



Testimony

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Transportation and Maritime Security,
Committee on Homeland Security,
House of Representatives

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ARCTIC CAPABILITIES

Coast Guard Is Taking Steps to Address Key Challenges, but Additional Work Remains

Statement of Marie A. Mak, Director,
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GAO Highlights

Highlights of [GAO-20-374T](#), a testimony before the Subcommittee on Transportation and Maritime Security, Committee on Homeland Security, House of Representatives

Why GAO Did This Study

The Coast Guard—a component of the Department of Homeland Security (DHS)—is a multimission, maritime military service that is responsible for maritime safety and national security, among other missions. Given the Arctic region's expansive maritime domain, the Coast Guard plays a significant role in Arctic policy implementation and enforcement. The Coast Guard is also the sole provider and operator of the U.S. polar icebreaking fleet—a critical component in ensuring year-round access to the Arctic. The Coast Guard is developing the first of three heavy polar icebreakers—the Polar Security Cutter—it has acquired in over 40 years.

This statement addresses (1) the Coast Guard's assessment of capability gaps in the region, and (2) key risks facing the Polar Security Cutter acquisition. This statement is primarily based on GAO's June 2016 report examining capability gaps in the Arctic and its September 2018 report examining the Coast Guard's polar icebreaker acquisition.

What GAO Recommends

In June 2016, GAO recommended, among other things, that Coast Guard develop measures for assessing how its actions have helped to mitigate Arctic capability gaps. In September 2018, GAO recommended that the Polar Security Cutter program develop a program schedule according to best practices. DHS concurred with all of the recommendations, and the Coast Guard is in the process of addressing them.

View [GAO-20-374T](#). For more information, contact Marie A. Mak at (202) 512-4841 or makm@gao.gov.

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What GAO Found

In fiscal year 2012, the Coast Guard—the primary federal maritime agency in the Arctic—assessed its capability to perform its missions in the region and identified a number of capability gaps. These gaps, which still exist today, include communications, infrastructure, maritime domain awareness, and icebreaking. The Coast Guard has worked to mitigate these gaps with its Arctic partners, such as other federal agencies. For example, during a 2015 annual operation in the Arctic, the Coast Guard took steps to enhance maritime domain awareness by testing the Department of Defense's communications equipment, extending communications capabilities further north than previously possible. However, in June 2016, GAO found that the Coast Guard did not systematically assess the extent to which its actions helped to mitigate these gaps. In response to GAO's recommendation, the Coast Guard is currently developing an implementation plan and corresponding metrics for its April 2019 Arctic Strategy.

In September 2018, GAO found that the Coast Guard faced four key risks when it established the Polar Security Cutter program in March 2018: technology, design, cost, and schedule. For example, the Coast Guard's initial planned delivery dates of 2023, 2025, and 2026 for the three ships were not informed by a realistic assessment of shipbuilding activities. The schedule was driven, instead, 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 (see figure).

U.S. Coast Guard's Icebreaker, the *Polar Star*



U.S. Coast Guard Cutter Polar Star

Source: U.S. Coast Guard. | GAO-20-374T

GAO recommended in September 2018 that the program develop a realistic schedule and determine schedule risks for the program. In response, the Coast Guard is now tracking additional schedule risks for the program and is in the process of updating its program schedule. GAO will continue to monitor the Coast Guard's progress in addressing this recommendation and other recommendations GAO made to address key risks, such as design and cost, facing the Polar Security Cutter program.

Chairman Correa, Ranking Member Lesko, and Members of the Subcommittee:

I am pleased to be here today to discuss key challenges that the Coast Guard faces in the Arctic, including its capability gaps in the region and efforts to recapitalize the nation's polar icebreaker fleet—a key step in addressing these gaps.

The Coast Guard, a component within the Department of Homeland Security (DHS), is the primary federal maritime agency in the Arctic and is currently developing the first heavy polar icebreaker it has acquired in over 40 years. As we reported in September 2018, the Coast Guard, in collaboration with the Navy, plans to invest up to \$9.827 billion for the acquisition, operation, and maintenance of three heavy polar icebreakers—also known as the Polar Security Cutters—over their entire 30-year life cycle.¹ In April 2019, the Navy awarded an approximately \$750 million detail design and construction contract to a shipbuilder for the first icebreaker. As the Coast Guard's only operating heavy polar icebreaker—the *Polar Star*—nears the end of its service life, the Polar Security Cutters will play a critical role in the Coast Guard's ability to ensure year-round access to the Arctic. Such access affects U.S. economic, maritime, and national security interests in this region.

