



November 2018

ARCTIC PLANNING

Navy Report to Congress Aligns with Current Assessments of Arctic Threat Levels and Capabilities Required to Execute DOD's Strategy

GAO Highlights

Highlights of [GAO-19-42](#), a report to congressional committees

Why GAO Did This Study

The Navy is responsible for providing ready forces for current operations and contingency response in the Arctic Ocean. According to data from the National Snow and Ice Data Center, the coverage of sea ice in the Arctic has diminished significantly since 1981. This could potentially increase maritime activities there, leading to a need for a greater U.S. military and homeland security presence in the region.

Public Law 115-91 required the Navy to report to Congress on the Navy's capabilities in the Arctic, including any capability gaps and requirements for ice-hardened vessels. It also included a provision for GAO to review the Navy's report. This report (1) assesses the extent to which the Navy's report aligns with current assessments of Arctic threat levels and capabilities required to execute DOD's 2016 *Arctic Strategy* and (2) describes any current requirements for ice-hardened vessels and DOD's approach for evaluating the capabilities needed as Arctic requirements evolve.

GAO reviewed the Navy's report along with DOD's assessments of Arctic threats and naval capabilities. GAO also reviewed the 2016 DOD *Arctic Strategy*—the most current strategy, DOD and Department of State information on the freedom of navigation program as well as DOD's processes for developing capabilities and assessing Arctic capability gaps.

GAO is not making any recommendations in this report. DOD provided written technical comments which were incorporated as appropriate.

View [GAO-19-42](#). For more information, contact John H. Pendleton at (202) 512-3489 or pendletonj@gao.gov.

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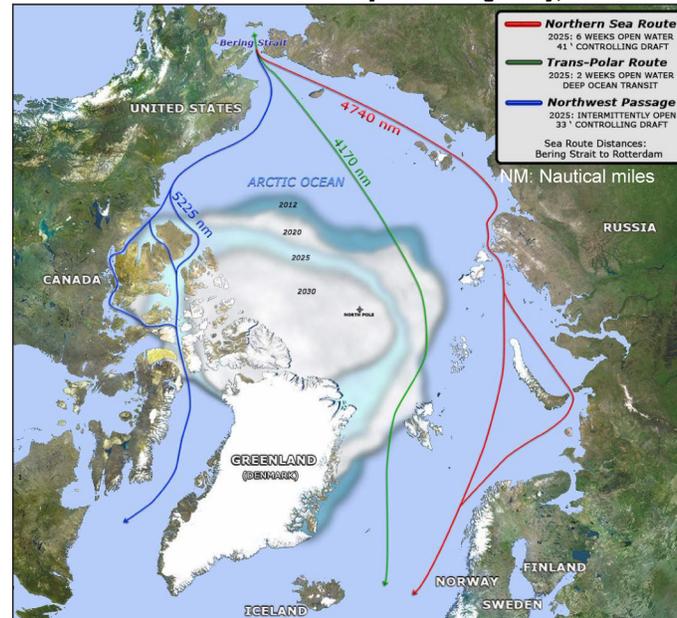
ARCTIC PLANNING

Navy Report to Congress Aligns with Current Assessments of Arctic Threat Levels and Capabilities Required to Execute DOD's Strategy

What GAO Found

The Navy's June 2018 report aligns with Department of Defense (DOD) assessments that the Arctic is at low risk for conflict and that DOD has the capabilities to execute the 2016 DOD *Arctic Strategy*. The June 2018 report also aligns with assessments of Arctic capabilities and gaps in the Navy's 2014 roadmap for implementing the strategy. The June 2018 report states that the Navy can execute the strategy with subsurface, aviation, and surface assets. The report notes the significant limitations for operating surface ships in the Arctic, but states that the Navy has the capabilities required for executing the strategy, and so has no plan to design ice-hardened surface ships. In addition, DOD officials stated that the United States has options other than Navy surface ships for demonstrating the U.S. right to operate in the Arctic, including using Coast Guard vessels, Navy submarines, or military aircraft.

Arctic Transit Routes and Their Projected Navigability, 2012-2030



Source: U.S. Navy. | GAO-19-42

Navy officials said that the Navy does not have a specific requirement for ice-hardening existing vessels or constructing new ones. The Navy plans to continue to use DOD's established process, the Joint Capabilities Integration and Development System to reassess Arctic-related requirements as conditions evolve (see fig.). In October 2017, the Joint Requirements Oversight Council validated U.S. Northern Command's initial capabilities document identifying three gaps in the ability to exercise/deploy, position, and conduct deterrence/decisive operations in ice-diminished Arctic waters. At the time of GAO's review, the Joint Staff had validated the capability gaps, which will now compete for resources with other issues designated for further study. Officials said additional study may identify alternative solutions such as adding capabilities to Coast Guard ships or partnering with allies to achieve common strategic goals in the Arctic.

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Abbreviations

DOD	Department of Defense
JCIDS	Joint Capabilities Integration and Development System
JROC	Joint Requirements Oversight Council

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November 8, 2018

Congressional Committees

According to data from the National Snow and Ice Data Center, the coverage of sea ice in the Arctic has diminished significantly since 1981.¹ This change could potentially increase commercial and other maritime activities there and, combined with competing sovereignty claims, lead to a need for a greater U.S. military and homeland security presence in the Arctic.² The United States, along with Canada, Denmark, Norway, and Russia, borders the Arctic Ocean. In 2018, the Department of Defense (DOD) updated its *National Defense Strategy* emphasizing the need to deter aggression from Russia or China, both of which have expressed interest in the Arctic.³

DOD's last *Arctic Strategy* was published in 2016 and defines the desired end-state for the Arctic: a secure and stable region where U.S. national interests are safeguarded, the U.S. homeland is defended, and nations work cooperatively to address challenges.⁴ Multiple DOD entities are involved in supporting Arctic operations. DOD's 2016 *Arctic Strategy* states that the Commander of the U.S. Northern Command is to advocate for the DOD capabilities required to operate in the Arctic environment, supporting DOD Arctic stakeholders in identifying capability requirements and shortfalls. According to the Navy's *Arctic Roadmap for 2014 to 2030*, the Navy has global leadership responsibilities to provide ready forces for current operations and contingency response that include the Arctic

¹The National Snow and Ice Data Center supports research into the Earth's snow, ice, glaciers, frozen ground, and climate. The center works with the National Oceanic and Atmospheric Administration and the National Science Foundation to gather and maintain Arctic data.

