



MARITIME INFRASTRUCTURE

A Strategic Approach and Interagency Leadership Could Improve Federal Efforts in the U.S. Arctic

Accessible Version

April 2020

GAO Highlights

Highlights of [GAO-20-460](#), a report to congressional requesters

Why GAO Did This Study

Arctic sea ice has diminished, lengthening the navigation season and increasing opportunities for maritime shipping. However, the U.S. Arctic lacks maritime infrastructure—such as a deep-draft port and comprehensive nautical charting—to support increased traffic. The lack of infrastructure exacerbates risks inherent to shipping in the Arctic such as vast distances and dangerous weather.

This report examines (1) how U.S. Arctic shipping trends have changed since 2009 and factors that have shaped shipping in the region, and (2) the extent to which U.S. agencies' efforts to address Arctic maritime infrastructure gaps have aligned with leading management practices. GAO collected U.S. Coast Guard traffic data from 2009 through 2019 and interviewed 20 stakeholders selected to represent a range of views. GAO also analyzed Arctic strategies, interviewed selected agencies involved with maritime infrastructure, and compared efforts to leading management practices.

What GAO Recommends

GAO is making three recommendations, including that OSTP and other appropriate entities within the Executive Office of the President: develop and publish a strategy to address gaps and designate the interagency mechanism responsible for leading federal efforts. OSTP neither agreed nor disagreed but noted it is considering the need for and role of additional federal coordination. GAO stands by its recommendations.

View [GAO-20-460](#). For more information, contact Andrew Von Ah at (202) 512-2834 or vonaha@gao.gov

April 2020

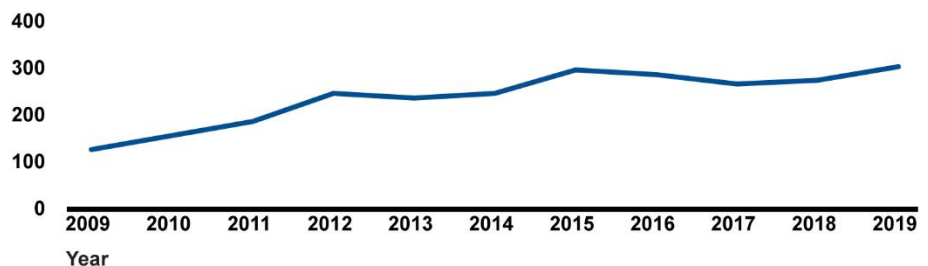
MARITIME INFRASTRUCTURE

A Strategic Approach and Interagency Leadership Could Improve Federal Efforts in the U.S. Arctic

What GAO Found

Maritime shipping activity, as indicated by the number of vessels in the U.S. Arctic, generally increased from 2009 through 2019. Domestic maritime activity declined after the discontinuation of offshore oil and gas exploration activities in Alaska's Chukchi Sea in 2015. However, since 2015, international activities related to natural gas development, particularly in the Russian Arctic, have increased, according to stakeholders. Factors affecting decisions of ship operators about whether to operate in the U.S. Arctic include increased operating costs of Arctic-capable ships, environmental changes that have caused more volatile weather and ice conditions, and concerns over environmental impacts.

Number of Vessels in the U.S. Coast Guard Arctic Area of Interest, 2009-2019



Source: GAO analysis of U.S. Coast Guard data. | GAO-20-460

Note: The USCG District 17 Arctic area of interest is defined as north of the Bering Strait to the North Pole, east to Banks Island in the Canadian Arctic, and west into Russia to the New Siberian Islands.

Agencies have taken some steps to address Arctic maritime infrastructure gaps identified by federal agencies, such as a lack of nautical charting, but federal efforts lack a current strategy and interagency leadership. Examples of agency actions include the U.S. Coast Guard developing recommended shipping routes and the National Oceanic and Atmospheric Administration continuing to chart Arctic waters. To guide federal efforts, the White House developed a *National Strategy for the Arctic Region* in 2013 and established an interagency Arctic Executive Steering Committee (AESC) in 2015. However, agency officials and stakeholders noted the strategy is now outdated due to changing conditions in the Arctic. As a result, federal efforts lack a current government-wide strategy that aligns with key management practices such as identifying goals, objectives, and establishing performance measures. Moreover, U.S. Arctic interagency groups do not reflect leading collaboration practices, such as sustained leadership and inclusion of all relevant stakeholders, and the White House has not designated which entity is to lead U.S. Arctic maritime infrastructure efforts. For example, the AESC is now dormant according to agency officials and staff at the White House Office of Science and Technology Policy (OSTP), which chairs the AESC. Without a current strategy and a designated interagency entity with these collaboration practices in place, agencies may miss opportunities to leverage resources and target infrastructure improvements in areas that would best mitigate risks.

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Abbreviations

AESC	Arctic Executive Steering Committee
CMTS	U.S. Committee on the Marine Transportation System
IARPC	Interagency Arctic Research Policy Committee
IMO	International Maritime Organization
LNG	liquefied natural gas
NOAA	National Oceanic and Atmospheric Administration
NSC	National Security Council
NSR	Northern Sea Route
NWP	Northwest Passage
OMB	Office of Management and Budget
OSTP	Office of Science and Technology Policy
PCC	Arctic Policy Coordinating Committee
Polar Code	International Code for Ships Operating in Polar Waters

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April 29, 2020

The Honorable Sam Graves
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Honorable John Garamendi
House of Representatives

As we have previously reported, climate change has led to widespread effects, including warming in the Arctic that has exceeded the warming in the rest of the world.¹ Since 1900, the Arctic region has warmed by about 3.6 degrees Fahrenheit—double the rate of the global temperature increase—leading to a significant decline in sea ice cover over the last four decades.² Record low levels of sea ice have made Arctic waters navigable for longer periods of time and have increased opportunities for shipping in the region. This change presents potential economic opportunities as well as safety and environmental risks, particularly given the lack of maritime infrastructure in the region. In particular, the U.S. Arctic does not have the typical elements of a maritime transportation system such as a deep-draft port,³ comprehensive waterways charting, and robust communications infrastructure, according to the U.S. Committee on the Marine Transportation System (CMTS), a federal interagency coordinating committee focused on the maritime transportation system. These infrastructure gaps exacerbate the inherent challenges of maritime activity in the Arctic—vast distances, dangerous

¹GAO, *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).

²*Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (Washington, D.C.: U.S. Global Change Research Program, 2018).

³The U.S. Army Corps of Engineers defined a deep-draft port as one that can accommodate large vessels such as big cargo ships with a water depth greater than 35 feet. See U.S. Army Corps of Engineers, *Alaska Deep-Draft Arctic Port System Study* (March 2013).

weather, and extreme ice conditions—that can pose safety risks to mariners and environmental risks to the fragile Arctic ecosystem.

Within the United States, there are a variety of stakeholders that play a role in maritime infrastructure in the Arctic, including several federal agencies, such as the National Oceanic and Atmospheric Administration (NOAA), U.S. Coast Guard, and U.S. Army Corps of Engineers. Given the range of federal agencies involved with the region, federal efforts require interagency collaboration. Previous administrations have taken steps to guide federal efforts in the Arctic, including developing a *National Strategy for the Arctic Region (National Strategy)*, which was issued in 2013.⁴ In addition, CMTS has issued several reports on Arctic maritime shipping and infrastructure priorities. In 2014, we reported that CMTS was developing a process to monitor agencies' progress in addressing recommended infrastructure priorities.⁵

You asked us to review federal efforts related to Arctic maritime shipping and infrastructure. This report examines (1) how U.S. Arctic shipping trends have changed since 2009 and the factors that have shaped shipping in this region, and (2) the extent to which federal agencies' efforts to address gaps in maritime infrastructure in the U.S. Arctic aligned with leading management practices.

In this report, the term "Arctic" refers to the entire region north of the Arctic Circle. With regard to the "U.S. Arctic," we use the definition set by the International Maritime Organization (IMO), the United Nations agency responsible for the safety and security of shipping and the prevention of pollution by ships. The IMO set this definition, which for the U.S. Arctic is bounded by a line at 60 degrees north that crosses the Bering Sea, as part of its International Code for Ships Operating in Polar Waters (Polar Code), which includes requirements for ships operating in the Arctic. This definition differs from the one established by the Arctic Research and Policy Act of 1984, which included all contiguous seas surrounding Alaska.⁶ We selected the IMO definition of the U.S. Arctic in part to

⁴White House, *National Strategy for the Arctic Region* (Washington, D.C.: May 10, 2013).

⁵GAO, *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).

⁶Pub. L. No. 98-373. § 112, 98 Stat. 1242, 1248 (codified at 15 U.S.C. § 4111). The Act defines the Arctic to mean all United States and foreign 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 chain.

exclude the Aleutian chain of islands in the southern portion of Alaska that are located along the great circle route, the shortest path between ports on either side of the North Pacific, and as a result receive high volumes of commercial maritime traffic.

To describe how U.S. Arctic shipping trends have changed since 2009, we reviewed U.S. Coast Guard annual traffic data from 2009 through 2019. In designing our review, we originally selected the decade of 2009 through 2018 for our analysis, as 2018 was the most recent year for which data were available at that time. However, in April 2020 as we were finalizing our report, the U.S. Coast Guard provided us with 2019 data, which we included in order to provide the most recent information available. These data include the annual number of vessels by vessel type (tugs, research, etc.) and number of vessel transits through the Bering Strait. To assess the reliability of the data, we reviewed documentation and interviewed officials from the U.S. Coast Guard as well as a representative from the Marine Exchange of Alaska, which manages an Automatic Identification System vessel tracking system that produces Arctic shipping data that is used by the U.S. Coast Guard. We determined these data were sufficiently reliable for the purpose of describing shipping trends. To identify and describe the factors that have shaped U.S. Arctic shipping over the past decade,⁷ we also interviewed or received written responses from 20 stakeholders selected to capture a range of known interests.⁸

⁷As mentioned previously, we originally selected the years 2009 through 2018 for the scope of this report but later added 2019 traffic information to include the most recent information available. Because of this change, as well as the fact that we interviewed stakeholders amidst the 2019 shipping season, the factors we describe may not specifically address factors affecting 2019 traffic levels.

⁸These stakeholders included: five research and insurance entities (U.S. Arctic Research Commission; National Science Foundation; Dr. Lawson Brigham, University of Alaska-Fairbanks; Woodrow Wilson Center's Polar Institute; and International Union of Marine Insurance); five local, state, and Alaska Native groups involved with shipping (Alaska Federation of Natives, Bering Straits Native Corporation, the State of Alaska, Arctic Waterways Safety Committee, and North Slope Borough); four carriers that operate vessels in the Arctic (Crowley Maritime Corporation, Maersk, Fednav, and Wagenborg); three organizations involved with maritime infrastructure (Marine Exchange of Alaska, Iridium Satellite LLC, and Port of Nome); and three shippers (Association of Arctic Expedition Cruise Operators; Alaska Oil and Gas Association; and Teck and NANA (NANA is the Alaska Native Organization that owns Red Dog mine, and Teck is the mine operator)).

To evaluate agencies' efforts to address gaps in maritime infrastructure in the U.S. Arctic, we reviewed relevant reports and strategies and interviewed officials from federal agencies, CMTS, and the White House Office of Science and Technology Policy (OSTP). Specifically, we collected information on agency actions identified in CMTS reports from 2013, 2016, and 2018. We reviewed our previous work,⁹ the 2013 *National Strategy* and subsequent implementation plans, and agency-specific Arctic strategies. The federal agencies we interviewed were: NOAA within the Department of Commerce (including National Weather Service; Oceanic and Atmospheric Research; National Ocean Service; and National Environmental Satellite, Data, and Information Service); U.S. Coast Guard within the Department of Homeland Security (both headquarters and District 17 in Alaska); and the Departments of Transportation, State, Interior, and Defense (including the Office of the Deputy Assistant Secretary of Defense for Strategy and Force Development; the Office of the Chief of Naval Operations for Policy and Posture; and the U.S. Army Corps of Engineers¹⁰). We selected these agencies and entities based on their role in Arctic coordination and strategic efforts.

To determine the extent to which federal efforts to address gaps in maritime infrastructure in the U.S. Arctic aligned with leading management practices, we compared collected information to the Office of Management and Budget's (OMB) risk management guidance and selected key practices and characteristics of risk management, national

⁹Since 2016, GAO has issued three related reports—on the U.S. Coast Guard's Arctic strategy, on the U.S. Coast Guard's polar icebreaking program, and on the U.S. Navy's Arctic planning efforts. See 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); GAO, *Coast Guard Acquisitions: Polar Icebreaker Program Needs to Address Risks before Committing Resources*, GAO, [GAO-18-600](#) (Washington, D.C.: Sept. 4, 2018); and GAO, *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).

¹⁰The U.S. Army Corps of Engineers has both a military and a Civil Works program. The military program provides, among other things, engineering and construction services to other U.S. government agencies and foreign governments, while the Civil Works program is responsible for investigating, developing, and maintaining water resources development projects. This report discusses only the Civil Works program.

strategies, and interagency collaboration, based on prior work.¹¹ We selected these practices because they are important to leading complex government-wide and interagency efforts. We focused on interagency collaborative efforts to address maritime infrastructure in the U.S. Arctic and did not assess interagency efforts related to other objectives, such as research, military strategy, or international relations.

