for subcontractors and suppliers needed to support construction, including installation drawings, schedules, material lists, and lists of prefabricated materials and parts.

<sup>22</sup>[GAO-23-105949](#).

## Service Life Extension Programs Will Help Relieve Some Pressure, but Legacy Assets Are Expensive and Challenging to Maintain

To help mitigate the delays of the OPC and PSC, the Coast Guard began two service life extension programs (SLEP) for its legacy assets—the 270-foot Medium Endurance Cutters, and the *Polar Star*—for an estimated \$325 million. The Coast Guard initiated the MEC SLEP in 2018 and the *Polar Star* SLEP in 2021. They are aimed to extend the service life of six MECs and the one *Polar Star* by 10 years and 4 to 5 years, respectively (see table 3).

**Table 3: The Coast Guard’s Current and Recent Maintenance History of the Medium Endurance Cutter and Heavy Polar Icebreaker**

Vessel	Design service life	Average age	Major maintenance history
270-foot Medium Endurance Cutter	30 years	36 years	The 270-foot Medium Endurance Cutters completed a Mission Effectiveness Project in 2014. This effort was intended to minimize maintenance costs and maximize the reliability of critical systems, but not increase the service life of the cutters. The Coast Guard initiated another program to extend the service life of six of the 13 270-foot Medium Endurance Cutters. This service life extension project is projected to cost \$250 million, and intended to extend service life for up to 10 years and close the gap in capability until the Offshore Patrol Cutter is operational.
Heavy polar icebreaker: <i>Polar Star</i>	30 years	46 years	The <i>Polar Star</i> completed a reactivation maintenance period in 2013 that was intended to add an additional 7-10 years to its service life from the time of reactivation. The Coast Guard initiated another service life extension program in 2021 to span 5 years and focus on upgrades or replacements of different systems. The Coast Guard completed the second year of this 5-year program in 2022, and plans on investing \$75 million in total to perform work from fiscal years 2021 through 2025 toward this effort. Ultimately, the service life extension program is intended to extend the service life of the <i>Polar Star</i> by 4 to 5 years, or, according to Coast Guard officials, until at least 2029 or 2030.

Source: GAO presentation and analysis of Coast Guard data. | GAO-23-106948

In addition, we previously found that these legacy assets are getting harder and more expensive to maintain. In July 2018, we found that it is unclear how the Coast Guard will be able to fund planned SLEPs on several aging assets in order to sustain them—that is, keep them operating at acceptable levels—until replacement assets are available.<sup>23</sup> We found that several of the Coast Guard’s aging cutters have spent more on depot-level maintenance than was planned. Combined, these

<sup>23</sup>GAO, *Coast Guard Acquisitions: Actions Needed to Address Longstanding Portfolio Management Challenges*, GAO-18-454 (Washington, D.C.: July 24, 2018).

cutters—the 210-foot and 270-foot MECs, and the *Polar Star*—expended about \$550 million, more than twice what was originally estimated (standard support levels), from 2010 to 2017.<sup>24</sup> In June 2023, we reported that depot-level maintenance costs for the MECs totaled about \$300 million from 2018 through 2021.<sup>25</sup>

In addition to increased maintenance costs, Coast Guard operators have had to make do with deteriorating legacy assets.

- **MEC:** The MECs have generally met or remained within target levels for operational and materiel availability. However, we found that maintenance being conducted was on significant systems that were resulting in casualties for the cutters.<sup>26</sup> For example, in fiscal year 2021, MEC crews reported 317 casualties with their propulsion system’s main diesel engines, generators, and the hull. Some of these casualties rendered the cutters disabled for multiple days. In addition, habitability remains a concern for both 210-foot and 270-foot MECs. Crews experience problems maintaining heating, venting, and air conditioning (HVAC) systems and those HVAC inefficiencies have led to high levels of condensation and mold in crew living spaces, such as berthing areas. Coast Guard crews told us they try to address these issues as they occur, but the number and frequency of maintenance issues, in addition to their regular mission duties, make living in these conditions a fact of life.
- **Heavy polar icebreaker:** In July 2023, we found that the *Polar Star* continues to face similar maintenance issues.<sup>27</sup> From 2019 through 2021, the Coast Guard reported that some of the top cost drivers for maintenance on the *Polar Star* included components like the main diesel engines, engine cylinders, a propulsion shaft, and fuel pumps. Electrical systems have also posed problems. For example, during the *Polar Star*’s 2019–2020 mission to Antarctica, the crew reported a cutter-wide loss of power. *Polar Star* crew told us that a cutter-wide loss of power can sometimes take an hour to fully resolve as they have to manually reset each system since older systems lack centralized digital controls. Further, during the 2021–2022