²Pub. L. No. 98-373 (1984) (codified at 15 U.S.C. § 4111) defines "the Arctic" as all U.S. and foreign territory north of the Arctic Circle and all U.S. territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas; and the Aleutian island chain. The Arctic Circle latitude is 66° 33' 44" N.

³DOD, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Washington, D.C.: January 2018).

⁴DOD, *Report to Congress on Strategy to Protect United States National Security Interests in the Arctic Region* (Washington, D.C.: December 2016). (hereinafter referred to as the 2016 DOD *Arctic Strategy*).

Ocean. The Naval Sea Systems Command's mission includes, among other things, providing materiel support to the Navy, such as ships and shipboard combat systems and components; coordinating shipbuilding and repair; and performing research, development, and test and evaluation for submarines and other undersea warfare. The Coast Guard stated in its 2013 *Arctic Strategy* that, to advance the U.S. interests in the Arctic region, the Coast Guard must work with stakeholders to promote maritime safety, security, and environmental responsibility in the region.⁵

The National Defense Authorization Act for Fiscal Year 2018 included a provision for the Navy to report on its Arctic capabilities.⁶ The act also included a provision that we review the Navy's report, which we refer to as the June 2018 report, within 90 days of the report's issuance.⁷ This report (1) assesses the extent to which the Navy's June 2018 report aligns with current Arctic threat level assessments and the capabilities required to execute DOD's 2016 *Arctic Strategy* and (2) describes any current requirements for ice-hardened vessels and DOD's approach for evaluating the capabilities needed as Arctic requirements evolve.

We focused our review on the naval capabilities needed to execute DOD's 2016 *Arctic Strategy*, with a focus on surface capabilities. For objective one, two analysts independently assessed the June 2018 report against the capabilities needed to execute DOD's 2016 *Arctic Strategy* and the five elements required by the National Defense Authorization Act for Fiscal Year 2018. A third analyst reviewed these assessments and reconciled any discrepancies. We conducted interviews with DOD and Navy officials to identify current naval capabilities used to meet Arctic requirements and attended threat briefings and conducted interviews at the U.S. Northern Command and at the Office of Naval Intelligence to identify the current threat status in the Arctic region. We assessed the June 2018 report against the current naval capabilities and threat status

⁵The Coast Guard, at all times, is a military service and branch of the armed forces of the United States. The Coast Guard operates under the Department of Homeland Security, except when operating as a service in the Navy. The Coast Guard may be transferred to the Navy by the Congress in a declaration of war or by presidential direction.

⁶National Defense Authorization Act for Fiscal Year 2018, Pub. L. No. 115-91, § 1065 (2017). The Navy submitted its report to Congress on June 25, 2018. See Department of the Navy, *Report to Congress on Department of Defense Review of Navy Capabilities in the Arctic Region* (Washington, D.C.: June 25, 2018).

⁷To meet this requirement, we provided a draft report to the defense congressional committees.

identified in those interviews and briefings. We reviewed *The United States Navy Arctic Roadmap for 2014 to 2030* that the Office of the Chief of Naval Operations issued in 2014 to provide guidance to prepare the Navy to respond effectively to future Arctic region contingencies, delineate the Navy's leadership role, and articulate the Navy's support to achieve national priorities in the Arctic.⁸ We reviewed information from DOD and the Department of State about the freedom of navigation program established in 1979 to maintain the global mobility of U.S. forces and unimpeded commerce.⁹ We also interviewed officials about the need for that program in the Arctic and about the program's benefits and risks. We reviewed a Navy technical document on operating ships in polar environments, and interviewed Naval Sea Systems Command and Coast Guard officials on what is known about the cost and feasibility of "ice-hardening" existing ships for Arctic operations.¹⁰

For objective two, to determine how DOD identifies its evolving capabilities and the requirements of the Arctic, we reviewed the Chairman of the Joint Chiefs of Staff Instruction 3170.011, *Joint Capabilities Integration and Development System (JCIDS)*, which establishes the process for identifying, assessing, validating, and prioritizing joint military capability requirements.¹¹ We also reviewed the U.S. Northern Command's fiscal year 2017 assessment of capability gaps related to the Arctic and discussed with U.S. Northern Command officials the capability gaps identified using this process. We did not validate the underlying data or assess the methodologies used in DOD's models and predictions. For a list of organizations we contacted for this review, see appendix I.

We conducted this performance audit from January 2018 to November 2018 in accordance with generally accepted government auditing

⁸Department of the Navy, *The United States Navy Arctic Roadmap for 2014 to 2030* (Washington, D.C.: February 2014).

⁹According to DOD's fiscal year 2017 *Annual Freedom of Navigation Report*, the freedom of navigation program consists of a two-pronged complementary strategy in which the Department of State diplomatically protests foreign laws, regulations, or other claims of coastal states that are inconsistent with international law (called "excessive maritime claims"), and DOD conducts operational challenges against excessive maritime claims.

¹⁰According to Naval Sea Systems Command officials, "ice-hardening" is not a process currently used by the Navy, but rather is a term they believe refers to the concept of hardening the hull of a ship and otherwise winterizing it to operate in polar temperatures.