We conducted this performance audit from February 2019 to April 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

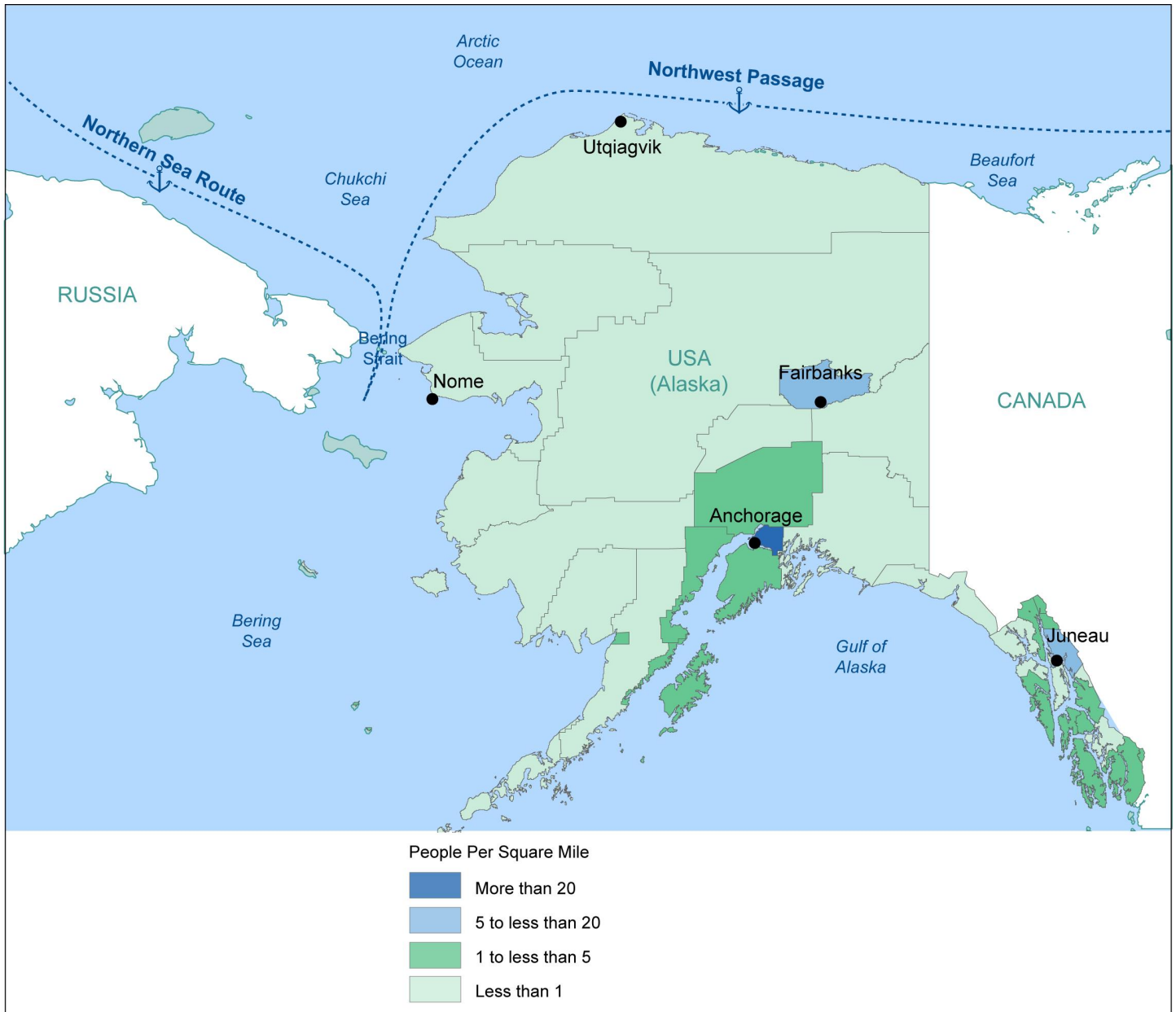
Alaska's location makes the United States an Arctic nation. Alaska has over 6,000 miles of coastline,¹² and is bordered by the Beaufort, Chukchi, and Bering Seas; the Arctic Ocean; and the Bering Strait, whose jurisdiction is divided between the United States and Russia (see fig. 1). According to the 2010 Census, the U.S. Arctic coastal regions are home to about 26,000 people, including the cities of Nome, located near the Bering Strait, and Utqiagvik (formerly Barrow), the northernmost city in the United States. The U.S. Arctic coastal region is sparsely populated even by the standards of Alaska, which has the lowest population density of any state in the nation. Specifically, this region accounted for about 4 percent of Alaska's total population of approximately 710,000 according to the 2010 Census. Alaska is also the largest state in the nation, and—

¹¹See Office of Management and Budget, *Management's Responsibility for Enterprise Risk Management and Internal Control*, OMB Circular No. A-123 (July 15, 2016); GAO, *Risk Management: Further Refinements Needed to Assess Risks and Prioritize Protective Measures at Ports and Other Critical Infrastructure*, [GAO-06-91](#) (Washington, D.C.: Dec. 15, 2005); GAO, *Enterprise Risk Management: Selected Agencies' Experiences Illustrate Good Practices in Managing Risks*, [GAO-17-63](#) (Washington, D.C.: Dec. 1, 2016); *Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism*, [GAO-04-408T](#) (Washington, D.C.: Feb. 3, 2004); and *Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms*, [GAO-12-1022](#) (Washington, D.C.: Sept. 27, 2012).

¹²This reflects the general outline of the seacoast. According to National Oceanic and Atmospheric Administration (NOAA) officials, Alaska has 66,000 miles of coastline when measuring features such as bays and inlets using a nautical chart scale.

given its size, terrain, environment, and population distribution—its transportation system is unique. Much of Alaska’s rail and highway infrastructure is located in the south central part of the state, and many U.S. Arctic cities and villages are accessible only by air or water.

Figure 1: Map of Alaska and Population Density by Borough and Census Area, according to the U.S. Census Bureau's 2017 American Community Survey



Sources: U.S. Census Bureau (American Community Survey); Map Resources; and GAO. | GAO-20-460

As Arctic waterways become more accessible due to declining sea ice, opportunities have increased to use maritime transportation to bring natural resources to market. The U.S. Arctic remains a frontier economy;

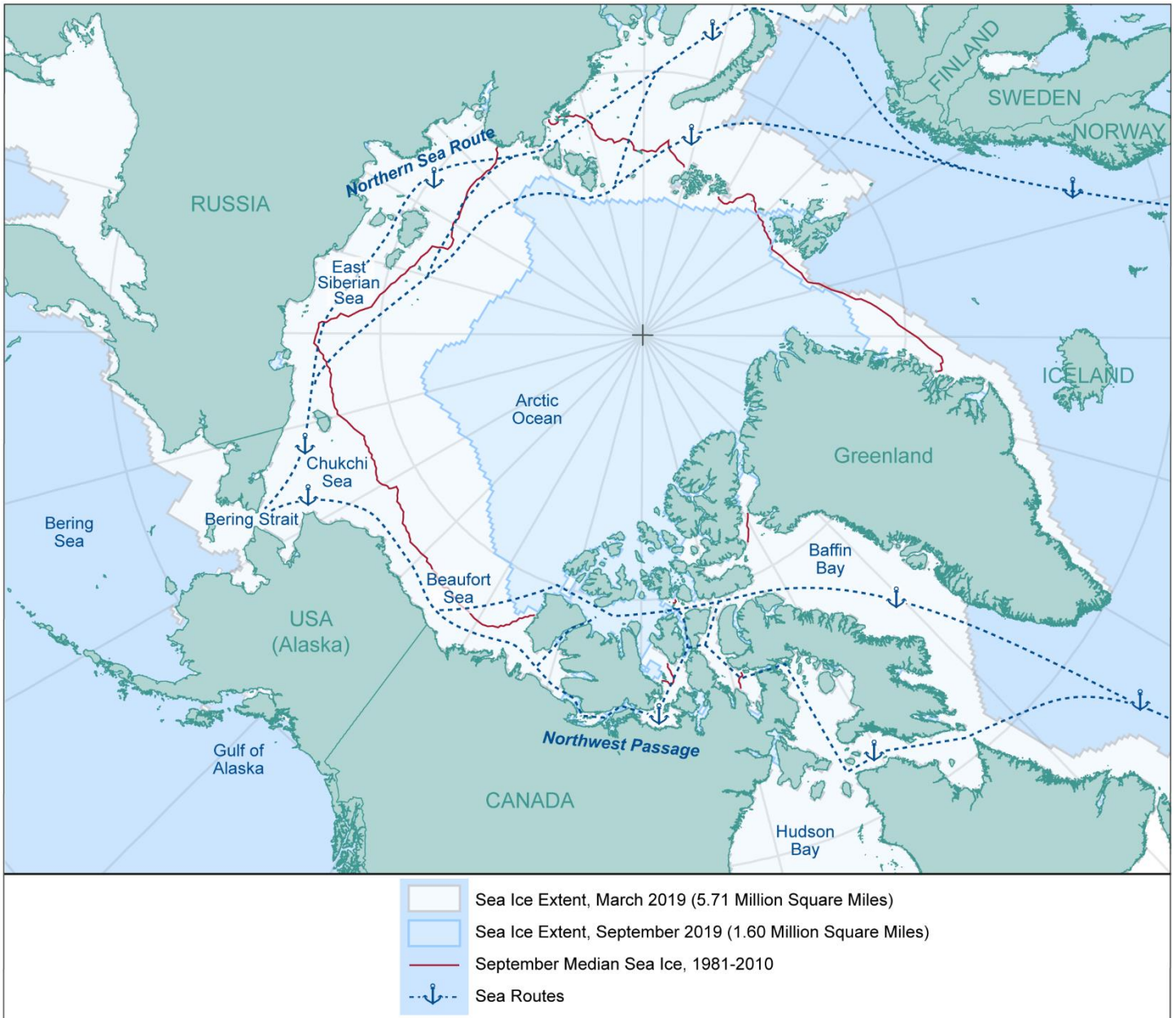
many of its products and much of the value of commercial activities derive from natural resources. According to an assessment of undiscovered but technically recoverable oil and gas resources by the Bureau of Ocean Energy Management, the outer continental shelf regions of the U.S. Arctic's Chukchi and Beaufort Seas contain about 24 billion barrels of oil and about 105 trillion cubic feet of natural gas.¹³ The U.S. Arctic also contains \$1 trillion worth of minerals, such as zinc, nickel, and lead. The extraction of these natural resources presents technical challenges and requires large financial investments given the Arctic environment.

Although warming over the past decades has made trans-Arctic maritime routes more accessible, Arctic sea ice extent remains seasonal, with most shipping occurring during a narrow window extending from summer to early fall. Arctic sea ice typically reaches its maximum extent in March and its minimum in September each year; as a result, the shipping season is typically from June through October. The minimum sea ice extent in September 2019 was tied with 2007 and 2016 as the second lowest on record since satellite observations began in 1979; the 13 lowest extents in the satellite record have all occurred in the last 13 years.¹⁴ As shown in figure 2, the September (minimum) sea ice extent in 2019 had a much smaller coverage area than the median September extent from 1981 to 2010. This contraction of sea ice over time has increased accessibility to the two key trans-Arctic maritime routes: the Northwest Passage (NWP) through the Canadian archipelago, and the Northern Sea Route (NSR) along the northern border of Russia. These two routes enable shipments between non-Arctic destinations, such as between Asia and Europe. However, most traffic in the U.S. Arctic is destinational, meaning it transports goods to and from the U.S. Arctic. Such traffic includes transporting natural resources extracted from the U.S. Arctic to the global marketplace and shipping supplies to U.S. Arctic communities.

¹³U.S. Department of the Interior, Bureau of Ocean Energy Management, *2016a Assessment of Oil and Gas Resources: Alaska Outer Continental Shelf Region*, (Anchorage, A.K.: Aug. 28, 2017).

¹⁴J. Richter-Menge, M. L. Druckenmiller, and M. Jeffries, Eds., 2019: Arctic Report Card 2019, <https://www.arctic.noaa.gov/Report-card>.

Figure 2: Trans-Arctic Maritime Routes and Arctic Sea Ice Extents from March and September 2019 Compared with the September Median, 1981 to 2010



Sources: National Snow and Ice Data Center; Office of Naval Intelligence; Map Resources; and GAO. | GAO-20-460

Note: Arctic sea ice typically reaches its maximum extent in March and its minimum in September each year.

Maritime shipping in the U.S. Arctic involves challenges, given that the region lacks many of the typical elements of a maritime transportation system. See table 1 for examples of the types of maritime infrastructure gaps that CMTS and federal agencies have reported in the U.S. Arctic.

Table 1: Examples of Maritime Infrastructure Gaps in the U.S. Arctic

Category	Examples	Status in the U.S. Arctic
Environmental information	Charting and mapping	Less than 5 percent of the U.S. maritime Arctic has been comprehensively surveyed to modern standards for nautical chart updates, according to the National Oceanic and Atmospheric Administration (NOAA).
Environmental information	Weather and sea ice forecasting	NOAA's National Weather Service and the U.S. National Ice Center, a partnership among NOAA, the U.S. Navy, and the U.S. Coast Guard, produce sea ice and weather forecasts. NOAA has previously noted that observations that are needed for timely forecasts, such as for wind and clouds, are very limited in the Arctic.
Response services	Search and rescue	There is limited infrastructure to support aviation-based search and rescue operations. The nearest U.S. Coast Guard air station to Utqiagvik, on Alaska's northern coast, is about 945 miles away in Kodiak.
Response services	Oil spill response	NOAA, U.S. Coast Guard, Interior, and the State of Alaska have roles in this area. Their ability to respond to oil spills is affected by the communications limitations in the region and the vast distances over which responders and their equipment must travel.
Response services	Icebreakers	The U.S. Coast Guard's medium icebreaker Healy was commissioned in 2000 and is the primary icebreaker used in the U.S. Arctic. The only U.S. Coast Guard heavy icebreaker, the Polar Star, was commissioned in 1976 and is currently used in Antarctica to support McMurdo station.
Operating environment	Vessel requirements	As of 2013, the International Maritime Organization (IMO) had yet to finalize requirements for vessels operating in Arctic and Antarctic ice-covered waters including requirements for training, vessel design, and vessel construction ^a
Operating environment	Communications	Communications, which are sufficient to support voice and data needs in the Bering Sea but limited at higher latitudes, are necessary for vessels to receive weather and sea ice information or request emergency services.
Navigation	Deep-draft port	The closest deep-draft port is Dutch Harbor in the southern Bering Sea, which is over 800 miles from the Bering Strait.
Navigation	Harbors of refuge	A harbor of refuge is a port, inlet, or other body of water normally sheltered from heavy seas by land in which a vessel can safely moor during severe conditions or when it needs repairs. The U.S. Arctic lacks such a harbor designated by the IMO.
Navigation	Managing waterways/ marine areas of ecological significance	The U.S. Committee on the Marine Transportation System reported in 2013 that compulsory regulations to protect areas in international Arctic waterways with heightened ecological and cultural significance from the impacts of shipping did not exist.