My statement today will address (1) the Coast Guard's role in the Arctic, including its assessment of capability gaps in the region, and (2) key risks facing the Coast Guard's acquisition of the Polar Security Cutters.

This statement is based primarily on our June 2016 report examining capability gaps in the Arctic and our September 2018 report examining the Coast Guard's polar icebreaker acquisition.² For the reports cited in this statement, among other methodologies, we analyzed Coast Guard and Navy guidance, data, and documentation, and interviewed Coast Guard and Navy officials. Detailed information on our scope and methodology can be found in the reports cited in this statement. Since the issuance of these reports, we received and reviewed information from the

¹GAO, *Coast Guard Acquisitions: Polar Icebreaker Program Needs to Address Risks before Committing Resources*, [GAO-18-600](#) (Washington, D.C.: Sept. 4, 2018).

²[GAO-18-600](#) and GAO, *Coast Guard: Arctic Strategy Is Underway, but Agency Could Better Assess How Its Actions Mitigate Known Arctic Capability Gaps*, [GAO-16-453](#) (Washington, D.C.: June 15, 2016).

Coast Guard on the actions it has taken in response to our recommendations. In addition to our prior work, for this statement we reviewed the Coast Guard’s 2019 Arctic strategic outlook.³

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 the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

The Coast Guard Has Taken Actions to Help Mitigate Arctic Capability Gaps but Has Not Yet Systematically Assessed Its Progress in This Effort

The Coast Guard is a multimission, maritime military service that is responsible for maritime safety and security, environmental protection, and national security, among other missions. Given the Arctic region’s expansive maritime domain, the Coast Guard plays a significant role in Arctic policy implementation and enforcement. Therefore, as we have reported, as more navigable ocean water has emerged in the Arctic and human activity increases, the Coast Guard has faced, and will continue to face, expanding responsibilities in the region.⁴

In June 2016, we found that the Coast Guard assessed its capability to perform its missions in the Arctic in fiscal year 2012 and identified various capability gaps, including the following:

- **Communications:** including the lack of communications architecture. Harsh weather conditions, high latitude disturbances, and geomagnetic storms combine to make communications in the Arctic difficult.
- **Arctic maritime domain awareness:** including limited nautical charting, inadequate navigation systems, and insufficient surveillance. Extremely limited operational assets and support infrastructure in the

³U.S. Coast Guard, *United States Coast Guard Arctic Strategic Outlook* (Washington, D.C.: April 2019).

⁴Other DHS components and federal agencies—such as the Departments of Defense (DOD), Interior, and Commerce, and the National Science Foundation—as well as interagency groups also have responsibilities in the Arctic. We found in June 2015 that DOD’s strategic guidance on the Arctic establishes a supporting role for DOD relative to other federal agencies, based on a low level of military threat expected in the region. See GAO, *Arctic Planning: DOD Expects to Play a Supporting Role to Other Federal Agencies and Has Efforts Under Way to Address Capability Needs and Update Plans*, [GAO-15-566](#) (Washington, D.C.: June 19, 2015). See also *Arctic Planning: Navy Report to Congress Aligns with Current Assessments of Arctic Threat Levels and Capabilities Required to Execute DOD’s Strategy*, [GAO-19-42](#) (Washington, D.C.: Nov. 8, 2018).

Arctic, as well as the harsh operating environment, make achieving maritime domain awareness a challenge.

- **Infrastructure:** including limited aircraft infrastructure on the North Slope in northern Alaska and limited logistical support. Facilities located below the Arctic Circle, and even those within Alaska, provide limited capability to support Arctic missions due to the long transits to the Arctic region. No deepwater ports currently exist on the North Slope or near the Bering Strait that are capable of refueling and re-provisioning polar capable cutters. This forces the Coast Guard's polar capable cutters to expend significant time transiting long distances to and from replenishment ports. Development of infrastructure to support operations is challenging, in part, due to the high cost of transporting materials to the Arctic and short construction seasons.⁵
- **Training and exercise opportunities:** including a limited pool of Arctic-trained and experienced Coast Guard personnel, and limited training, exercise, and educational opportunities to enhance Arctic skills among staff. According to Coast Guard officials, few opportunities exist to train in the Arctic, in part, because of limited Coast Guard icebreaking capacity.
- **Icebreaking:** including limited icebreaking capacity given the Coast Guard's existing active inventory of one medium and one heavy polar icebreaker, as discussed later in this testimony.⁶