¹¹Chairman of the Joint Chiefs of Staff Instruction 3170.011, *Joint Capabilities Integration and Development System (JCIDS)* (Jan. 23, 2015).

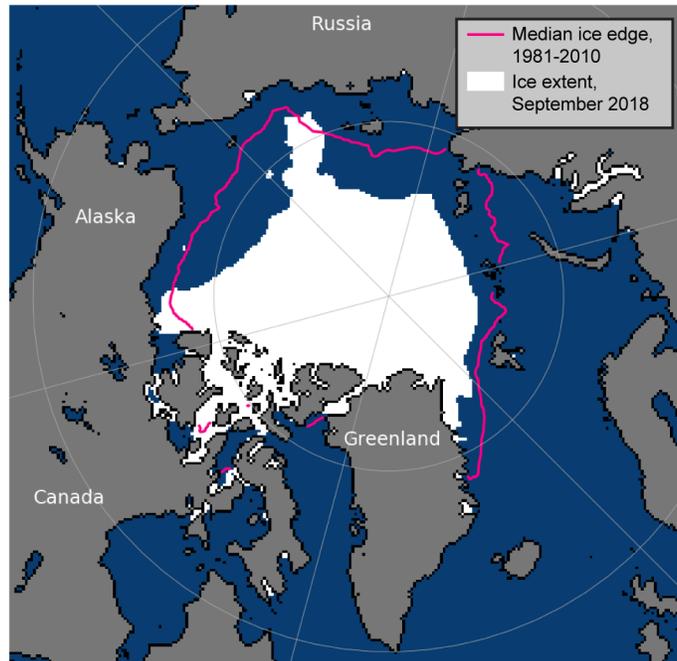
standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Scientific research on and projections of the changes taking place in the Arctic vary, but there is a general consensus that the Arctic is warming and that its sea ice is diminishing.¹² For example, scientists at the National Snow and Ice Data Center reported that for 2018 the minimum amount of sea ice coverage in the Arctic—typically occurring in September each year—was the sixth lowest in the satellite record and 656,000 square miles fewer than the mean for the 1981 through 2010 time frame. Further, the scientists found that the 12 lowest recordings of September ice coverage on satellite record have all occurred in the past 12 years. Figure 1 shows the sea ice coverage (i.e., extent) in the Arctic for September 2018 compared with the median ice edge for 1981 through 2010.

¹²According to the National Oceanic and Atmospheric Administration, average temperatures in the Arctic have increased by more than twice as fast as those of the rest of the world over the last 10 years.

Figure 1: September 2018 Sea Ice Coverage (Extent) in the Arctic Compared with Median Ice Edge, 1981-2010

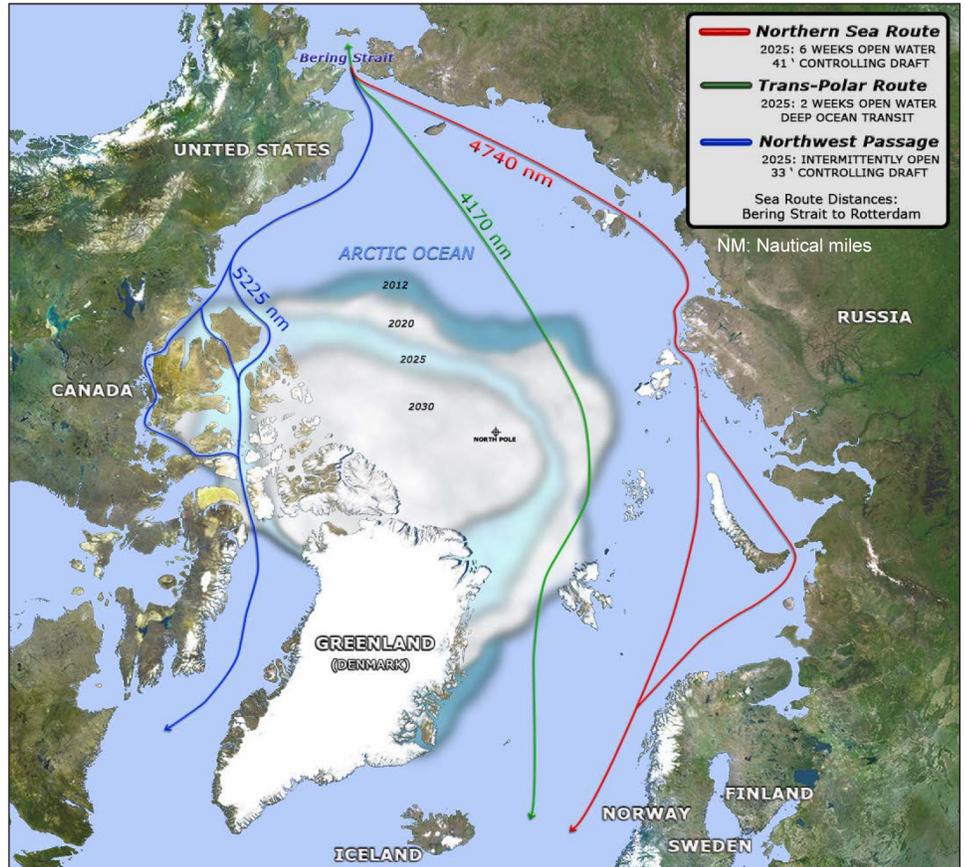


Source: National Snow and Ice Data Center. | GAO-19-42

While much of the Arctic Ocean remains ice-covered for the majority of the year, most scientific estimates predict there will be a continued decrease in sea ice coverage in the Arctic Ocean in the summer sometime in the next 20 to 40 years. According to the Navy's *Arctic Roadmap for 2014 to 2030*, while there may be less sea ice there in the future, the ice that remains will continue to be a challenge to those operating in the area.