Source: GAO analysis of federal agency information. | GAO-20-460

^aFor more recent actions taken regarding this and other gaps, see table 3 below.

Many federal agencies are involved with, and have a role in, U.S. Arctic maritime shipping and infrastructure (see table 2). Although these agencies' missions are not specifically tied to the U.S. Arctic, they extend to the U.S. Arctic like any other geographic region of the country.

Table 2: A Selection of Federal Agencies' Missions as they Relate to Arctic Maritime Shipping and Infrastructure

Department	Agency or Office	Mission as it Relates to Arctic Maritime Shipping and Infrastructure
Commerce	National Oceanic and Atmospheric Administration	Conduct research and provide weather and climate services, sea ice forecasting, nautical charting and other navigation services, and oil spill preparedness and response.
Defense	U.S. Army Corps of Engineers	Construct and maintain channels, harbors (including ports), and waterways.
	U.S. Navy	Executes core national defense functions, such as deterrence and power projection. Also provides maritime security, including supporting U.S. Coast Guard operations.
Homeland Security	U.S. Coast Guard	Conduct all Coast Guard statutory missions, including to: enforce laws and regulations, ensure port and waterways security, conduct search and rescue, advance navigation safety, and maintain an icebreaker fleet to support operational demands in the Arctic.
Interior	Bureau of Ocean Energy Management	Manage the development of oil, natural gas, and mineral resources on Alaska's Outer Continental Shelf.
	Bureau of Safety and Environmental Enforcement	Regulate oil spill preparedness of offshore oil and gas activities and research oil spill preparedness and response.
State	Office of Ocean and Polar Affairs	Develop and coordinate U.S. policy affecting the Arctic region, such as freedom of navigation and environmental stewardship.
Transportation	Maritime Administration	Foster and promote the U.S. maritime industry to strengthen the marine transportation system, including landside infrastructure.

Source: GAO analysis of federal agency information. | GAO-20-460

Note: GAO selected these agencies based upon recent activities to address maritime infrastructure, participation in interagency coordination efforts, and mention in previous GAO reports and federal Arctic strategies.

Other state, local, and international organizations also play a role. For example, the state of Alaska's Department of Environmental Conservation is involved with oil spill response. In addition, the North Slope Borough, a municipal government that encompasses an area of nearly 95,000 square miles along Alaska's northern coast, has a search and rescue department that provides airborne emergency response. Alaska Native organizations represent communities that have inhabited the Arctic region for thousands of years and have cultures that are particularly sensitive to environmental changes, since they rely on hunting animals such as whales, seals, and walrus. To represent local concerns, the Arctic Waterways Safety Committee, which is comprised of subsistence hunters and others, was created in October 2014 to develop best practices for safe and efficient use of Arctic waterways. Alaska Native Corporations are private entities that manage land and assets on

behalf of Alaska Natives.¹⁵ Lastly, international forums such as the Arctic Council and international organizations such as the IMO also have a role in establishing Arctic maritime policies and regulations.¹⁶

For nearly 50 years the U.S. government has articulated its interest in the Arctic through a series of strategies. For example, in 1971 a then-classified memo from National Security Council (NSC) under the Nixon Administration called for the sound and rational development of the Arctic, guided by the principles of minimizing adverse environmental effects, promoting international cooperation, and protecting security interests, including the preservation of the freedom of the seas.¹⁷ These same priorities, along with promoting scientific research, were underscored by the Reagan Administration in 1983.¹⁸ In January 2009, the George W. Bush Administration issued an *Arctic Region Policy*, which outlined priorities for maritime transportation in the Arctic including to facilitate safe, secure, and reliable navigation and protect maritime commerce and the environment.¹⁹ More recently, the Obama Administration issued a *National Strategy for the Arctic Region (National Strategy)* in May 2013, which identified three goals for the region: to advance U.S. security interests, pursue responsible stewardship, and strengthen international cooperation.²⁰ Subsequent implementation plans for the *National Strategy* indicated maritime shipping and infrastructure fell under all three of these stated goals. For example, “preparing for increased activity in the maritime domain” fell under advancing U.S. security interests, “charting

¹⁵Under the 1971 Alaska Native Claims Settlement Act (Pub. L. No. 92-203, 85 Stat. 688 (1971)), as amended, approximately 44 million acres of land and a nearly \$1 billion cash payment were conveyed to Alaska Native Corporations in exchange for extinguishing aboriginal land claims in Alaska. Overall, 12 regional corporations within Alaska formed and have since grown into diverse and often large businesses, important to Alaska’s economy. For more information on Alaska Native Corporations see GAO, *Regional Alaska Native Corporations: Status 40 Years after Establishment, and Future Considerations*, [GAO-13-121](#) (Washington, D.C.: Dec. 13, 2012).

¹⁶The Arctic Council is an intergovernmental forum for the eight Arctic states (United States, Canada, Denmark, Finland, Iceland, Norway, Sweden, and Russia).

¹⁷National Security Council, *United States Arctic Policy and Arctic Policy Group* National Security Decision Memorandum 144 (Washington, D.C.: Dec. 22, 1971).

¹⁸White House, *United States Arctic Policy* National Security Decision Directive Number 90 (Washington, D.C.: Apr. 14, 1983).

¹⁹White House, *Arctic Region Policy*, National Security Presidential Directive/ NSPD-66 and Homeland Security Presidential Directive/ HSPD-25 (Washington, D.C.: Jan. 9, 2009).

²⁰White House, *National Strategy for the Arctic Region* (Washington, D.C.: May 10, 2013).

the Arctic region” fell under pursuing responsible stewardship, and “promoting waterways management” fell under strengthening international cooperation.²¹

As federal strategies related to the Arctic region have evolved over the years, so have the interagency groups to implement and guide these efforts. Interagency activity in the U.S. Arctic has historically been coordinated through the NSC, including the 1971 and 1983 strategies. In 1984, legislation established the U.S. Arctic Research Commission as well as the Interagency Arctic Research Policy Committee (IARPC).²² More recently, to enhance coordination of national efforts in the Arctic, particularly those related to the 2013 *National Strategy*, a 2015 Executive Order established the interagency Arctic Executive Steering Committee (AESC).²³ AESC is chaired by the Director of the Office of Science and Technology Policy (OSTP), which is an office within the White House that leads interagency science and technology policy coordination efforts. AESC also includes NSC as a member, along with 20 other federal departments and entities. The 2016 *National Strategy* Implementation Framework assigned portions of the strategy’s areas of focus to interagency groups;²⁴ specifically, NSC was assigned responsibility for advancing national security interests, OSTP for pursuing responsible stewardship, and the Department of State for strengthening international cooperation.

The U.S. Committee on the Marine Transportation System (CMTS), which was required in 2010 to coordinate the establishment of domestic transportation policies in the Arctic to ensure safe and secure maritime shipping,²⁵ has issued several relevant reports, including a 10-year projection of maritime activity in 2015, and a 10-year prioritization of

²¹White House, *Implementation Plan for the National Strategy for the Arctic Region* (Washington, D.C.: Jan. 30, 2014). The implementation plan was superseded in March 2016 by the *Implementation Framework for the National Strategy for the Arctic Region*.

²²Arctic Research and Policy Act of 1984, Pub. L. No. 98-373, §§ 103, 107, 98 Stat. 1242, 1248 (codified as amended at 15 U.S.C. §§ 4102, 4106).

²³Executive Order 13689—Enhancing Coordination of National Efforts in the Arctic, 80 Fed. Reg. 4191 (Jan. 26, 2015).

²⁴White House, the *Implementation Framework for the National Strategy for the Arctic Region* (Washington, D.C.: Mar. 9, 2016).

²⁵Pub. L. No. 111-281, § 307(c), 124 Stat. 2905, 2928 (2010) (codified, as amended, at 14 U.S.C. § 716(c)).

infrastructure needs in the U.S. Arctic in 2016—both of which were directed by the 2014 *National Strategy* implementation plan.²⁶ More recently, CMTS issued a 2018 report revisiting its 2016 near-term recommendations for prioritizing infrastructure needs in the U.S. Arctic and a 2019 update to its projections of Arctic maritime shipping activity from 2020 to 2030.²⁷ These and other reports addressing maritime infrastructure in the U.S. Arctic are listed in appendix I.

Maritime Shipping in the U.S. Arctic Generally Increased from 2009 through 2019 but Remains Limited and Was Affected by Several Factors

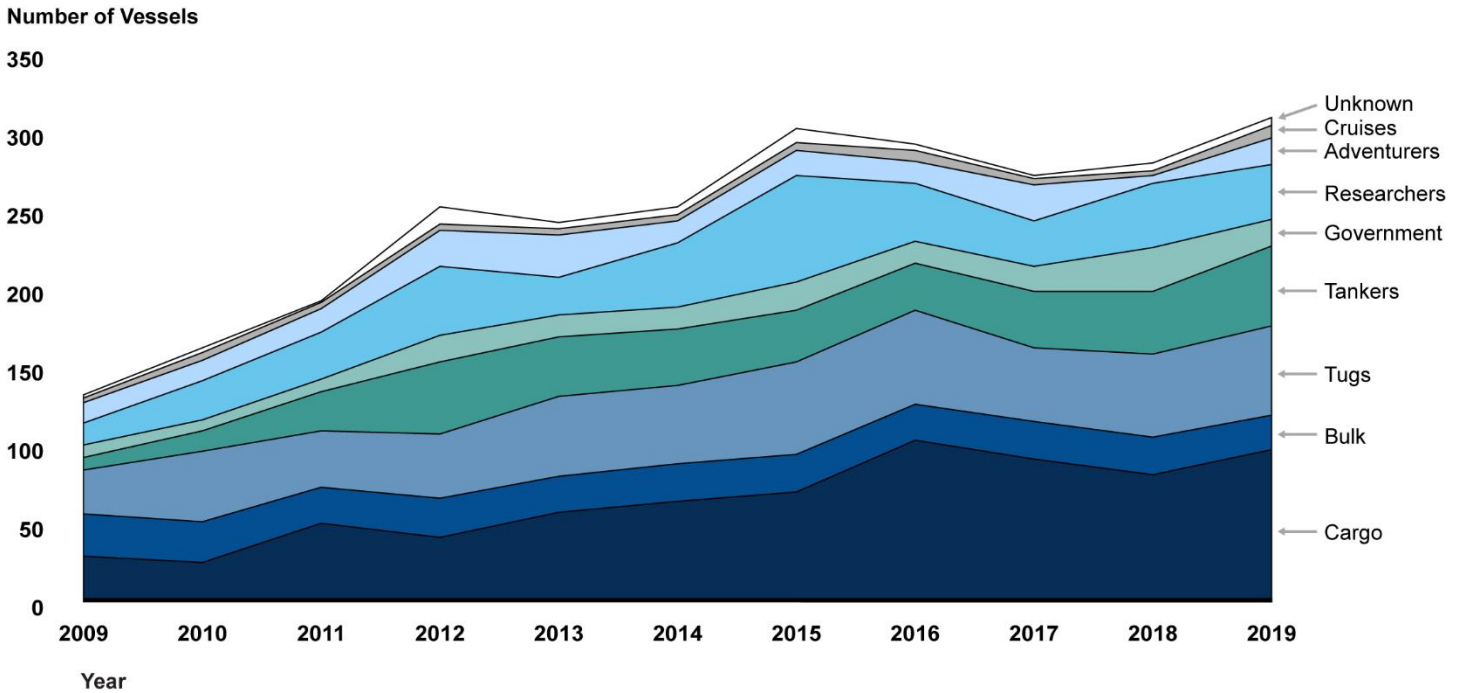
Maritime Shipping in the U.S. Arctic Increased from 2009 through 2019 with a Range of Vessel Types Represented

U.S. Coast Guard data indicate the number of vessels in the U.S. Arctic increased from 2009 through 2019 (see fig. 3). The types of vessels the U.S. Coast Guard tracks in the U.S. Arctic includes vessels conducting marine scientific research; tugs that provide communities with supplies; and adventurer vessels such as private yachts. U.S. Coast Guard data also include bulk cargo vessels from the Red Dog mine, one of the largest zinc mines in the world. The mine trucks its zinc ore to a facility on the Chukchi Sea, where it is stored for maritime transport during the shipping season. The U.S. Coast Guard District responsible for the U.S. Arctic counts more types of vessels in its area of interest—such as research, tug, and adventurer—than are typically counted for the purposes of tracking commercial shipping.

²⁶See CMTS, *A 10-Year Projection of Maritime Activity in the U.S. Arctic Region* (Washington, D.C.: Jan. 1, 2015) and CMTS, *A Ten-Year Prioritization of Infrastructure Needs in the U.S. Arctic* (Washington, D.C.: Apr. 15, 2016). The implementation plan also called for recommendations for pursuing federal public-private partnerships. See CMTS, *Recommendations and Criteria for Using Federal Public-Private Partnerships to Support Critical U.S. Arctic Maritime Infrastructure* (Washington, D.C.: January 2017).

²⁷CMTS, *Revisiting Near-Term Recommendations to Prioritize Infrastructure Needs in the U.S. Arctic* (Washington, D.C.: 2018) and CMTS, *A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020-2030* (Washington, D.C.: September 2019).

Figure 3: Number of Vessels in the U.S. Coast Guard (USCG) District 17 Arctic Area of Interest by Type, 2009-2019



Source: GAO analysis of U.S. Coast Guard data. | GAO-20-460

Note: The USCG District 17 area of interest extends north of the Bering Strait to the North Pole, east to Banks Island in the Canadian Arctic, and west to the New Siberian Islands in Russia.