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<sup>24</sup>The *Polar Star*’s expenditures are calculated from 2014 to 2017 since it was in a reactivation period prior to 2014 and was not operational.

<sup>25</sup>[GAO-23-105805](#).

<sup>26</sup>[GAO-23-105805](#).

<sup>27</sup>[GAO-23-105949](#).

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deployment, a propulsion control failure placed the cutter at risk of colliding with another vessel in Puget Sound.

The *Polar Star* SLEP, which began in 2021 and is conducted annually during dry dock, has made upgrades to the *Polar Star* such as improvements to its propulsion control system. However, habitability remains a health concern for its crew. For example, annual assessments of the cutter's condition noted the need to remove asbestos and lead paint from compartments of the cutter, and a past assessment also found that systems to produce fresh water and filter air for the crew were barely functional. The *Polar Star* crew also told us that the heaters in some operational spaces are inadequate to combat Antarctic temperatures.

When combined with the challenges facing the acquisition portfolio noted above, the Coast Guard will likely struggle to pay for the maintenance of older assets, a situation that could lead to deferred maintenance and lost operational capability.

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## Coast Guard Has Not Managed the Backlog of Shore Infrastructure Projects

In February 2019, we found that the Coast Guard is confronted with a costly backlog of shore infrastructure projects—such as piers, docks, boat stations, air stations, and housing units—that is contributing to concerns of affordability for its recapitalization and related sustainment efforts.<sup>28</sup> We found that 45 percent of the Coast Guard's shore infrastructure was beyond its service life. For example, at least 53 percent of piers—all of which the Coast Guard has identified as mission-critical assets—were past their service lives as of 2017.

Also at this time, the Coast Guard rated its overall shore infrastructure condition as mediocre. For example, the waterfront asset line—which includes piers, wharfs, boathouses, and small boat lifts—was rated as mediocre and showing signs of deterioration and increasingly vulnerable to risk. The industrial asset line—which includes maintenance shops, corrosion control facilities, and ship lifts—was rated as poor to fair condition and mostly below standard. This is in part because the eight of the nine assets that are part of the Coast Guard Yard in Baltimore, Maryland—the only Coast Guard facility that can perform dry dock

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<sup>28</sup>GAO, *Coast Guard Shore Infrastructure: Applying Leading Practices Could Help Better Manage Project Backlogs of at Least \$2.6 Billion*, [GAO-19-82](#) (Washington, D.C.: Feb. 21, 2019).

maintenance on large Coast Guard ships—are more than 5 years beyond their service life.