Most commercial ship activity in the Arctic is regional—shipping into or out of the Arctic, mainly in support of commercial activity—not trans-Arctic. However, according to the official Navy estimate from 2013, the decreasing coverage of sea ice will result in more open water allowing increased maritime activity along three trans-Arctic routes from 2012 through 2030: the Northern Sea Route, the Northwest Passage, and the Trans-Polar Route (see fig. 2). This development could, for example, reduce by thousands of miles and by several days of travel the shipping of goods between countries in Asia and North America.

Figure 2: Arctic Transit Routes with Potential for Increased Maritime Activity from 2012 through 2030



Source: U.S. Navy. | GAO-19-42

Increased economic activity in the Arctic could potentially increase the need for military capabilities there to safeguard U.S. interests. For example, estimates of significant oil, gas, and mineral deposits in the Arctic have increased the interest in exploration opportunities in the region. These resources include an estimated 13 percent of the world's undiscovered oil; 30 percent of the world's undiscovered gas; and approximately \$1 trillion of minerals including gold, zinc, nickel, and platinum.¹³ According to information provided by the Department of State,

¹³United States Coast Guard, *Arctic Strategy* (Washington, D.C.: May 2013).

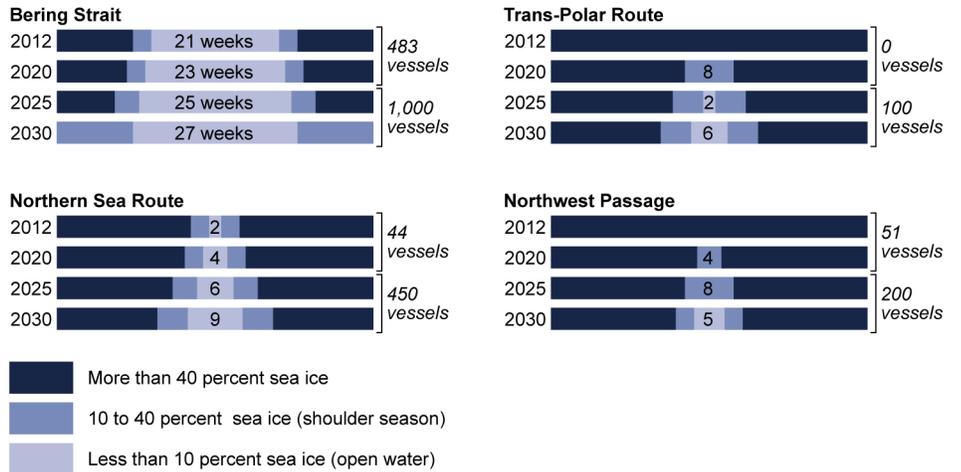
the vast majority of these resources are within the undisputed continental shelf of the respective coastal states. Officials from the Department of State stated that disputed claims related to the small remaining portions of the Arctic seabed may be addressed within the international framework established by the United Nations Convention on the Law of the Sea.

However, as we reported in 2015, even with the changing climate and growing interest in the region, several enduring characteristics will continue to provide challenges to surface navigation in the Arctic for the foreseeable future.¹⁴ These include large amounts of winter ice and increased movement of ice from spring to fall. Increased movement of sea ice makes its location less predictable, a situation that increases the risk that ships can become trapped or damaged by ice impacts. In addition, the lack of infrastructure in the Arctic region affects the reliability of shipping through the area. Economic factors such as risk costs, as well as changes in the shipping market resulting from the Panama Canal expansion may also affect the amount of shipping along these routes. As figure 3 shows, even as the seasonal ice decreases over time, the Navy has projected that the Arctic will remain impassable for most commercial ships for most of the year from 2012 through 2030. These factors combined are likely to affect the pace at which commercial activity will increase.¹⁵

¹⁴GAO, *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).

¹⁵We focused our report on the risks as it relates to the Navy's ability to execute the 2016 *DOD Arctic Strategy*. In technical comments provided by the Coast Guard, officials noted areas of broader risk, including increasing maritime traffic, and investments by Russia in energy, logistics, and infrastructure along the Northern Sea Route. While the Coast Guard noted that overall maritime activity is lower in the Arctic compared to other parts of the globe, increasing traffic combined with the extreme Arctic conditions and limited infrastructure in the area increase the likelihood of a maritime incident affecting human lives, natural resources, economic security, and the environment.

Figure 3: Navy Projections of the Navigability of Arctic Sea Routes from 2012 through 2030