Even at its peak, maritime shipping in the U.S. Arctic remained limited compared to global commercial shipping, although CMTS recently reported that the number of flag states, or countries where vessels are registered, has increased. Specifically, the 307 vessels in the U.S. Arctic in 2019 represented a small portion of the total number of shipping vessels operating globally. For comparison, according to the United Nations Conference on Trade and Development, in 2015 the world fleet of commercial shipping vessels was approximately 89,000.²⁸ However, in its 2019 traffic projections report, CMTS analyzed U.S. Coast Guard data and other data sources and found that between January 2015 and December 2017, the number of flag states in the U.S. Arctic increased.²⁹ CMTS noted this indicates a shift away from regionally focused operators

²⁸United Nations Conference on Trade and Development, *Review of Maritime Transport 2015*, UNCTAD/ RMT/ 2015 (Geneva, Switzerland: October 2015).

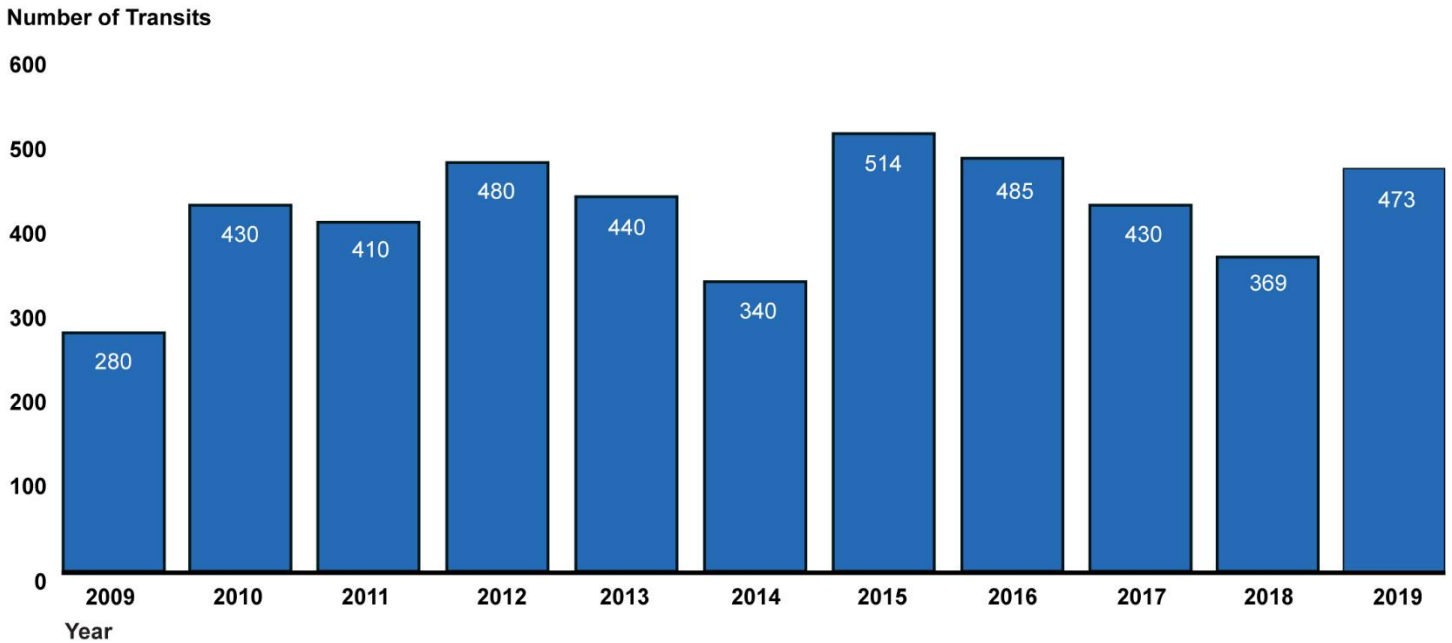
²⁹CMTS, *A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020-2030* (Washington, D.C.: September 2019).

toward a more diverse and international set of operators. CMTS found that the majority of vessels were flagged to the United States (about 41 percent) or Russia (about 24 percent) over this time period, with the remaining 35 percent from 35 other flag states, each with a considerably smaller percentage than the United States or Russia.

Given that a single vessel can make multiple trips per shipping season, U.S. Coast Guard also measures maritime activity by the number of transits that vessels make per year through the Bering Strait, a key convergence point for trans-Arctic routes that connects the NWP and NSR to the Pacific Ocean. According to U.S. Coast Guard data, the number of transits through the Bering Strait has ranged from as few as 280 in 2009, to as many as 514 in 2015 (see fig. 4). There were far fewer transits through the Bering Strait than through some other convergence points for established major maritime transportation routes that have more developed maritime infrastructure. For example, the number of transits through the Panama Canal, which like the NWP connects the Atlantic and Pacific Oceans, was almost 14,000 in 2018 and the number of vessels that transited the Suez Canal, which like the NSR enables shipping between Asia and Europe, was over 18,000.³⁰

³⁰Panama Canal Authority, *Annual Report 2018* (Balboa, Ancon, Republic of Panama: 2019); Suez Canal Authority Information Center, *Suez Canal Traffic Statistics Annual Report 2018* (Ismailia, Egypt: 2018).

Figure 4: Number of Transits in the Bering Strait, 2009-2019



Source: GAO analysis of U.S. Coast Guard data. | GAO-20-460

Factors Affecting Arctic Maritime Shipping Included Changes in Domestic and International Demand and Unpredictable Conditions

Stakeholders told us that along with factors such as demand that shape shipping trends worldwide, factors unique to the Arctic also play a role, such as potential cost savings due to shorter routes; additional operating costs incurred by Arctic-capable ships; environmental hazards like unpredictable weather and sea ice; and a lack of maritime infrastructure typically found along shipping routes. The 20 stakeholders we interviewed representing the shipping industry, research institutions, and state, local, and Alaska Native groups among others, described the following factors that affect U.S. Arctic maritime shipping.

Domestic and International Demand

As mentioned earlier, diminished sea ice has presented opportunities for maritime shipping of natural resources extracted from the Arctic, such as oil, gas, and minerals. However, such activities decreased domestically

after Royal Dutch Shell, PLC (Shell) discontinued its offshore oil and gas exploration of the Burger prospect in Alaska's Chukchi Sea in 2015.³¹ As shown in figure 4, the number of transits in the Bering Strait steadily declined from 514 in 2015 to 369 in 2018. Specifically, CMTS reported that Shell demobilized its drill ship, anchor handling vessels, and anti-pollution ships from the study area prior to the start of the 2016 shipping season.³² One stakeholder said there was a reduction in the number of seasonal transits after Shell suspended exploration activities, since Shell had previously accounted for more than a hundred transits through the Bering Strait. Other traffic related to domestic natural resource extraction stayed at consistent levels. Specifically, representatives from the Red Dog zinc mine reported that from 1999 to 2019 they consistently shipped between 21 and 26 cargo vessels per year, averaging 24 vessels per year over the 20-year period. Meanwhile, several stakeholders said international activities related to natural resource development, particularly in the Russian Arctic, have recently increased, and that Russia has been investing heavily in Arctic infrastructure. The U.S. Coast Guard attributed increased cargo traffic levels in 2016 to construction projects in the Russian Arctic, particularly a liquefied natural gas (LNG) facility on the Yamal peninsula (see fig. 3 above). In 2017, a Russian LNG tanker, the *Christophe de Margerie*, became the first ship to transit the NSR without being accompanied by an icebreaker.

Demand for tourism cruises in the U.S. Arctic has increased slightly recently. A representative from an Arctic cruise industry association told us that the overall cruise industry worldwide grows 5 to 10 percent a year and that there is growing demand for expedition cruises to farther-flung areas like the Arctic. In both 2016 and 2017, the cruise ship *Crystal Serenity* transited the NWP with over a thousand passengers on board. Stakeholders noted that cruise ship voyages in the U.S. Arctic, such as the *Crystal Serenity* voyages, raised concerns for passenger safety given the lack of infrastructure, particularly for search and rescue. However, according to an Arctic cruise industry association representative, the number of smaller ships purpose-built for Arctic conditions is growing; the association estimates 25 to 30 such vessels are under construction.

³¹Royal Dutch Shell, PLC, "Shell Updates on Alaska Exploration," press release, Sept. 28, 2015.

³²CMTS, *A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020-2030* (Washington, D.C.: September 2019).

Domestic and foreign research vessels have also increased in number in the U.S. Arctic due to greater interest in the region's changing environment. For example, according to National Science Foundation officials, their polar-capable vessel *Sikuliaq* entered service in 2016. Internationally, China has increased its activity in the Arctic since gaining observer status on the Arctic Council in 2013 and now operates two icebreaking research vessels.³³ One stakeholder said that such investments by countries such as China may be the first step towards achieving longer-term economic goals for those countries.

Cost of Operations

Trans-Arctic routes can reduce travel time between certain destinations compared to traditional routes and may therefore reduce fuel and labor costs. For example, the route from Shanghai, China, to Northwestern Europe via the NSR is 27 percent shorter than via the Suez Canal.³⁴ The operators of the Russian LNG tanker that transited the NSR in 2017, the *Christophe de Margerie*, reported they completed the journey in 19 days, 30 percent faster than the Suez Canal.³⁵ For reasons such as these, according to news reports, Russia has announced plans to develop the NSR and ship 80 million tons of goods through the route by 2024.³⁶ Similarly, an official from a Canadian ship owner and operator told us that, depending on the vessel's origin and destination, using the NWP can be 10-15 days faster than using the Panama Canal, resulting in a cost savings of \$100,000 to \$150,000.

Although trans-Arctic routes have the potential for cost savings due to shorter distances, they require additional investments not necessary for

³³According to a Department of Defense report to Congress, Chinese civilian research could support a strengthened Chinese military presence in the Arctic Ocean, and the Arctic region is an area of opportunity for Russian-Chinese commercial cooperation. See Department of Defense, Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2019*.

³⁴CBS Maritime, *Arctic Shipping- Commercial Opportunities and Challenges* (Copenhagen, Denmark: January 2016). The route from Shanghai, China, to Northwestern Europe is 7,688 nautical miles via the NSR and 10,532 nautical miles via the Suez Canal.

³⁵Sovcomflot (SCF), "Sovcomflot's unique LNG carrier sets new record with Northern Sea Route transit of just 6.5 days," August 23, 2017.

³⁶Atle Staalesen. "It's an Order from the Kremlin: Shipping on Northern Sea Route to Reach 80 Million Tons by 2024." *The Independent Barents Observer*, May 15, 2018.

traditional routes that may offset those savings. For example, representatives of one carrier said Arctic-capable ships cost three to four times more than ordinary ships because they require more steel and higher power output to withstand ice conditions. The additional steel also limits the amount of cargo the vessel can carry; representatives from another carrier noted every ton of steel used to construct the ship is a ton of cargo that the ship cannot carry in order to recoup expenses. The size of vessels that can safely operate in the region is also constrained by draft limitations that specify the maximum weight and size at which ships can navigate the shallow waters of the Arctic. By contrast, the trend among ocean carriers over the past decades, which have capitalized on advances in fuel-efficient engine technology, is toward constructing increasingly larger vessels to capture economies of scale.³⁷ In addition, stakeholders told us that shippers operating in the Arctic must invest in special onboard equipment and prepare for contingencies due to the lack of maritime infrastructure usually found in traditional routes, such as deep-draft ports, harbors of refuge, reliable communications, and search and rescue infrastructure. Stakeholders noted Arctic voyages also require additional training for crew members on navigating in ice conditions.

Shippers must determine whether the cost savings obtained from shorter trans-Arctic routes outweigh the additional operating expenses. For example, although Maersk, one of the largest shipping companies in the world, successfully completed a trial passage of a container ship through the NSR in September 2018, the company emphasized at the time that the transit was a “one-off trial designed to gain operational experience in a new area and to test vessel systems” and that it did not view the route as a commercially viable alternative to existing routes. In a press release, Maersk noted that the NSR was only feasible for around 3 months a year and required the use of more costly ice-classed vessels.³⁸ Despite this, news reports in June 2019 indicate Maersk is exploring sending more goods through the NSR in cooperation with a Russian icebreaker

³⁷GAO, *West Coast Ports: Better Supply Chain Information Could Improve DOT's Freight Efforts* [GAO-17-23](#) (Washington, D.C.: Oct. 31, 2016).

³⁸Maersk, “Press Release: Maersk concludes trial passage of Northern Sea Route,” Sept. 28, 2018.

company in response to demand for the transport of goods from Asia to West Russia.³⁹

Unpredictable Conditions and Lack of Infrastructure

Although diminished sea ice has prolonged the shipping season and opened up shipping routes, environmental changes have also resulted in less predictable conditions, such as more volatile weather and sea ice. One stakeholder involved with Arctic research noted that the conditions that have led to open waters can also lead to harsher conditions such as strong low pressure systems, gale force winds, and storms. Such conditions pose challenges for shipping—one shipper representative said that it is difficult to load barges in shallow waters and that typically loading and unloading activities have to be suspended with swells above 3 feet. In addition, stakeholders told us variation in ice conditions from year to year makes planning Arctic voyages difficult to do with reasonable accuracy. For example, while warming trends might suggest that overall sea ice diminishes further each year, one carrier representative noted its vessel encountered severe ice conditions in June 2018. This representative noted that diminished overall ice coverage can lead to localized conditions with more mobile and older ice migrating into shipping lanes. The unpredictable and harsh weather and ice conditions, combined with the vast distances and lack of maritime infrastructure, pose safety risks. For example, according to stakeholders, the “tyranny of distance” in the Arctic stretches the limited search and rescue capabilities, resulting in slow incidence response. Furthermore, a lack of a designated harbor of refuge means vessels do not have a place to moor safely in case of emergency. As a result, a representative from the International Union of Marine Insurance noted that in the Arctic even a minor incident, such as a small engine failure, can result in substantial damages and even loss of life.