At the time of our June 2016 review, Coast Guard officials stated that the capability gaps were not the sole responsibility of the Coast Guard to mitigate and did not completely impair or eliminate their ability to perform operations. For example, while communications can be a challenge in remote regions, the risk of lost communications can be mitigated by using multiple assets working together to mitigate risk if lost communications is anticipated. Coast Guard officials also stated that given its activity levels at the time, the mobile and seasonal nature of its Arctic presence, and its ability to leverage partners' resources, the Coast Guard has had sufficient resources to fulfill its Arctic responsibilities. However, Coast Guard

⁵We previously reported on the efforts of the Committee on the Marine Transportation System to prioritize Arctic infrastructure, and on the actions taken by government entities in support of planning and developing U.S. Arctic maritime infrastructure; see GAO, *Maritime Infrastructure: Key Issues Related to Commercial Activity in the U.S. Arctic over the Next Decade*, GAO-14-299 (Washington, D.C.: Mar. 19, 2014). We currently have ongoing work examining maritime infrastructure gaps in the U.S. Arctic and expect to issue a report in 2020.

⁶GAO-16-453.

officials stated they would reassess their approach as Arctic activity and resulting mission requirements change over time. As we reported in June 2016, if Arctic activity continues to increase, as anticipated, the Coast Guard may have insufficient resources to meet expanded Arctic requirements.

In June 2016, we also found that the Coast Guard worked with its Arctic partners—such as other federal agencies—to carry out actions to help mitigate Arctic capability gaps. For example, the Coast Guard took steps to enhance Arctic maritime domain awareness by testing communications equipment belonging to DOD during a 2015 annual operation in the Arctic, extending communications capabilities further north than previously possible.⁷ However, we found that the Coast Guard did not systematically assess how its actions helped to mitigate these gaps. Such an assessment—which includes developing measures for gauging its progress, when feasible—is critical to the Coast Guard’s understanding of its progress towards addressing these gaps. By systematically assessing and measuring how its actions have helped to mitigate capability gaps, the Coast Guard will be better positioned to effectively plan its Arctic operations, including its allocation of resources and prioritization of activities to target the gaps.

As a result, we recommended in June 2016 that the Coast Guard (1) develop measures for assessing how its actions have helped to mitigate Arctic capability gaps and (2) design and implement a process to systematically assess its progress on this.⁸ DHS concurred with our recommendations. As of January 2020, the Coast Guard had not yet taken action to implement these two recommendations, in part because the Coast Guard issued its Arctic strategic outlook in April 2019 and is currently updating its corresponding implementation plan for this

⁷The annual operation—also known as Operation “Arctic Shield”—is a seasonal surge operation designed to help the Coast Guard learn how to operate in this increasingly active area of responsibility. Arctic Shield is intended to provide the Coast Guard with the opportunity to (a) perform Coast Guard missions and activities, (b) advance maritime domain awareness, (c) broaden partnerships in support of Coast Guard Arctic operations, and (d) enhance and improve preparedness, prevention, and response capabilities in the Arctic. It is also the primary operation through which the Coast Guard carries out activities in the Arctic region and includes the deployment of aircraft, cutters, and personnel to the Arctic region.

⁸[GAO-16-453](#).

strategy.⁹ The plan is expected to provide the foundation for systematically assessing efforts to address Arctic capability gaps. Coast Guard officials stated that they are also developing a strategic metrics framework for measuring progress in addressing the capability gaps. Coast Guard officials did not identify when they plan to complete the plan and framework, stating that these are longer-term efforts.

The Coast Guard highlighted the Arctic capability gaps in its 2013 Arctic Strategy and again in its 2019 Arctic strategic outlook.¹⁰ The 2019 strategy highlighted the need to elevate the Arctic region's prominence as a strategically competitive space due to (1) the resurgence of nation-state competition from the United States' two nearest-peer powers, Russia and China, and (2) reduced ice conditions in the Arctic which have led to increased human and economic activity in the region.

In addition, the 2019 Arctic strategy highlighted three overarching goals:

- enhance capability to operate effectively in a dynamic Arctic domain,
- strengthen the rules-based order, and
- innovate and adapt to promote resilience and prosperity.

Further, the 2019 Arctic strategy noted that the Coast Guard is the sole provider and operator of the U.S. polar icebreaking fleet—a critical component in achieving the Coast Guard's overarching goals in the strategy—but currently does not have the capability or capacity to ensure access in the Arctic region.¹¹ The Coast Guard's polar icebreaking fleet

⁹U.S. Coast Guard, *United States Coast Guard Arctic Strategic Outlook* (Washington, D.C.: April 2019).