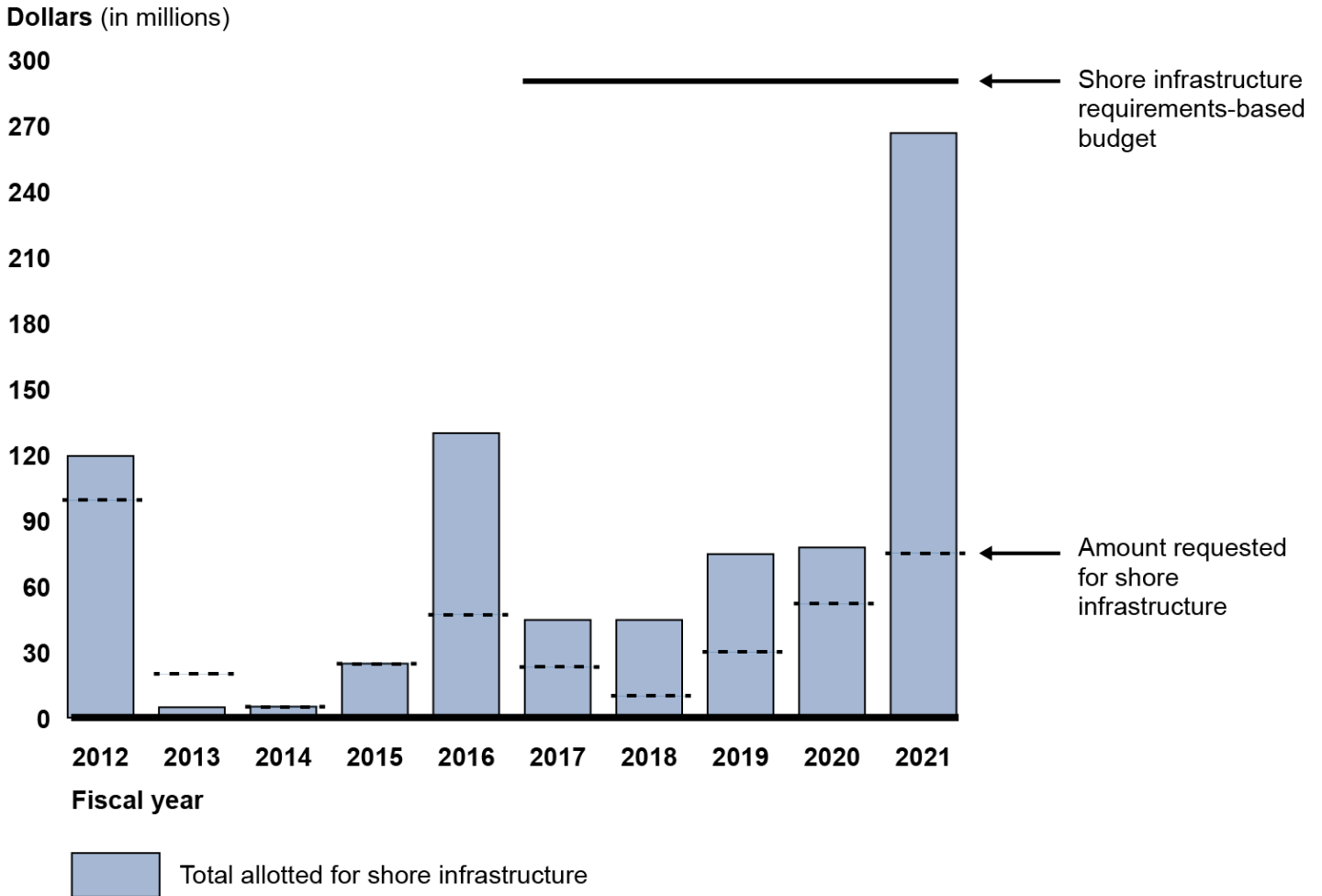
We also found that the Coast Guard had not provided accurate information about its requirements-based budget targets for shore infrastructure in its budget requests.<sup>29</sup> According to the Coast Guard, a requirements-based budget is an estimate of the cost to operate and sustain its shore infrastructure portfolio of assets over the life cycle of the asset, from initial construction or capital investment through divestiture or demolition.<sup>30</sup> We found that Coast Guard targets for recapitalization of shore assets exceeded \$290 million annually. However, its budget requests for fiscal years 2012 through 2021 ranged from about \$5 million to about \$99 million annually, and allotments ranged from about \$5 million to about \$266 million annually (see fig. 5).

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<sup>29</sup>[GAO-19-82](#).

<sup>30</sup>According to Coast Guard officials, the Coast Guard's requirements-based budget planning is based on industry standards and aligns with the National Academy of Sciences benchmarks for sustainable facility and infrastructure management. National Research Council of the National Academy of Sciences, *Stewardship of Federal Facilities: A Proactive Strategy for Managing the Nation's Public Assets* (Washington, D.C.: National Academies Press, 1998).