Environmental Concerns

Some stakeholders we interviewed expressed concerns about impacts of shipping on wildlife, including the species that Alaska Natives rely on for food. One stakeholder noted that awareness has grown in the past 10 years of the environmental impact of shipping. Such impacts include

³⁹Reuters, “Maersk explores Arctic shipping route with Russia,” June 14, 2019; World Maritime News, “Maersk eyes Northern Sea Route collaboration with Atomflot,” June 17, 2019.

emissions containing sulphur oxide and black carbon from ships' engines that could damage the fragile Arctic ecosystem. As a result of such environmental concerns, the IMO is currently considering a ban on heavy fuel oil in the Arctic.⁴⁰ In addition, in 2019 several major carriers, including CMA CGM, Hapag-Lloyd, and Mediterranean Shipping Company, announced they would not pursue trans-Arctic shipping.⁴¹ Furthermore, in 2019 Nike and Ocean Conservancy launched the Arctic Corporate Shipping Pledge, a voluntary commitment by consumer goods and shipping logistics companies to not send ships through the Arctic.⁴² The pledge also supports precautionary Arctic shipping practices to enhance the environment and human safety, which may include a heavy fuel oil ban and an evaluation of low impact shipping corridors that protect important ecological and cultural areas. A representative of one carrier we spoke with said a heavy fuel oil ban in the Arctic could increase the cost of transporting cargo and, as a result, severely impact shipping in the region.

Agencies Have Taken Some Steps to Address Gaps in Maritime Infrastructure in the U.S. Arctic, but Federal Efforts Lack a Current Strategy and Consistent Leadership

While agencies have taken actions to address maritime infrastructure gaps, federal efforts lack (1) a government-wide assessment of risks posed by gaps in maritime infrastructure, (2) a current government-wide strategy for addressing maritime infrastructure that includes goals, performance measures, and appropriate responses to prioritized risks, and (3) an interagency mechanism and consistent leadership to guide agency actions related to maritime infrastructure. Without these elements,

⁴⁰The 7th session of the IMO's Sub-Committee on Pollution Prevention and Response, held February 17-21, 2020, agreed to draft amendments to introduce a prohibition on the use and carriage for use of heavy fuel oil by ships in Arctic waters on or after July 1, 2024. See IMO, Meeting Summary of the Sub-Committee on Pollution Prevention and Response (PPR7), February 17-21, 2020.

⁴¹CMA CGM, "Press Release: CMA CGM Will Not Use the Northern Sea Route," Aug. 23, 2019; Hapag-Lloyd, "Press Release: Will Hapag-Lloyd Sail Container Ships through the Arctic?" Sept. 30, 2019; MSC, "Press Release: MSC Rules Out Arctic Exploration on Environmental Concerns," Oct. 17, 2019.

⁴²Ocean Conservancy, "Press Release: Nike and Ocean Conservancy Announce New Arctic Shipping Pledge," Oct. 24, 2019.

federal agencies may lack information on which to base decisions and prioritize actions, assurance that their investments are directed to prioritized risks, and the ability to demonstrate progress in addressing maritime infrastructure. Furthermore, agencies may miss opportunities to work together and leverage resources towards achieving broader outcomes.

Agencies Have Taken Actions to Address Navigation and Other Gaps in U.S. Arctic Infrastructure

Agencies have taken some actions since 2013, when CMTS first reported on gaps in U.S. Arctic infrastructure. For example, U.S. Coast Guard reported that it has taken a flexible approach to addressing infrastructure gaps by establishing seasonal, forward operating bases in the U.S. Arctic as needed to provide search and rescue support in areas where major shipping activity is occurring. See table 3 for selected examples of agency actions.

Table 3: Examples of Federal Agency Actions to Address Maritime Infrastructure Gaps in the U.S. Arctic since 2013

Category	Examples	Agency actions in the U.S. Arctic
Environmental information	Charting and mapping	National Oceanic and Atmospheric Administration (NOAA) reported in 2019 that it had acquired nearly 1,500 square nautical miles of Arctic hydrographic survey data over the past 3 years, which accounts for a small percentage of the over 200,000 square nautical miles significant to navigation in the U.S. Arctic.
Environmental information	Weather and sea ice forecasting	NOAA increased its observations of weather and sea ice to improve modeling and forecasts by leveraging new satellite-based observational capabilities.
Response services	Search and rescue	The U.S. Coast Guard deploys surface and aviation assets to the U.S. Arctic seasonally based on activity levels. In 2015, the U.S. Coast Guard also led the formation of the Arctic Coast Guard Forum which includes coast guards from the eight Arctic countries to help ensure safe operations in the region. As part of the forum, the U.S. Coast Guard participated in a full-scale maritime search and rescue exercise in September 2017.
Response services	Oil spill response	In 2017, Department of Interior developed an Arctic Spill Response Database Query Tool to provide data on the availability of resources to respond to oil spills in the region. The Department of Interior, in conjunction with Norway, also completed a 2017 report for the Arctic Council on potential oil spill response systems in the Arctic marine environment.
Response services	Icebreakers	The U.S. Coast Guard initiated procurement of a polar security cutter, which is a type of heavy icebreaker, awarding a \$745.9 million contract for design and construction in April 2019.
Operating environment	Vessel requirements	The International Code for Ships Operating in Polar Waters (Polar Code) was adopted November 2014 by the International Maritime Organization’s (IMO) Maritime Safety Committee and entered into force in January 2017. The U.S. Coast Guard issued a policy letter in June 2018 on standards such as for training and certification in support of the Polar Code.

Category	Examples	Agency actions in the U.S. Arctic
Operating environment	Communications	The U.S. Coast Guard launched two satellites in December 2018 to test the extent to which satellites could improve communications in the Arctic environment; however, agency officials told us the satellites stopped operating within months of the launch.
Navigation	Deep-draft port	The U.S. Army Corps of Engineers has been conducting a feasibility study of a U.S. Arctic deep-draft port in Nome, Alaska since 2018. The study has an estimated cost of \$3 million, with the city of Nome funding half the cost.
Navigation	Harbors of refuge	U.S. Coast Guard District 17 has designated Port Clarence as a Potential Port of Refuge in the Arctic. However, the International Maritime Organization (IMO), the standard-setting authority for ship operators internationally, has not designated it as such.
Navigation	Managing waterways/ marine areas of ecological significance	The U.S. Coast Guard developed a joint proposal with Russia in 2017 for Bering Strait and Bering Sea shipping routes and precautionary areas that avoid key areas of fishing and subsistence activities among other risks, which the IMO approved in 2018. In 2018, the U.S. Coast Guard initiated a Port Access Route Study to proactively manage anticipated future increased shipping activity by studying possible routes for the northern coast (i.e., North Slope) of Alaska.

Source: GAO analysis of federal agency information. | GAO-20-460

Federal Efforts Lack a Government-wide Risk Assessment to Inform Decisions in the U.S. Arctic

Although federal agencies have taken some steps to address gaps in U.S. Arctic infrastructure, those efforts are not based on a government-wide assessment of the economic, environmental, and safety risks posed by maritime infrastructure gaps to inform investment decisions in the U.S. Arctic. Rather, agency officials said that they currently base Arctic infrastructure decisions on their agency-specific missions, strategies, and collaborative efforts. Specifically, agency officials said that securing the resources to address U.S. Arctic infrastructure is challenging because such projects must compete with other established agency mission areas. For example, officials told us that infrastructure investments may not compete as well against other agency-established priorities in other parts of the country, in part, because the Arctic is an emerging region and because of the considerable costs of developing infrastructure in the harsh Arctic environment.

Leading management practices we reviewed note the importance of assessing risks in order to select and prioritize countermeasures to prevent or mitigate risks. A 2016 Office of Management and Budget (OMB) circular emphasized the importance of risk assessment and called for agencies to use a structured and systematic approach to identify risks and assess the causes, sources, probability of the risk occurring, and

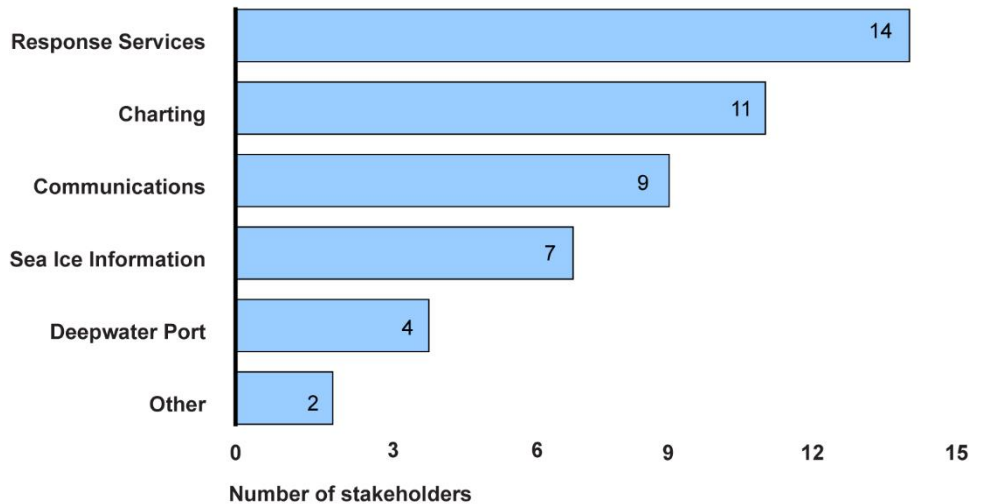
potential outcomes, and then prioritize the results of the analysis.⁴³ Such an approach can be used by decision makers to evaluate the effectiveness of, and to prioritize, countermeasures relative to the associated costs. Risk management is a widely endorsed strategy for helping policymakers make decisions about allocating finite resources and taking actions in conditions of uncertainty.⁴⁴ Such a framework is especially applicable to the U.S. Arctic given the uncertain conditions in the region and safety and environmental risks described above.

Without a risk assessment, agencies lack assurance that their investments are addressing the highest-priority risks. In particular, we found that agencies' actions to address maritime infrastructure gaps were not fully consistent with the areas that the stakeholders we interviewed identified as the most critical (see fig. 5). For example, 11 of the 20 stakeholders we interviewed identified charting Arctic waters as the highest priority to address, and in May 2019 NOAA reported that it had acquired nearly 1,500 square nautical miles of hydrographic survey data in the Arctic over the prior 3 years. This is, however, less than 1 percent of the over 200,000 square nautical miles of waters NOAA has identified as significant to navigation in the U.S. Arctic. In addition, nine stakeholders identified addressing gaps in communications in the U.S. Arctic as a key priority. However, CMTS reports indicate no change in the status of communications capabilities in the U.S. Arctic between 2013 and 2018.

⁴³Office of Management and Budget, *Management's Responsibility for Enterprise Risk Management and Internal Control*, OMB Circular No. A-123 (July 15, 2016).

⁴⁴GAO, *Risk Management: Further Refinements Needed to Assess Risks and Prioritize Protective Measures at Ports and Other Critical Infrastructure*, [GAO-06-91](#) (Washington, D.C.: Dec. 15, 2005). See also GAO, *Enterprise Risk Management: Selected Agencies' Experiences Illustrate Good Practices in Managing Risks*, [GAO-17-63](#) (Washington, D.C.: Dec. 1, 2016). In addition to risk assessment, GAO's risk management framework also includes other phases, including: strategic goals, objectives, and constraints; alternatives evaluation; management selection; and implementation and monitoring.

Figure 5: Maritime Infrastructure Gaps by the Number of Stakeholders Identifying it as the Highest Priority to Address



Source: GAO. | GAO-20-460

Notes: The number of stakeholders interviewed by GAO (20) does not correspond to the total number of responses in the figure because some stakeholders identified multiple maritime infrastructure gaps as the highest priority.

Some stakeholders did not identify a maritime infrastructure gap as the highest priority to address, because they said they were not in a position to comment or considered all maritime infrastructure gaps to be a priority.

CMTS has in the past noted the importance of conducting a risk assessment to inform Arctic decision-making. Specifically, CMTS’s 2013 report noted that greater access to the U.S. Arctic and increased activity presents additional risks for people, vessels, and the environment in the fragile region and that managing that risk requires an in-depth understanding of the issues and trade-offs associated with key decisions. Although CMTS reported that developing an assessment tool that provides a quantifiable level of risk and that accounts for the unique risk elements in the Arctic was a challenge for the nation, it proposed a model for determining risk that considered the likelihood of adverse events actually occurring, vulnerability to damage, and potential consequences. CMTS further stated that, given the rate at which other nations are progressing with Arctic shipping and development, the United States should decide the acceptable degree of risk for Arctic operations.

Although CMTS has provided useful information on maritime infrastructure gaps to decision makers and described possible risks to the U.S. Arctic, it has not systematically assessed the risks posed by these gaps. For example, in 2016, CMTS made near-, mid-, and long-term

recommendations for addressing maritime infrastructure needs, but noted this ordering was not intended to create a hierarchy of infrastructure needs from most to least important. CMTS officials told us that they have not systematically assessed risks posed by maritime infrastructure gaps in the U.S. Arctic because CMTS's priorities are established by its member agencies, and that CMTS has not been directed to conduct such an assessment by its members. However, CMTS is required by statute to, among other things, coordinate the establishment of domestic transportation policies in the Arctic to ensure safe and secure maritime shipping⁴⁵ and make recommendations with regard to federal policies that impact the marine transportation system.⁴⁶ Furthermore, according to CMTS officials, there is nothing in CMTS's authority that would prevent it from doing a risk assessment.