¹⁰U.S. Coast Guard, *United States Coast Guard Arctic Strategy* (Washington, D.C.: May 2013); and *United States Coast Guard Arctic Strategic Outlook* (Washington, D.C.: April 2019).

¹¹Under federal law, the Coast Guard has been responsible for carrying out the nation's polar icebreaking needs since 1965—when it assumed primary responsibility for the nation's polar icebreaking fleet. 14 U.S.C. § 2 establishes that one of the Coast Guard's required primary functions is to maintain icebreaking facilities for use on the high seas and on waters subject to U.S. jurisdiction, as well as, pursuant to international agreements, to maintain icebreaking facilities on waters other than the high seas and on waters not subject to U.S. jurisdiction—specifically, the Antarctic region. Title 14 authorities do not prevent other agencies from owning or operating icebreakers or ice-capable vessels. For example, the ice-strengthened Research Vessel Sikuliaq, which was commissioned in March 2015 and operates in the Arctic Region, is owned by the National Science Foundation and operated by the University of Alaska Fairbanks. The Sikuliaq, however, is unsuitable for extended operation in the Arctic and can only operate in ice up to 2.5-feet thick.

comprises two operational polar icebreakers—the *Polar Star* and *Healy*—of which only the *Healy* is currently active and operating in the Arctic.¹² The *Healy* is a medium icebreaker that primarily supports Arctic research, and while it is capable of carrying out a wide range of activities, it cannot ensure timely access to some Arctic areas in the winter given that it does not have the icebreaking capabilities of a heavy polar icebreaker. See figure 1 for photographs of the Coast Guard’s active icebreakers.

Figure 1: U.S. Coast Guard’s Icebreakers, the *Polar Star* and *Healy*



U.S. Coast Guard Cutter *Polar Star*



U.S. Coast Guard Cutter *Healy*

Source: U.S. Coast Guard. | GAO-20-374T

In November 2018, the Coast Guard Assistant Commandant for Acquisition testified that the Coast Guard’s current polar icebreaking fleet provides minimal capacity to carry out current icebreaking missions and that the nation must take swift action to rebuild and enhance this critical national capability.¹³ To this end, DHS approved the Coast Guard’s Polar Security Cutter acquisition program’s cost, schedule, and performance baselines in February 2018.¹⁴

¹²The *Polar Sea* has been inactive since 2010 when it experienced a catastrophic engine failure.

¹³U.S. Coast Guard, Testimony of Rear Admiral Michael J. Haycock, Assistant Commandant for Acquisition and Chief Acquisition Officer, on Polar Icebreaker Acquisition before the House Transportation and Infrastructure Subcommittee on Coast Guard and Maritime Transportation (Washington, D.C.: Nov. 29, 2018).

¹⁴The corresponding acquisition decision memorandum was signed in March 2018.

The Coast Guard Has Taken Steps to Address Technology, Design, Cost, and Schedule Risks for the Polar Security Cutters

In September 2018, we found that the Coast Guard did not have a sound business case when it established the acquisition baselines for the Polar Security Cutter program in March 2018 due to risks in four key areas: technology, design, cost, and schedule.¹⁵ Our prior work has found that successful acquisition programs start with solid, executable business cases before setting program baselines and committing resources.¹⁶ A sound business case requires balance between the concept selected to satisfy operator requirements and the resources—design knowledge, technologies, funding, and time—needed to transform the concept into a product, which in this case is a ship with polar icebreaking capabilities. 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.

To address the key risks we identified and help establish a sound business case for the Polar Security Cutter program, we made six recommendations to DHS, Coast Guard, and the Navy in our September 2018 report.¹⁷ The agencies concurred with all six recommendations and have taken steps to address some of the risks, as noted below.

- **Technology.** The Coast Guard planned to use proven technologies for the program, but did not conduct a technology readiness assessment to determine the maturity of key technologies prior to setting baselines.¹⁸ As a result, the Coast Guard did not have full insight into whether these technologies were mature and was potentially underrepresenting the technical risk of the program. We

¹⁵[GAO-18-600](#).

¹⁶GAO, *Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments*, [GAO-18-238SP](#) (Washington, D.C.: June 6, 2018); *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).

¹⁷[GAO-18-600](#).