**Figure 5: Coast Guard's Allotments for Shore Procurement, Construction and Improvements from Its Appropriations and Shore Infrastructure Requirements-based Budget, Fiscal Years 2012 through 2021**



Source: GAO analysis of U.S. Coast Guard documents. | GAO-23-106948

Notes: Reported in current-year dollars. Beginning in fiscal year 2019, the President's budget requests refer to Procurement, Construction and Improvements, which previously referred to Acquisitions, Construction, and Improvements in the annual fiscal year appropriations.

<sup>a</sup>Beginning in 2016, the Coast Guard started using a requirements-based budget to determine shore infrastructure budget needs and applied it for the first time with its fiscal year 2017 submission. According to this budgeting approach and Coast Guard officials, the Coast Guard's targets for recapitalization of shore infrastructure exceeded \$290 million annually as determined by the U.S. Coast Guard.

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<sup>b</sup>Amount requested” represents the amount requested in the President’s budget, as identified in the Coast Guard’s fiscal year congressional justifications.

<sup>c</sup>Values for 2013 reflect sequestration.

To address the backlog, we found that the Coast Guard could increase budget transparency for shore infrastructure. Specifically, we found the Coast Guard’s budget requests had (1) not clearly identified funding allotted for routine shore infrastructure maintenance needs, and (2) not generally addressed deferred maintenance and repair deficiencies, resulting in increases to its backlogs. In addition, the Coast Guard had not included information in its Unfunded Priorities Lists and other related reports that clearly articulated trade-offs among competing project alternatives, as well as the impacts on missions conducted from shore facilities in disrepair.<sup>31</sup> This information could help to inform decision makers of the risks posed by untimely investments in maintenance and repair backlogs.

We recommended that the Coast Guard include supporting details about competing project alternatives and report trade-offs in congressional budget requests and related reports. The Coast Guard agreed with our recommendation, but noted that addressing this recommendation is challenging due to limitations imposed by the Office of Management and Budget and DHS. As of May 2023, the Coast Guard was working toward publishing some related information on its website, according to officials. Without such information about Coast Guard budgetary requirements, Congress will lack critical information that could help to prioritize funding to address the Coast Guard’s shore infrastructure backlogs.

Over the last decade, we have made 40 recommendations to DHS and the Coast Guard on how to better manage the Coast Guard’s acquisition programs. Currently, we have 14 recommendations that remain open and that the Coast Guard has not fully addressed—many discussed above—and six others that we closed as not implemented generally based off inaction by the Coast Guard over several years or because they were overcome by events. Addressing the open recommendations will help the Coast Guard better manage its recapitalization efforts.

Additionally, we recommended two matters to Congress in June 2023. Specifically, we recommended that you consider requiring the Coast

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<sup>31</sup>The term “unfunded priority” means a program or mission requirement that (1) has not been selected for funding in the applicable proposed budget; (2) is necessary to fulfill a requirement associated with an operational need; and (3) the Commandant would have recommended for inclusion in the applicable proposed budget had additional resources been available, or had the requirement emerged before the budget was submitted. 14 U.S.C. § 5108.



Guard to update its acquisition policy to establish that all shipbuilding programs should (1) mature critical technologies—including those that are developmental or that are novel in application or form, fit, and function—to a TRL 7 (successfully demonstrating critical technologies in a realistic environment) prior to a program’s contract award for detail design and construction; and (2) achieve 100 percent completion of basic and functional design, including the routing of all distributive systems, prior to lead ship construction. Doing so will help ensure that future Coast Guard acquisitions follow leading practices and will help get these programs on a sound footing.

Chairman Webster, Ranking Member Carbajal, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

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## GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this testimony, please contact Marie A. Mak, Director, Contracting and National Security Acquisitions, at (202) 512-4841 or [makm@gao.gov](mailto:makm@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement.

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