Given its previous reports and work in the U.S. Arctic and its coordinating role with its member agencies, CMTS is well suited to conduct a government-wide assessment of the risks posed by gaps in maritime infrastructure in the U.S. Arctic. For example, CMTS published a traffic projections report in September 2019 that aimed to provide decision makers with a wide-ranging portrait of potential changes in vessel activity in the U.S. Arctic over the next decade. To inform its risk assessment, CMTS can draw on the expertise of its member agencies, such as U.S. Coast Guard and NOAA. For example, U.S. Coast Guard officials told us that they have responded to the unpredictable economic changes in the U.S. Arctic—including fluctuations in the level and type of maritime activity in the region—by investing in icebreakers and seasonal forward operating bases, rather than developing permanent infrastructure. In addition, CMTS can also draw on numerous reports discussing maritime infrastructure in the U.S. Arctic that have been published since 2013, as detailed in appendix I. For example, in 2019 the University of Alaska's Arctic Domain Awareness Center held a series of workshops on the factors that impact the ability of the U.S. Coast Guard and other stakeholders to conduct safe, secure, and effective operations in the Arctic environment.⁴⁷

⁴⁵14 U.S.C. § 716(c).

⁴⁶46 U.S.C. § 55501(e).

⁴⁷Arctic Domain Awareness Center, *Arctic IoNS 2019 Alaska Native and Rural Arctic "Insights" Community Workshop* (Nome, Alaska: University of Alaska, 2019).

A government-wide risk assessment could better enable agencies to evaluate potential U.S. Arctic infrastructure expenditures and assess the extent to which these expenditures will mitigate identified risks. For example, a report on the U.S. Coast Guard's Arctic capabilities suggested that a systematic analysis of needs and risks in the U.S. Arctic could help the agency generate momentum for closing Arctic capability gaps.⁴⁸ By conducting such a risk assessment, agencies would have better information on which to base decisions for agency expenditures in the U.S. Arctic and prioritize appropriate actions in response to risks.

Federal Interagency Efforts Lack a Current Strategy and Consistent Interagency Leadership to Guide Agency Actions Related to Maritime Infrastructure

We found that the federal interagency efforts to address U.S. Arctic maritime infrastructure lack a current strategy and consistent interagency leadership to guide agencies' actions. Although several agencies have developed strategies to guide their own agencies' efforts, these do not provide government-wide direction or establish current government-wide goals, objectives, and performance measures as leading management practices call for. Moreover, the federal agencies lack clarity on which interagency entity is responsible for guiding federal efforts and providing consistent leadership to ensure government-wide objectives are met.

Current Strategy

The federal government lacks a current government-wide strategy for addressing U.S. Arctic maritime infrastructure gaps that includes key characteristics, such as goals, objectives, and performance measures, and appropriate responses to risks. Agency officials and stakeholders said the 2013 *National Strategy* is outdated because conditions in the U.S. Arctic have changed since 2013. In particular, agency officials said national security is a growing concern in the Arctic. OSTP officials agreed that conditions had changed in the Arctic, but could not state whether the 2013 *National Strategy* was still current. Our past work on interagency

⁴⁸RAND Corporation, *Identifying Potential Gaps in U.S. Coast Guard Arctic Capabilities*, RR-2310-DHS (Santa Monica, Calif.: 2018). This research was sponsored by the U.S. Coast Guard Office of Emerging Policy and conducted within the Homeland Security Operational Analysis Center, a federally funded research and development center operated by the RAND Corporation under contract with the Department of Homeland Security.

collaboration found that written agreements documenting how participating agencies collaborate, such as strategies, are most effective when they are regularly updated and monitored.⁴⁹ The changing conditions in the Arctic described above make a current government-wide strategy for maritime infrastructure in the U.S. Arctic particularly important.

In our past work, we have reported that complex interagency efforts—such as those to address maritime infrastructure in the U.S. Arctic—can benefit from developing a national strategy.⁵⁰ Our prior work has identified key characteristics of national strategies, which we refer to in this report as a government-wide strategy, including: (1) problem definition and risk assessment which addresses the threats the strategy is directed towards; and (2) goals, objectives, and performance measures to gauge and monitor results.⁵¹ Furthermore, our prior enterprise risk management work has noted that risk assessment should include a ranking of risks based on priorities in relation to strategic objectives, and that senior leaders should determine if a risk requires treatment or not based on risk tolerance or appetite. Leaders then review the prioritized list of risks and select the most appropriate response to address the risk.⁵² These key characteristics help managers determine the extent of investment needed and facilitate effective targeting of federal resources; this is especially important when multiple agencies are involved, as is the case with maritime infrastructure in the U.S. Arctic.

Although several federal agencies have recently updated their Arctic strategies, these agency-specific Arctic strategies are not linked to a current government-wide strategy for the Arctic region and are not specifically focused on addressing Arctic maritime infrastructure gaps. Specifically:

⁴⁹GAO, *Managing for Results: Key Considerations for Implementing Interagency Collaborative Mechanisms*, [GAO-12-1022](#) (Washington, D.C.: Sept. 27, 2012).

⁵⁰GAO, *Biosurveillance: Efforts to Develop a National Biosurveillance Capability Need a National Strategy and a Designated Leader*, [GAO-10-645](#) (Washington, D.C.: June 30, 2010).

⁵¹[GAO-04-408T](#).

⁵²[GAO-17-63](#).

- **U.S. Coast Guard.** In April 2019, U.S. Coast Guard published its Arctic Strategic Outlook, which supersedes its 2013 Arctic Strategy.⁵³ The updated strategy established three lines of effort: (1) enhance capability to operate effectively in a dynamic Arctic domain, (2) strengthen the rules-based order, and (3) innovate and adapt to promote resilience and prosperity.⁵⁴ We recommended in 2016 that the U.S. Coast Guard develop measures for assessing how its actions have helped to mitigate Arctic capability gaps and design and implement a process to systematically assess its progress.⁵⁵ However, as of February 2020, the U.S. Coast Guard has not implemented these recommendations.⁵⁶ U.S. Coast Guard officials state that they are currently developing an implementation plan and Strategic Metrics Framework for the Arctic Strategic Outlook.
- **U.S. Navy.** In January 2019, the U.S. Navy published its Arctic strategy, which updated its previous strategy from 2014.⁵⁷ The updated strategy included the following strategic objectives: defend U.S. sovereignty and the homeland from attack; ensure the Arctic remains a stable, conflict-free region; preserve freedom of the seas; and promote partnerships to achieve the above objectives.
- **Department of Defense.** In June 2019, Department of Defense updated its 2016 Arctic strategy which included the following as part of its approach: (1) building Arctic awareness, (2) enhancing Arctic operations, and (3) strengthening the rules-based order in the Arctic.⁵⁸
- **NOAA.** NOAA officials originally told us that they were working to complete an update to NOAA's strategic plan for the Arctic in 2019.

⁵³U.S. Coast Guard, *United States Coast Guard Arctic Strategy* (Washington, D.C.: May 2013).

⁵⁴U.S. Coast Guard, *United States Coast Guard Arctic Strategic Outlook* (Washington, D.C.: April 2019).

⁵⁵[GAO-16-453](#)

⁵⁶GAO, *Arctic Capabilities: Coast Guard is Taking Steps to Address Key Challenges, but Additional Work Remains*, [GAO-20-374T](#) (Washington, D.C.: Feb. 5, 2020).

⁵⁷U.S. Navy, *Strategic Outlook for the Arctic*, January 2019; U.S. Navy, *U.S. Navy Arctic Roadmap 2014-2030*, February 2014.

⁵⁸U.S. Department of Defense. *Report to Congress Department of Defense Arctic Strategy* (June 2019). Section 1071 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 required the Secretary of Defense to submit a report on an updated Arctic strategy to improve and enhance joint operations to the congressional defense committees. Pub. L. No. 115-232, § 1071, 132 Stat. 1636 (1978).

However, as of February 2020, officials told us that this update is currently on hold pending the completion of a new government-wide *National Strategy*. As mentioned previously, OSTP staff said they could not state whether the 2013 *National Strategy* was still current, and OSTP provided no additional information as to whether a new strategy was in development. NOAA officials told us that the agency's current three priorities in the Arctic are (1) weather and water (including weather and water research, observations, and Arctic contributions to global weather monitoring); (2) blue economy (including ocean mapping, seafood competitiveness, tourism, and coastal resilience); and (3) innovative partnerships in Alaska and the Arctic.⁵⁹

CMTS has taken some steps to monitor agencies' progress in addressing maritime infrastructure, but the current lack of performance measures makes it difficult to monitor agencies' progress over time. We reported in 2014 that CMTS was developing a process to monitor such progress and noted that such monitoring would help agencies develop a shared understanding of current priorities and actions needed.⁶⁰ However, while CMTS did issue reports that described the status of maritime infrastructure in the U.S. Arctic in 2016 and 2018, the reports did not include goals or performance measures to assess agencies' progress. According to officials, CMTS did not develop or include performance measures to monitor agencies' progress because it does not have the authority to designate agencies' priorities, and that agencies are best situated to identify priorities in pursuit of their individual missions.

Priorities in the U.S. Arctic are currently based on each agency's mission, which makes it difficult to take a government-wide approach to responding to risks. To improve unity of effort, the U.S. Coast Guard has expressed support for a national approach to Arctic planning in both its 2013 and 2019 Arctic strategies. Without a current government-wide strategy that includes goals and objectives, agencies lack assurance that their investments are directed to prioritized risks. Furthermore, without performance measures, agencies are not able to demonstrate, and

⁵⁹The term "blue economy" has been used in different ways, including to encompass the range of economic sectors and related policies that aim to promote economic growth and preserve or improve livelihoods while at the same time ensuring the environmental sustainability of oceans and coastal areas. See United Nations, World Bank Group, *The Potential of the Blue Economy: Increasing Long-term Benefits of the Sustainable Use of Marine Resources for Small Island Developing States and Coastal Least Developed Countries*, (Washington, D.C.: 2017).

⁶⁰[GAO-14-299](#).

decision makers are unable to monitor, the extent to which agency actions have addressed maritime infrastructure gaps.

Interagency Leadership

We have previously reported that federal agencies use a variety of mechanisms, including interagency groups, to implement interagency collaborative efforts and that such mechanisms benefit from key features such as sustained leadership and inclusion of all relevant participants, such as stakeholders.⁶¹ We also reported that leadership should be sustained over time to provide continuity for long-term efforts and that having top-level commitment from the President, Congress, or other high-level officials can strengthen the effectiveness of interagency collaborative groups. We also found that lack of continuity is a frequent issue with interagency mechanisms that are tied to the Executive Office of the President, particularly when administrations change, and that transitions and inconsistent leadership can weaken a collaborative mechanism's effectiveness. In addition, our prior work has noted the importance of ensuring that all relevant participants are included in the collaborative effort, such as participants with the appropriate knowledge, skills, and abilities to contribute.

There are many interagency groups involved in the U.S. Arctic, including:

- **AESC** was established by Executive Order in 2015 to shape national priorities and set strategic direction in the Arctic.
- **NSC Arctic Policy Coordinating Committee (PCC)** is the current interagency forum for executive-level Arctic collaboration, according to agency officials.
- **CMTS** is the main forum for collaboration regarding maritime infrastructure according to agency officials.

These interagency groups vary in the extent to which they meet the key features noted above. Specifically:

- **Sustained leadership:** Both the NSC, which, as mentioned previously, has traditionally played a role in Arctic collaboration dating back to 1971, and the AESC, which was chaired by the OSTP within the White House, would have top-level commitment given their proximity to the White House. However, according to agency officials, the AESC has not met in

⁶¹[GAO-12-1022](#).

the past 2 years and is now dormant. OSTP staff told us that they are not aware of any current AESC activities. Meanwhile, although CMTS has been active in the area of U.S. Arctic maritime infrastructure for the past decade, CMTS officials said CMTS does not sit within the Executive Office of the President.⁶² As a result, CMTS officials note their role is to facilitate an interagency partnership, share information among member agencies, and provide information to decision-makers to support agencies' efforts. CMTS's statutory authority addresses, among other things, the coordination of federal policies that impact the maritime transportation system, including in the U.S. Arctic, rather than the development and execution of government-wide policies.

- **Inclusion of relevant stakeholders:** The AESC, when it was active, included a wide range of over 20 federal departments and entities, including those less associated with maritime infrastructure such as the Department of Agriculture. For the NSC Arctic PCC, we were unable to verify the participants, so it is unclear whether relevant stakeholders are involved. However, agency officials noted the PCC's focus is on national security rather than on maritime infrastructure, which may indicate not all maritime infrastructure stakeholders are included. Lastly, CMTS includes stakeholders involved directly with maritime transportation. For example, officials from the U.S. Army Corps of Engineers noted that they actively participate in CMTS, including its Arctic Integrated Action Team, but do not participate in other interagency groups, where they are often represented by higher-level Department of Defense officials.

The Executive Office of the President has not designated an interagency group as responsible for developing or executing the administration's strategy for maritime infrastructure in the U.S. Arctic. We have previously reported that interagency efforts can benefit from the leadership of a single entity to provide assurance that federal programs are well coordinated and based upon a coherent strategy.⁶³ Agency officials said priorities in the U.S. Arctic have shifted to national security under the current administration, which may have led executive-level interagency collaboration efforts to move from AESC to the NSC Arctic PCC. However, it is unclear whether the NSC Arctic PCC includes the relevant stakeholders. Moreover, the shift in Arctic priorities to security issues

⁶²According to CMTS officials, CMTS developed its Arctic Marine Transportation Integrated Action Team, which includes participants from 14 federal agencies and entities, in 2010. The lead agencies are U.S. Coast Guard, U.S. Maritime Administration, and NOAA.

⁶³GAO, *Combatting Terrorism: Selected Challenges and Related Recommendations* [GAO-01-822](#) (Washington, D.C.: Sept. 20, 2001).

does not diminish the importance of Arctic maritime infrastructure. As indicated in the 2013 National Strategy, maritime shipping and infrastructure are a key component of overarching goals in the region like advancing U.S. security interests, pursuing responsible stewardship, and strengthening international cooperation.