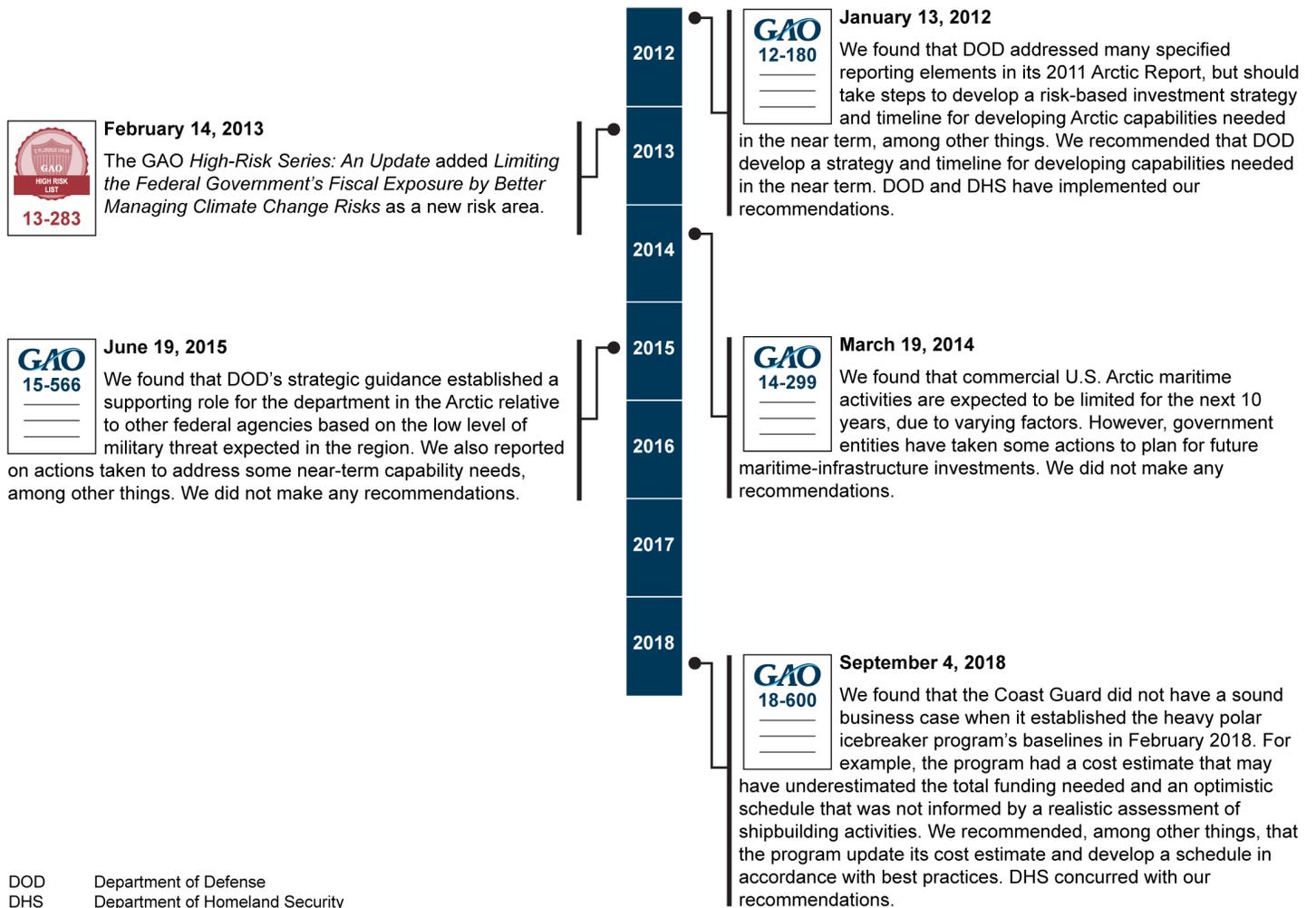


Source: U.S. Navy. | GAO-19-42

Note: Vessel projections courtesy of the Office of Naval Intelligence

We have previously examined emerging issues and challenges for the United States in the Arctic. See figure 4 for a timeline of our prior reports related to Arctic issues. We also include a list of our prior work related to the Arctic at the end of this report.

Figure 4: Timeline of Our Prior Reports Related to Arctic Issues



DOD Department of Defense
 DHS Department of Homeland Security

Source: GAO analysis of prior GAO reports. | GAO-19-42

The Navy's Report Aligns with Current Assessments of Arctic Threat Levels and Capabilities Required to Execute DOD's Arctic Strategy

The Navy's June 2018 report aligns with DOD's assessments that the Arctic threat level remains low and that DOD has the capabilities required to execute its 2016 *DOD Arctic Strategy*.¹⁶ Specifically, the June 2018 report and the information it provides for each of the reporting elements discusses how the department can execute the 2016 *DOD Arctic Strategy*.

The strategy contains two overarching objectives: to (1) ensure security, support safety, and promote defense cooperation and (2) prepare to respond to a wide range of challenges and contingencies to maintain stability in the region.¹⁷ These objectives reflect DOD's assessment that there is a low level of military threat in the Arctic, as well as the stated commitment of the Arctic nations to work within a common framework of diplomatic engagement. In the strategy, DOD identifies the types of investments that will need to be made over time as activity in the region increases; however, DOD also discusses the importance of assessing the needs in the Arctic and of balancing potential Arctic-specific capabilities investments against other national security priorities and fiscal realities. The Arctic threat assessment briefings we received from officials at the U.S. Northern Command and the Office of Naval Intelligence also reflected the low risk for conflict in the Arctic referenced in the Navy's June 2018 report. Below, we summarize the Navy's response to each reporting element, and our evaluation of whether the response aligns with current assessments of Arctic threat levels and capabilities required to execute DOD's 2016 *Arctic Strategy*.

¹⁶Department of the Navy, *Report to Congress on Department of Defense Review of Navy Capabilities in the Arctic Region* (Washington, D.C.: June 25, 2018). Navy officials stated that DOD tasked the Office of the Chief of Naval Operations Undersea Warfare Directorate with compiling the Navy's June 2018 report, given the submarine community's experience with operating in the Arctic. To answer the five reporting elements, officials said they examined DOD's past reports to Congress on related topics. They also convened meetings with subject matter experts across the Navy, including from the Deputy Assistant Secretary of the Navy Ships, Policy and Operations, Warfare Systems, and Information Warfare.

¹⁷DOD, *Report to Congress on Strategy to Protect United States National Security Interests in the Arctic Region* (Washington, D.C.: December 2016).

Report Provides Information on Current Naval Capabilities in the Arctic That Align with DOD's Strategy

Reporting Element One: The Navy was required to report on the current naval capabilities of the Department of Defense in the Arctic region, with a particular emphasis on surface capabilities.

Source: Section 1065 of the National Defense Authorization Act for Fiscal Year 2018. | GAO-19-42

The June 2018 report provides information on this required element, with the Navy stating that it relies on the submarine force as well as on aviation assets and surface operations when necessary to operate in the Arctic. These capabilities in the Arctic region are consistent with those identified in *The United States Navy Arctic Roadmap for 2014 to 2030* to execute the 2016 DOD *Arctic Strategy*, and as corroborated in our discussions with U.S. Northern Command and Navy officials.