¹⁸A technology readiness assessment is a systematic, evidence-based process that evaluates the maturity of critical technologies—hardware and software technologies critical to the fulfillment of the key objectives of an acquisition program. According to our best practices, a technology readiness assessment should be conducted prior to program initiation. For more information, see *GAO Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects*, [GAO-20-48G](#) (Washington, D.C.: Jan. 7, 2020).

recommended that the program conduct a technology readiness assessment, which DHS completed in June 2019. DHS determined that two of the three key technologies were mature and the remaining technology was approaching maturity. The Coast Guard now has plans in place to use testing results to increase the maturity and reduce risks for the remaining technology—the hull form.

- **Design.** The Coast Guard set program baselines before conducting a preliminary design review. This review is a systems engineering event intended to verify that the contractor’s design meets the requirement of the ship specifications and is producible. By not conducting this review before establishing program baselines, the program is at risk of having an unstable design, thereby increasing the program’s cost and schedule risks. We recommended that the program update its baselines prior to authorizing lead ship construction and after completion of the preliminary design review. DHS and the Coast Guard agreed and plan to take these steps by fiscal year 2022.
- **Cost.** The cost estimate that informed the program’s \$9.8 billion cost baseline—which includes life cycle costs for the acquisition, operations, and maintenance of three polar icebreakers—substantially met our best practices for being comprehensive, well-documented, and accurate.¹⁹ But the estimate only partially met best practices for being credible. The cost estimate did not quantify the range of possible costs over the entire life of the program, such as the period of operations and support. As a result, the cost estimate was not fully reliable and may underestimate the total funding needed for the program. We recommended that the program update its cost estimate to include risk and uncertainty analysis on all phases of the program life cycle, among other things. Subsequently, in December 2019, we found that while the Coast Guard updated the cost estimate in June 2019 to inform the budget process, the estimate did not reflect cost changes resulting from the contract award two months prior.²⁰ Coast Guard officials acknowledged these cost risks and plan to address them as part of the next update to the program’s cost estimate. Coast

¹⁹The GAO Cost Estimating and Assessment Guide was used as criteria in this analysis. A cost estimate is considered reliable if the overall assessment ratings for each of the four characteristics—comprehensive, accurate, well documented, and credible—are substantially or fully met. For more information, see *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: Mar. 2, 2009).

²⁰GAO, *Homeland Security Acquisitions: Outcomes Have Improved but Actions Needed to Enhance Oversight of Schedule Goals*, [GAO-20-170SP](#) (Washington, D.C.: Dec. 19, 2019).

Guard officials told us that they plan to update the cost estimate by the end of February 2020.

- **Schedule.** The Coast Guard’s initial planned delivery dates of 2023, 2025, and 2026 for the three ships were not informed by a realistic assessment of shipbuilding activities. Rather, these dates were primarily 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. In addition, our analysis of selected lead ships for other Coast Guard and Navy shipbuilding programs found the icebreaker program’s estimated construction time of 3 years to be optimistic. An unrealistic schedule puts the Coast Guard at risk of not delivering the icebreakers when promised. As a result, the potential gap in icebreaking capabilities could widen. We recommended that the program develop a realistic schedule, including delivery dates, and determine schedule risks during the construction phase of the program. In response, the Coast Guard is now tracking additional schedule risks for the program and is in the process of updating its program schedule. Further, in December 2019, we found that the contract delivery date for the lead ship, May 2024, is 2 months after the delivery date in the program’s schedule baseline.²¹ Coast Guard officials said they plan to address this risk when they update the program’s schedule by the end of March 2020.

In summary, the Arctic region has increased in strategic importance in recent years, and with the increase comes more responsibility for the Coast Guard. The Coast Guard has emphasized that as the Arctic continues to open and strategic competition drives more actors to look to the Arctic for economic and geopolitical advantages, the demand for Coast Guard leadership and presence will continue to grow. As the Coast Guard embarks on the acquisition of its new polar icebreakers, it faces a number of key acquisition risks. The Coast Guard has begun to take steps to address these risks and must remain committed to executing a sound business case for the program to mitigate capability gaps in the Arctic. To this end, we will continue to monitor the Coast Guard’s progress in addressing our recommendations.

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

²¹[GAO-20-170SP](#).

GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this statement, please contact Marie A. Mak, (202) 512-4841 or makm@gao.gov. In addition, contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals who made key contributions to this testimony include Rick Cederholm, Assistant Director; Claire Li, Analyst-in-Charge; Peter Anderson; Jay Berman; Tracey Cross; Laurier Fish; Miranda Riemer, and Roxanna Sun.

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