Without an interagency mechanism with sustained leadership and inclusion of relevant stakeholders to direct federal efforts related to U.S. Arctic maritime infrastructure, agencies may miss opportunities to leverage resources toward achieving a broader outcome. For example, as noted earlier, stakeholders we spoke to identified communications as a key infrastructure gap. According to U.S. Coast Guard officials, communications is a whole-of-government effort, requiring partnerships across agencies including the Department of Defense. Without an interagency collaboration mechanism designated to lead these efforts, it is unclear who has responsibility for such whole-of-government efforts to address maritime infrastructure in the U.S. Arctic.

Conclusions

The U.S. Arctic, including the Bering Strait, is an essential part of the increasingly navigable Arctic and a key convergence point for maritime transportation routes connecting the Pacific and Atlantic oceans. The risks inherent to Arctic shipping—including vast distances, extreme ice conditions, and unpredictable weather—are exacerbated by gaps in maritime infrastructure in the U.S. Arctic. While agencies have taken some actions to address these gaps, without a government-wide assessment of risks posed by maritime infrastructure gaps in the U.S. Arctic and a current strategy to address those risks, agencies lack assurance that their actions are effectively targeting priority areas. Without a strategy that includes goals, objectives, and performance measures, agencies cannot demonstrate the results of their efforts, and decision makers cannot gauge the extent of progress in addressing maritime infrastructure gaps. In addition, without a designated interagency group to provide sustained leadership, agencies lack the ability to leverage resources to address maritime infrastructure and achieve government-wide priorities in the complex and changing U.S. Arctic.

Recommendations for Executive Action

The U.S. Committee on the Marine Transportation System should:

- Complete a government-wide assessment of the economic, environmental, and safety risks posed by gaps in maritime infrastructure in the U.S. Arctic to inform investment priorities and decisions. (Recommendation 1)

The appropriate entities within the Executive Office of the President, including the Office of Science and Technology Policy should:

- Develop and publish a strategy for addressing U.S. Arctic maritime infrastructure that identifies goals and objectives, performance measures to monitor agencies' progress over time, and the appropriate responses to address risks. (Recommendation 2)
- Designate the interagency group responsible for leading and coordinating federal efforts to address maritime infrastructure in the U.S. Arctic that includes all relevant stakeholders. (Recommendation 3)

Agency Comments and Our Evaluation

We provided a draft of this report to the Executive Office of the President's Office of Science and Technology Policy (OSTP); the U.S. Committee on the Marine Transportation System (CMTS); and the Departments of Homeland Security, Commerce, Defense, Interior, State, and Transportation for comment. With the exception of the Department of Defense, all of these entities provided technical comments, which we incorporated as appropriate. Only CMTS provided written comments, which were transmitted via letter from the Department of Transportation, and are reprinted in appendix II.

In its technical comments, the Department of Homeland Security's U.S. Coast Guard provided Arctic traffic data for the 2019 shipping season. As stated in our report, we originally selected the decade of 2009 through 2018 for our analysis when designing our review, as 2018 was the most recent year for which data were available at that time. In response to the U.S. Coast Guard's comments submitted in April 2020, we revised our report to include data from the 2019 shipping season on (1) the number of vessels in the U.S. Coast Guard District 17 Arctic area of interest and (2)

the number of transits in the Bering Strait, to ensure the report contained the most current information available.

In its written comments, CMTS partially concurred with our recommendation that CMTS complete a government-wide assessment of the economic, environmental, and safety risks posed by gaps in maritime infrastructure in the U.S. Arctic to inform investment priorities and decisions. However, CMTS also noted several areas of disagreement with our conclusions, which we address here:

First, CMTS noted that GAO's draft report contained dated information and that the 2019 data contradicts GAO statements that suggest a decrease in vessel activity since 2015. CMTS noted that the 2019 data shows that vessel traffic has increased steadily over the last decade, and that although growth slowed between 2015 and 2017, "it did not stall." However, we dispute this characterization. The 2019 shipping data included in this report emphasizes the finding from our draft report that maritime shipping activity generally increased over the time period of our review. However, this trend does not reflect a steady increase throughout the entire timeframe or "slowed growth" between 2015 and 2017 as CMTS indicates. Specifically, the data show year-to-year decreases in the number of vessels from 2015 to 2017 in the U.S. Coast Guard District 17 Arctic area of interest (see fig. 3) and in the number of transits in the Bering Strait from 2015 to 2018 (see fig. 4). CMTS's own 2019 report indicated that the number of vessels had decreased from a peak in 2015, after Shell's decision in 2015 to not pursue further exploratory drilling efforts.⁶⁴ As such, we stand by our description of the overall growth in maritime activity in the U.S. Arctic since 2009, as well as the pattern of declining traffic within that period from 2015 through 2018.

Second, CMTS also noted in its written comments that our use of data from 2009 to 2018 in the draft report do not lead to the conclusions and recommendation to assess infrastructure risks and prioritize future investment in the Arctic. We dispute this characterization. Our decision to include the 2019 data further emphasizes the finding in our draft report of a general increase in maritime activity in the U.S. Arctic and the need for an assessment of risks posed by gaps in maritime infrastructure. As we note in the report, CMTS has reported that the U.S. Arctic does not have the typical elements of a maritime infrastructure system such as a deep-

⁶⁴CMTS, *A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020-2030* (Washington, D.C.: September 2019).

draft port or robust communications infrastructure. These infrastructure gaps exacerbate the inherent challenges of maritime activity in the Arctic—vast distances, dangerous weather, and extreme ice conditions—that can pose safety risks to mariners and environmental risks to the fragile Arctic ecosystem. While agencies have taken some steps to address infrastructure gaps, without a risk assessment, agencies lack assurance that their investments are addressing the highest-priority risks. As such, we stand by our conclusion and recommendation that increasing maritime traffic poses risks, and a government-wide assessment of those risks would inform federal decisions on investments to appropriately address risks.

Third, CMTS disagreed with GAO's statement that a government-wide risk assessment could better enable agencies to evaluate potential U.S. Arctic infrastructure expenditures. Although CMTS agreed that understanding infrastructure gaps is critical to improving the Arctic marine transportation system, CMTS contends that such risk assessments are the responsibility of each agency as directed by the Office of Management and Budget (OMB). As we note in the report, many agencies have a role in U.S. Arctic maritime shipping and infrastructure and although agencies and others have conducted many reviews of maritime infrastructure in the U.S. Arctic (see appendix I), agency-by-agency assessments do not reflect or analyze risks from a government-wide perspective.

CMTS itself has previously noted the importance of evaluating risks on a government-wide basis. Specifically, in 2013 CMTS noted that increased activity in the U.S. Arctic presents additional risks for the people, vessels, and the environment and that managing that risk requires an in-depth understanding of the issues and trade-offs associated with key decisions, such as how to prioritize investments. As our report states, CMTS stated that developing a tool to assess the unique risk elements in the Arctic was a challenge for the nation, and it proposed a model for determining risk that considered the likelihood of adverse events actually occurring, vulnerability to damage, and potential consequences. This model is similar to the 2016 OMB circular, which called for agencies to, among other things, assess the causes, sources, probability of the risk occurring, and potential outcomes.⁶⁵ As stated in our report, given its previous work in the U.S. Arctic and its coordinating role with its member agencies,

⁶⁵OMB, *Management's Responsibility for Enterprise Risk Management and Internal Control*, OMB Circular No. A-123 (July 15, 2016).

CMTS is well suited to conduct a government-wide assessment of the risks posed by gaps in maritime infrastructure in the U.S. Arctic. As such, we stand by our recommendation.

Based on these items, CMTS did not agree to perform and lead a government-wide risk assessment. Instead, as an “alternate action” to address GAO’s recommendation, CMTS noted it plans to update a table of information published in its past reports on infrastructure gaps in the U.S. Arctic and provide an inventory of existing risk assessments and their criteria, which agencies can then use to improve their own assessments to inform decisions. In our view, the proposed action described by CMTS would not provide the same level of information proposed by CMTS itself in 2013 and by OMB’s 2016 circular, which calls for, among other things, assessing the causes, sources, probability of the risk occurring, and potential outcomes.

As stated in our report, CMTS is uniquely positioned as a federal interagency coordinating committee focused on the maritime transportation system to draw on the expertise of its member agencies, such as U.S. Coast Guard and the National Oceanic and Atmospheric Administration, to complete this risk assessment. Moreover, CMTS is required by statute to coordinate the establishment of domestic transportation policies in the Arctic to ensure safe and secure maritime shipping⁶⁶ and make recommendations with regard to federal policies that impact the marine transportation system.⁶⁷ Furthermore, according to CMTS officials, there is nothing in CMTS’s authority that would prevent it from doing a risk assessment. As such, we stand by our recommendation as written and do not believe CMTS’s alternate action is sufficient to address the recommendation.

In comments provided via email, OSTP neither agreed nor disagreed with the report’s recommendations. OSTP acknowledged the Arctic is of critical national importance and noted interagency coordination can be implemented through the entities of the National Science and Technology Council, which is located within OSTP. OSTP noted the need for, and role of additional federal coordination, such as the Arctic Executive Steering Committee, is under consideration by OSTP. We continue to believe that the appropriate entities within the Executive Office of the President, including OSTP, should designate the interagency group responsible for

⁶⁶14 U.S.C. § 716(c).

⁶⁷46 U.S.C. § 55501(e).

leading and coordinating federal efforts to address maritime infrastructure in the U.S. Arctic that includes all relevant stakeholders. As we note in our report, without an interagency collaboration mechanism designated to lead these efforts, it is unclear who has responsibility for whole-of-government efforts to address U.S. Arctic maritime infrastructure.

In addition, we stand by our other recommendation to OSTP and other entities within the Executive Office of the President to develop and publish a strategy for addressing U.S. Arctic maritime infrastructure that identifies goals and objectives, performance measures to monitor agencies' progress over time, and the appropriate responses to address risks. As we note in the report, without such a strategy agencies lack assurance that their actions are effectively targeting priority areas and decision makers cannot gauge the extent of progress in addressing maritime infrastructure gaps.

We are sending copies of this report to the appropriate congressional committees; the Executive Office of the President; the U.S. Committee on the Marine Transportation System; the Secretaries of Homeland Security, Commerce, Defense, Interior, State, and Transportation; and other interested parties. In addition, this report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or vonaha@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.



Andrew Von Ah
Director, Physical Infrastructure Issues

Appendix I: Reports Relevant to Maritime Infrastructure in the U.S. Arctic Published Since 2013

2013

National Ocean Council. *National Ocean Policy Implementation Plan*. Washington, D.C.: April 2013.

White House. *National Strategy for the Arctic Region*. Washington, D.C.: May 10, 2013.

U.S. Coast Guard. *United States Coast Guard Arctic Strategy*. Washington, D.C.: May 2013.

U.S. Committee on the Marine Transportation System. *U.S. Arctic Marine Transportation System: Overview and Priorities for Action*. Washington, D.C.: 2013.

2014

The White House. *Implementation Plan for the National Strategy for the Arctic Region*. Washington, D.C.: January 30, 2014.

U.S. Navy. *The United States Navy Arctic Roadmap for 2014 to 2030*. Washington, D.C.: February 2014.

GAO. *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.

U.S. Department of Commerce. National Oceanic and Atmospheric Administration. *NOAA's Arctic Action Plan: Supporting the National Strategy for the Arctic Region*. Silver Spring, M.D: April 2014.

GAO. *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.

2015

Brigham, L. W. *Alaska and the New Maritime Arctic Executive Summary: Executive Summary of a Project Report to the State of Alaska Department of Commerce, Community and Economic Development*. Fairbanks, A.K.: February 1, 2015.

The International Council on Clean Transportation. *A 10-Year Projection of Maritime Activity in the U.S. Arctic Region*. Washington, D.C.: January 2015. This report was contracted and coordinated under the U.S. Committee on the Marine Transportation System.

Executive Order No. 13689. *Enhancing Coordination of National Efforts in the Arctic*. 80 Fed. Reg. 4191. January 26, 2015.

The White House. Arctic Executive Steering Committee. *National Strategy for the Arctic Region Implementation Report*. Washington, D.C.: January 30, 2015.

Alaska Arctic Policy Commission. *Final Report of the Alaska Arctic Policy Commission*. Anchorage and Bethel, A.K.: January 30, 2015.

U.S. Army Corps of Engineers. Alaska District. *Alaska Deep-Draft Arctic Port System Study: Draft Integrated Feasibility Report, Draft Environmental Assessment (EA), and Draft Finding of No Significant Impact (FONSI)*. Nome, AK: February 2015.

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.

Arctic. *Status on Implementation of the AMSA 2009 Report Recommendations*. Tromsø, Norway: April 2015.

World Economic Forum. Global Agenda Council on the Arctic. *Arctic Investment Protocol: Guidelines for Responsible Investment in the Arctic*. Geneva, Switzerland: November 2015.

U.S. Coast Guard. *Arctic Strategy Implementation Plan*. Washington, D.C.: December 2015.

2016

Arctic Economic Council, Telecommunications Infrastructure Working Group. *Arctic Broadband: Recommendations for an Interconnected Arctic*. Tromsø, Norway: Winter 2016.

Copenhagen Business School and Arctic Institute. *Arctic Shipping: Commercial Opportunities and Challenges*. CBS Maritime, January 2016.

The White House. Arctic Executive Steering Committee. *2015 Year in Review: Progress Report on the Implementation of the National Strategy for the Arctic Region*. Washington, D.C.: March 2016.

The White House. Arctic Executive Steering Committee. *2015 Year in Review: Progress Report on the Implementation of the National Strategy for the Arctic Region; Appendix A, Implementation Framework for the National Strategy for the Arctic Region*. Washington, D.C.: March 2016.

U.S. Committee on the Marine Transportation System. Arctic Marine Transportation Integrated Action Team. *A Ten-Year Prioritization of Infrastructure Needs in the U.S. Arctic*. Washington, D.C.: April 15, 2016.

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.