In addition, the Navy discusses the significant limitations of its surface ships for Arctic operations in the June 2018 report. The limitations identified are consistent with information contained in the *U.S. Navy Cold Weather Handbook for Surface Ships* and with information we discussed with Naval Sea Systems Command officials who oversee modifications to the fleet and the acquisition of new ships. For example, Navy officials told us that top-side icing has detrimental effects on ships. As sea spray accumulates on a ship deck and freezes, a ship can lose some of the capabilities of its external sensors and radars and a ship's stability in the water decreases as the ship's center of gravity becomes top heavy. Navy and Coast Guard officials told us that while the Coast Guard regularly operates in the Arctic given its ice-breaking and maritime safety missions, among others, Navy surface ships have not been designed to maneuver and operate in icy waters. Although some of the Navy's T-class ships have some capability to operate in light or broken first-year ice due to the inherent strength of their hulls, traditional surface combatant ships (e.g., Cruisers, Destroyers, or Frigates) are not designed to operate in icy waters.

Report Provides Information on the Gaps between Current Naval Capabilities and the Ability to Execute DOD's Strategy

Reporting Element Two: The Navy was required to report on any gaps that exist between the current naval capabilities and the ability of the department to fully execute its updated strategy for the Arctic region.

Source: Section 1065 of the National Defense Authorization Act for Fiscal Year 2018. | GAO-19-42

The June 2018 report provides information on this required element, with the Navy stating that the department can execute the 2016 DOD *Arctic Strategy* with current naval capabilities. The June 2018 report is similarly aligned with Navy assessments of Arctic capabilities and gaps contained in its plan, *The United States Navy Arctic Roadmap for 2014 to 2030* that the Office of the Chief of Naval Operations issued in February 2014. This

plan provides guidance to prepare the Navy to respond effectively to future Arctic Region contingencies, delineates the Navy's leadership role, and articulates the Navy's support to achieve national priorities in the region.¹⁸ At the time of our review, DOD was in the process of drafting another report—on DOD arctic capability and resource gaps—as required by section 1054 of the National Defense Authorization Act for Fiscal Year 2018. In addition, according to Navy officials, the Navy was also drafting its *Arctic Strategic Outlook*, which is a follow-up to *The United States Navy Arctic Roadmap for 2014 to 2030*. According to DOD and Navy officials, both forthcoming reports will focus on contextualizing Arctic needs within the framework of the 2018 *National Defense Strategy*. Because these efforts were not complete at the time of our review, we were unable to determine whether the Navy's June 2018 report aligns with these assessments.

Report Provides Information on Any Gaps in Naval Capabilities Requiring the Ice-Hardening of Existing Vessels or the Construction of New Vessels to Achieve DOD's Strategy

Reporting Element Three: The Navy was required to report on any gaps in the current naval capabilities that require ice-hardening of existing vessels or the construction of new vessels to preserve freedom of navigation in the Arctic region whenever and wherever necessary.

Source: Section 1065 of the National Defense Authorization Act for Fiscal Year 2018. | GAO-19-42

The June 2018 report provides information on this required element, with the Navy stating that there are currently no validated capability gaps that require the Navy to ice-harden existing vessels or construct new ice-capable vessels to preserve freedom of navigation in the Arctic. Furthermore, the Navy stated that its current assets are sufficient to execute the 2016 DOD *Arctic Strategy*. As noted above, freedom of navigation operations are undertaken to, among other things, promote maritime stability and to challenge excessive sovereignty claims. In addition, DOD officials stated that the United States already has options other than Navy surface ships for demonstrating the United States' freedom to operate in the Arctic, including using Coast Guard vessels, Navy submarines, or military aircraft.

¹⁸Department of the Navy, *The United States Navy Arctic Roadmap for 2014 to 2030* (Washington, D.C.: February 2014).

Report Provides Information on Navy's Analysis and Recommendation for Ice-Hardening Vessels to Achieve DOD's Strategy

Reporting Elements Four and Five: The Navy was required to provide an analysis and recommendation of which Navy vessels could be ice-hardened to effectively preserve freedom of navigation in the Arctic region when and where necessary, in all seasons and weather conditions, and an analysis of any cost increases or schedule adjustments that may result from ice-hardening existing or new Navy vessels.

Source: Section 1065 of the National Defense Authorization Act for Fiscal Year 2018. | GAO-19-42

The June 2018 report provides some information on these required elements, with the Navy stating that it is not pursuing ice-hardening or the winterization of surface ships. According to the Navy, because there is no specific capability requirement for the Navy to ice-harden ships, the report does not list or name potential ice-hardening candidates among existing vessels or provide cost or schedule estimates for ice-hardening vessels. Officials with the Naval Sea Systems Command, which develops cost and schedule estimates for ship modifications and new construction, told us that they had not conducted life-cycle cost studies for ice-hardening existing ships because there is no capability requirement for an ice-hardened ship and, therefore, no ship design on which to base such a study or estimate.

Furthermore, the June 2018 report states that the Navy is leveraging cooperative research with international partner-nations such as Canada, Denmark, Finland, and Norway, to better understand how other Arctic nations are meeting additional requirements for Arctic operations. Navy officials from the Naval Sea Systems Command stated that ships built to operate in ice and extreme cold environments have unique features, including stronger, thicker construction of all portions of the hull that would come into contact with ice; different hull form design; redesigned propellers constructed of higher than traditional strength material; increased strength ship parts, such as rudders and seawater intakes and discharges designed to resist the formation or accumulation of ice; and more powerful heating and ventilation to accommodate sustained operations in extreme cold environments, among other things. They also noted that research completed to date has advanced the Navy's knowledge in several of these areas including hull form and propeller design.