Department of Defense. *Report To Congress On Strategy To Protect United States National Security Interests In The Arctic Region*. Washington, D.C.: December 2016.

2017

RAND Corporation. *Maintaining Arctic Cooperation with Russia: Planning for Regional Change in the Far North*. RR-1731-RC. Santa Monica, CA: 2017.

U.S. Committee on the Marine Transportation System. *Recommendations and Criteria for Using Federal Public-Private Partnerships to Support*

Critical U.S. Arctic Maritime Infrastructure. Washington, D.C.: January 2017.

Arctic Council, Emergency Prevention, Preparedness and Response. *Circumpolar Oil Spill Response Viability Analysis: Technical Report*. March 7, 2017.

Council of Foreign Relations. *Arctic Imperatives: Reinforcing U.S. Strategy of America's Fourth Coast*, New York, N.Y.: March 2017.

Ocean Conservancy. *Navigating the North: An Assessment of the Environmental Risks of Arctic Vessel Traffic*. Anchorage, A.K.: June 28, 2017.

Center for Strategic and International Studies, *Maritime Futures: The Arctic and the Bering Strait Region*. Washington, D.C.: November 2017.

2018

RAND Corporation. *Identifying Potential Gaps in US Coast Guard Arctic Capabilities*. RR-2310-DHS. Santa Monica, CA: 2018.

U.S. Committee on the Marine Transportation System. *Revisiting Near-Term Recommendations to Prioritize Infrastructure Needs in the U.S. Arctic*. Washington, D.C.: 2018.

Department of Defense. *Report to Congress on Assessment of Requirement for a Strategic Arctic Port*. Washington, D.C.: January 2018.

Department of Homeland Security, Office of the Chief Financial Officer. *Arctic Search and Rescue: Fiscal Year 2017 Report to Congress*. Washington, D.C.: March 13, 2018.

International Union of Marine Insurance. *IUMI Position Paper: Arctic Sailings*. Hamburg, Germany: August 2018.

U.S. Coast Guard Acquisition Directorate, Research & Development Center. *Alaska AIS Transmit Prototype Test, Evaluation, and Transition Summary Report for the Near Shore Arctic Navigational Safety Information System (ANSIS)*. New London, C.T.: October 2018.

GAO. *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.: November 8, 2018.

Alaska Federation of Natives. *Indigenous Engagement with Their Countries' Military and Civilian Services/ Government on Maritime Arctic Issues*. Anchorage, A.K.: December 2018.

RAND Europe. *The Future of Arctic Cooperation in a Changing Strategic Environment*, PE-268-RC. Cambridge, United Kingdom: 2018.

2019

U.S. Navy. *Strategic Outlook for the Arctic*. January 2019.

U.S. Coast Guard. *Arctic Strategic Outlook*. April 2019.

Department of Defense. Office of the Secretary of Defense. *Annual Report to Congress on Military and Security Developments Involving the People's Republic of China 2019*. Washington, D.C.: May 2, 2019.

Pompeo, Michael, R. Secretary of State. U. S. Department of State. *Looking North: Sharpening America's Arctic Focus*. Remarks. Rovaniemi, Finland, May 6, 2019.

Pompeo, Michael R. Secretary of State. U.S. Department of State. Remarks. Arctic Council Ministerial Meeting. Rovaniemi, Finland, May 7, 2019.

Department of Defense. Office of the Under Secretary of Defense for Policy. *Report to Congress on Department of Defense Arctic Strategy*. Washington, D.C.: June 2019.

U.S. Committee on the Marine Transportation System. *A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region. 2020-2030*: Washington, D.C.: September 2019.

Congressional Research Service. *Changes in the Arctic: Background and Issues for Congress*. Washington, D.C.: November 27, 2019.

U.S. Army Corps of Engineers, Alaska District. *Port of Nome Modification Feasibility Study: Draft Integrated Feasibility Report and Supplemental Environmental Assessment*. Nome, A.K.: December 2019.

**Appendix I: Reports Relevant to Maritime
Infrastructure in the U.S. Arctic Published
Since 2013**

2020

Congressional Research Service. *Changes in the Arctic: Background and Issues for Congress*. Washington, D.C.: January 23 2020.

Appendix I: Reports Relevant to Maritime Infrastructure in the U.S. Arctic Published Since 2013

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U.S. Department of Transportation
Office of the Secretary of Transportation

Assistant Secretary for Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

April 13, 2020

Andrew Von Ah
Director, Physical Infrastructure Issues
U.S. Government Accountability Office (GAO)
441 G Street NW
Washington, DC 20548

Dear Mr. Von Ah:

The U.S. Committee on the Marine Transportation System (CMTS) is a Federal interagency coordinating body whose 28 member agencies and offices all play a role in the marine transportation system (MTS). Authorized in the *Coast Guard and Maritime Transportation Act of 2012*, the CMTS is directed to periodically assess the state of the MTS, promote the integration of the MTS with other modes of transportation and the environment, and maintain an interagency partnership from which policies could be recommended to support the MTS.

The CMTS was also authorized in the Coast Guard and Maritime Transportation Authorization of 2010 to coordinate transportation policy in the U.S. Arctic for safety and security. Interagency support for U.S. Arctic-related activities is managed within the CMTS's Arctic Maritime Transportation Integrated Action Team (IAT). Since 2014, the IAT has published a number of reports which provide relevant information to Federal agencies and MTS stakeholders regarding infrastructure needs and vessel activity in the U.S. Arctic.¹

CMTS reviewed the GAO draft report and has the following comments:

- We believe that GAO's use of dated information does not accurately reflect the current trends in Arctic shipping and vessel activity. For example, there are several instances in the GAO draft report citing 2018 as the most recent year from which vessel traffic data was available. CMTS provided GAO points of contact and authoritative agencies who have data from 2019, which were not included in the draft report. The 2019 data contradicts GAO statements that suggest a decrease in vessel activity since 2015. The 2019 data shows that vessel traffic has increased steadily over the last decade, and that although growth slowed between 2015-2017, it did not stall. This misstatement, among other statements presented in GAO's draft report, does not lead to the conclusions and recommendation to assess infrastructure risks and prioritize future investment in the Arctic.
- We do not agree with GAO's statement that, "without a risk assessment, agencies lack assurance that their investments are addressing the highest-priority risks," or that "a government-wide risk assessment could better enable agencies to evaluate potential U.S. Arctic infrastructure expenditures and assess the extent to which these expenditures will


¹ *A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020-2030* (2019); *Revisiting Near-Term Recommendations to Prioritize Infrastructure Needs in the U.S. Arctic* (2018); and *A Ten-Year Prioritization of Infrastructure Needs in the U.S. Arctic* (2016).

**Appendix I: Reports Relevant to Maritime
Infrastructure in the U.S. Arctic Published
Since 2013**

mitigate identified risks.” The risks that flow from infrastructure gaps are mission and agency dependent. As noted in the draft report, the Office of Management and Budget (OMB) already directs agencies to “use a structured and systematic approach to identify risks and assess the causes, sources, probability of the risk occurring, and potential outcomes, then prioritizing the results of the analysis.” An assessment undertaken by the CMTS would not supersede either OMB guidance or any forthcoming Administration guidance or strategy to inform investment priorities or decisions.

Upon review of the draft report, CMTS partially concurs with the recommendation to complete an assessment of the economic, environmental, and safety risks posed by gaps in maritime infrastructure in the U.S. Arctic to inform investment priorities and decisions. We agree that understanding infrastructure gaps is critical to improving the Arctic MTS, as reflected in previously published CMTS and other reports. However, the CMTS does not agree to perform and lead a government-wide risk assessment of Arctic MTS infrastructure gaps. The CMTS maintains that a risk assessment of respective investments, including their impacts on the U.S. Arctic, is the responsibility of each Agency as directed by OMB. As an alternate action to address GAO’s finding, CMTS plans to update its “U.S. MTS Arctic Infrastructure Table” to include infrastructure gaps and their potential impacts for different MTS elements, and to perform an inventory of existing risk assessments, which will include a catalogue of different criteria used by member agencies that consider the economic, environmental, and safety impacts of increased activity in the Arctic region. Agencies and departments can use this information to improve their own assessments and inform future budgetary prioritizations and decisions.

Sincerely,



Keith Washington
Deputy Assistant Secretary for Administration

Appendix III: GAO Contact and Staff Acknowledgments

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Andrew Von Ah, (202) 512-2834 or vonaha@gao.gov

Staff Acknowledgments

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Appendix IV: Accessible Data

Data Tables

Accessible Data for Number of Vessels in the U.S. Coast Guard Arctic Area of Interest, 2009-2019

Year	Number of Vessels
2009	130
2010	160
2011	190
2012	250
2013	240
2014	250
2015	300
2016	290
2017	270
2018	278
2019	307

Accessible Data for Figure 3: Number of Vessels in the U.S. Coast Guard (USCG) District 17 Arctic Area of Interest by Type, 2009-2019

Year	Cargo	Bulk	Tugs	Tankers	Government	Researchers	Adventurers	Cruises	Unknown
2009	27	27	28	8	8	14	13	3	2
2010	23	26	45	13	7	25	13	5	3
2011	48	23	36	25	8	30	15	4	1
2012	39	25	41	46	17	44	23	4	11
2013	55	23	51	38	14	24	27	4	4
2014	62	24	50	36	14	41	14	4	5
2015	68	24	59	33	18	68	16	5	9
2016	101	23	60	30	14	37	14	7	4
2017	89	24	47	36	16	29	23	4	2
2018	79	24	53	40	28	41	5	3	5
2019	95	22	57	51	17	35	17	8	5

Accessible Data for Figure 4: Number of Transits in the Bering Strait, 2009-2019

Year	Number of Transits
2009	280
2010	430
2011	410
2012	480
2013	440
2014	340
2015	514
2016	485
2017	430
2018	369
2019	473

Accessible Data for Figure 5: Maritime Infrastructure Gaps by the Number of Stakeholders Identifying it as the Highest Priority to Address

Label	Number of stakeholders
Response Services	14
Charting	11
Communications	9
Sea Ice Information	7
Deepwater Port	4
Other	2

Agency Comment Letter

Accessible Text for Appendix II Comments from the U.S. Committee on the Marine Transportation System

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April 13, 2020

Andrew Von Ah

Director, Physical Infrastructure Issues

U.S. Government Accountability Office (GAO)

441 G Street NW

Washington, DC 20548

Dear Mr. Von Ah:

The U.S. Committee on the Marine Transportation System (CMTS) is a Federal interagency coordinating body whose 28 member agencies and offices all play a role in the marine transportation system (MTS). Authorized in the Coast Guard and Maritime Transportation Act of 2012, the CMTS is directed to periodically assess the state of the MTS, promote the integration of the MTS with other modes of transportation and the environment, and maintain an interagency partnership from which policies could be recommended to support the MTS.

The CMTS was also authorized in the Coast Guard and Maritime Transportation Authorization of 2010 to coordinate transportation policy in the U.S. Arctic for safety and security. Interagency support for U.S. Arctic-related activities is managed within the CMTS's Arctic Maritime Transportation Integrated Action Team (IAT). Since 2014, the IAT has published a number of reports which provide relevant information to Federal agencies and MTS stakeholders regarding infrastructure needs and vessel activity in the U.S. Arctic.¹

CMTS reviewed the GAO draft report and has the following comments:

- We believe that GAO's use of dated information does not accurately reflect the current trends in Arctic shipping and vessel activity. For example, there are several instances in the GAO draft report citing 2018 as the most recent year from which vessel traffic data was available. CMTS provided GAO points of contact and authoritative agencies who have data from 2019, which were not included in the draft report. The 2019 data contradicts GAO statements that suggest a decrease in vessel activity since 2015. The 2019 data shows that vessel traffic has increased steadily over the last decade, and that although growth slowed between 2015-2017, it did not stall. This misstatement, among other statements presented in GAO's draft report, does not lead to the

conclusions and recommendation to assess infrastructure risks and prioritize future investment in the Arctic.

- We do not agree with GAO's statement that, "without a risk assessment, agencies lack assurance that their investments are addressing the highest-priority risks," or that "a government-wide risk assessment could better enable agencies to evaluate potential U.S. Arctic infrastructure expenditures and assess the extent to which these expenditures will

¹ A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020-2030 (2019); Revisiting Near-Term Recommendations to Prioritize Infrastructure Needs in the U.S. Arctic (2018); and A Ten-Year Prioritization of Infrastructure Needs in the U.S. Arctic (2016).

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- mitigate identified risks." The risks that flow from infrastructure gaps are mission and agency dependent. As noted in the draft report, the Office of Management and Budget (OMB) already directs agencies to "use a structured and systematic approach to identify risks and assess the causes, sources, probability of the risk occurring, and potential outcomes, then prioritizing the results of the analysis." An assessment undertaken by the CMTS would not supersede either OMB guidance or any forthcoming Administration guidance or strategy to inform investment priorities or decisions.

Upon review of the draft report, CMTS partially concurs with the recommendation to complete an assessment of the economic, environmental, and safety risks posed by gaps in maritime infrastructure in the U.S. Arctic to inform investment priorities and decisions. We agree that understanding infrastructure gaps is critical to improving the Arctic MTS, as reflected in previously published CMTS and other reports. However, the CMTS does not agree to perform and lead a government-wide risk assessment of Arctic MTS infrastructure gaps. The CMTS maintains that a risk assessment of respective investments, including their impacts on the U.S. Arctic, is the responsibility of each Agency as directed by OMB. As an alternate action to address GAO's finding, CMTS plans to update its "U.S. MTS Arctic Infrastructure Table" to include infrastructure gaps and their potential impacts for different MTS elements, and to perform an inventory of existing risk assessments, which will include a catalogue of different criteria used by member agencies that consider the economic, environmental, and safety impacts of increased activity in the Arctic region. Agencies and departments can use this

information to improve their own assessments and inform future budgetary prioritizations and decisions.

Sincerely,

Keith Washington

Deputy Assistant Secretary for Administration

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