Navy officials estimated that a new ship design might require 20 years to reach initial operational capability. They noted the process might take only 10 years if the Navy can leverage an ongoing program, such as the

DDG-51 Class program.¹⁹ Navy officials cautioned that the combination of features that enable ice-capable ships to sustain operating in extreme cold environments could compromise other performance areas such as speed, range, and ship motion. Officials told us that this would add to the Navy's already strained efforts to maintain existing global naval presence requirements.

Although the June 2018 report did not discuss any cost and schedule adjustments that might arise from ice-hardening or new ship construction, we have previously reported that the Navy has faced challenges meeting its shipbuilding cost, schedule, and performance goals over the past decade.²⁰ Specifically, we found that the 11 lead ships most recently delivered to the Navy cost \$8 billion more to construct than initially budgeted for. Navy officials stated that the Navy contractor construction yards currently lack expertise in the design for construction of winterized, ice-capable surface combatant and amphibious warfare ships. Accordingly ice-hardening and winterization design practices could introduce cost and schedule risk, challenging the execution of an ice-hardened new construction ship building program for an ice-capable ship. If the Navy executes this potential program without the requisite knowledge at key points it could be at risk of cost and schedule growth that we have seen in recent Navy shipbuilding programs. The Navy has faced these challenges in part because the department has proceeded with construction prior to completing technology development and ship design. We have found that successful ship building programs are based on sound business cases, starting with the lead ship, and on the attainment of critical levels of knowledge at key points in the process prior to making significant investments.²¹

¹⁹The DDG-51 Class warships provide multimission offensive and defensive capabilities. They can operate independently or as part of carrier strike groups, surface action groups, amphibious ready groups, and underway replenishment groups.

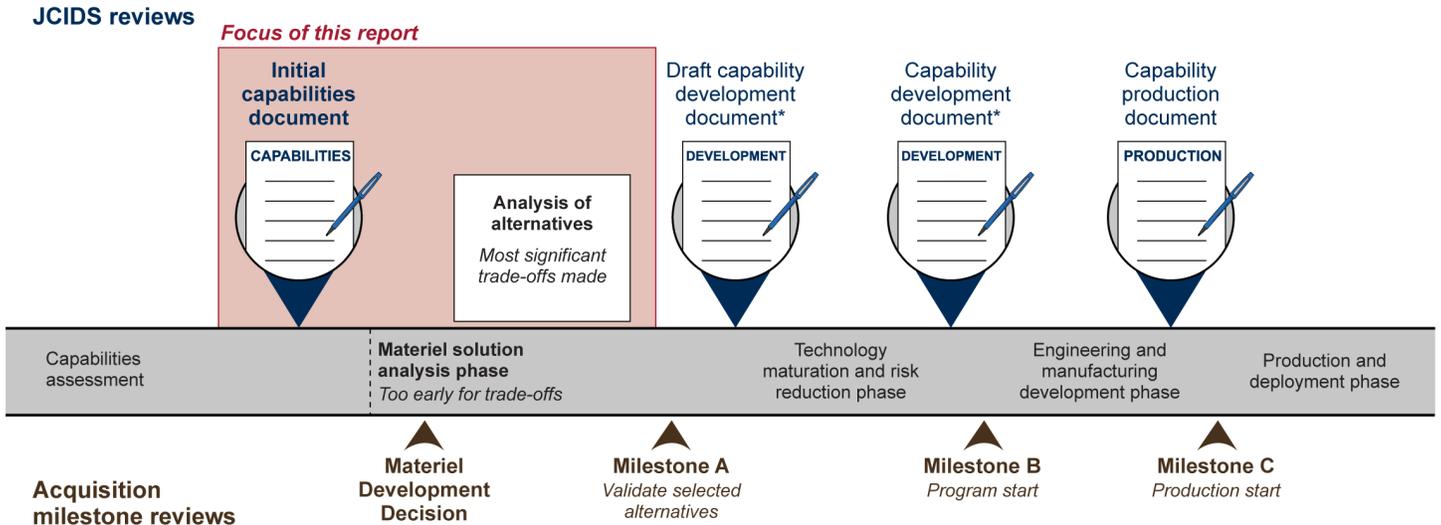
²⁰GAO, *Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments*, [GAO-18-238SP](#) (Washington, D.C.: June 6, 2018).

²¹[GAO-18-238SP](#).

The Navy Does Not Have a Capability Requirement to Ice-Harden Existing Vessels or Construct New Ones and Is Evaluating Arctic-Related Capabilities Using the Established DOD Process

Navy officials said that the Navy does not currently have a specific capability requirement for ice-hardening existing vessels or for the construction of new ones, and stated that the Navy or Joint Force is unlikely to produce such a requirement in the near term. Navy officials told us that the Navy will continue to use DOD’s established process, the Joint Capabilities Integration and Development System (JCIDS), which governs the department’s requirements process, to assess Arctic-related capability requirements in the near and long term (see fig. 5). All DOD components use the JCIDS process or variations of the process within their organizations to identify, assess, validate, and prioritize joint military requirements.

Figure 5: Overview of Joint Capabilities Integration and Development System (JCIDS) Process



* Or equivalent approved/validated requirements document

Source: GAO analysis of Department of Defense (DOD) policy and DOD officials’ statements. | GAO-19-42

Before starting the JCIDS process, the military services, combatant commanders, and other DOD components conduct capabilities-based assessments or other studies to assess capability requirements and associated capability gaps and the associated risks. In October 2017, the Joint Requirements Oversight Council (JROC) validated U.S. Northern

Command's initial capabilities document identifying three gaps in the ability to exercise/deploy, position, and conduct deterrence/decisive operations in ice-diminished Arctic waters. At the time of our review, the JROC had reviewed and validated the U.S. Northern Command's Arctic initial capabilities document and designated it for further study by the Navy.²² The validation of an initial capabilities document by the JROC is an early part of the JCIDS process, and informs updates to capability requirement documents related to specific materiel and nonmateriel capability solutions to be pursued.

A Navy official stated that the capability gaps identified in the U.S. Northern Command's validated initial capabilities document will now compete for resources with other issues designated for study across the Navy.²³ According to a Navy official, whenever the Navy initiates a study, this triggers the analysis of alternatives phase of the JCIDS process. Under this process, each alternative would need to be specifically evaluated for its costs and benefits. DOD officials noted that there are several analytical steps in the JCIDS process during which potential solutions for any identified gaps are analyzed. They told us that potential solutions might also include alternatives other than ice-hardening or new ship construction, such as adding capabilities to Coast Guard ships or partnering with allies to achieve common strategic goals in the Arctic.

Even as the seasonal ice decreases over time, according to Navy officials, the Arctic will remain impassable for most commercial ships for most of the year. For these reasons, projections of increased Arctic sea activity remain uncertain. DOD, U.S. Northern Command, Navy, and Coast Guard officials told us that even as Arctic maritime activity is expected to increase, several enduring characteristics will continue to provide challenges to surface navigation in the Arctic for the foreseeable future. These challenges include large amounts of winter ice and increased movement of ice from spring to fall. As mentioned earlier, the increased movement of sea ice makes its location less predictable, a situation that is likely to increase the risk that ships can become trapped

²²When the JROC reviews the initial capabilities documents, the council ensures that capabilities are prioritized within and across the various portfolios of the joint force.

²³Once a requirement is validated, it appears on the combatant commander's integrated priority list, a list of a combatant commander's highest priority requirements prioritized across service and functional lines, defining shortfalls in key programs that, in the judgment of the combatant commander, adversely affect the capability of the combatant commander's forces to accomplish their assigned mission.

or damaged by ice impacts.²⁴ Coast Guard officials noted that a challenging environment like the Arctic may result in a higher likelihood of incidents occurring. Further, responding to incidents with search and rescue operations are riskier to execute than in non-polar environments. In addition, the lack of infrastructure and logistical support in the Arctic affects maritime activities through that region.

Agency Comments

We are not making any recommendations in this report. We provided a draft of our report to DOD, Department of Homeland Security, and the Department of State for comment. DOD, Department of Homeland Security, and Department of State provided technical comments, which we incorporated into this report as appropriate.

We are sending copies of this report to the appropriate congressional committees. We are also sending copies to the Secretary of Defense, Secretary of State, and the Secretary of Homeland Security. In addition, this report will be available at no charge on our website at <http://www.gao.gov>.

If you or your staff have questions about this report, please contact me at (202) 512-3489 or pendletonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.



John H. Pendleton, Director
Defense Capabilities and Management

²⁴These challenges are noted in the Coast Guard's *High Latitude Study*, which the Coast Guard provided to Congress in July 2011.

List of Committees

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Committee on Armed Services
House of Representatives

The Honorable Kay Granger
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The Honorable Pete Visclosky
Ranking Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Organizations We Interviewed

Department of Defense Organizations:

- Office of the Under Secretary of Defense for Policy
- Department of the Navy
 - Deputy Assistant Secretary of the Navy–Ships
 - Office of the Chief of Naval Operations
 - Surface Warfare Directorate
 - Naval Sea Systems Command
 - Office of Naval Intelligence
- U.S. Northern Command
- U.S. European Command
- U.S. Pacific Fleet
- U.S. Fleet Forces Command

Department of Homeland Security Organizations:

- U.S. Coast Guard
 - Office of Counterterrorism and Defense Operations Policy
 - Marine Transportation Systems Directorate, Arctic Policy

Department of State Organization:

- Office of Ocean and Polar Affairs

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

John H. Pendleton, (202) 512-3489 or pendletonj@gao.gov

Staff Acknowledgments

In addition to the contact named above, Suzanne Wren (Assistant Director), Delia Zee (Analyst-in-Charge), John Beauchamp, Mae Jones, Amie Lesser, Ned Malone, and Shahrzad Nikoo made key contributions to this report.

Related GAO Products

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

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

Coast Guard Acquisitions: Status of Coast Guard's Heavy Polar Icebreaker Acquisition. [GAO-18-385R](#). Washington, D.C.: April 13, 2018.

Coast Guard: Status of Polar Icebreaking Fleet Capability and Recapitalization Plan. [GAO-17-698R](#). Washington, D.C.: September 25, 2017.

High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others. [GAO-17-317](#). Washington, D.C.: February 15, 2017.

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.

Climate Change Adaptation: DOD Can Improve Infrastructure Planning and Processes to Better Account for Potential Impacts. [GAO-14-446](#). Washington, D.C.: May 30, 2014.

Arctic Issues: Better Direction and Management of Voluntary Recommendations Could Enhance U.S. Arctic Council Participation. [GAO-14-435](#). Washington, D.C.: May 16, 2014.

Maritime Infrastructure: Key Issues Related to Commercial Activity in the U.S. Arctic over the Next Decade. [GAO-14-299](#). Washington, D.C.: March 19, 2014.

Managing for Results: Implementation Approaches Used to Enhance Collaboration in Interagency Groups. [GAO-14-220](#). Washington, D.C.: February 14, 2014.

Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms. [GAO-12-1022](#). Washington, D.C.: September 27, 2012.

Arctic Capabilities: DOD Addressed Many Specified Reporting Elements in Its 2011 Arctic Report but Should Take Steps to Meet Near- and Long-term Needs. [GAO-12-180](#). Washington, D.C.: January 13, 2012.

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Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion. [GAO-09-551](#). Washington, D.C.: June 3, 2009.

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