THE COST OF DOING NOTHING: MARITIME INFRASTRUCTURE VULNERABILITIES IN AN EMERGING ARCTIC

(116–14)

HEARING

BEFORE THE

SUBCOMMITTEE ON
COAST GUARD AND MARITIME TRANSPORTATION

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

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U.S. House of Representatives
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MAY 8, 2019

SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Coast Guard and Maritime Transportation
FROM: Staff, Subcommittee on Coast Guard and Maritime Transportation
RE: Hearing on "The Cost of Doing Nothing: Maritime Infrastructure Vulnerabilities in an Emerging Arctic."

PURPOSE

The Subcommittee on Coast Guard and Maritime Transportation will hold a hearing entitled "The Cost of Doing Nothing: Maritime Infrastructure Vulnerabilities in an Emerging Arctic" on Wednesday, May 8, 2019, at 2:00 p.m., in 2167 Rayburn House Office Building to examine the findings and recommendations of the recent report by the U.S. Committee on the Marine Transportation System (CMTS) entitled "Revising Near-Term Recommendations to the Prioritize Needs in the U.S. Arctic." The Subcommittee will hear testimony from the U.S. Coast Guard (Coast Guard or Service), the Army Corps of Engineers (Corps), the National Oceanic and Atmospheric Administration (NOAA), and experts on Arctic infrastructure.

BACKGROUND

The United States is an Arctic Nation. The U.S. Arctic, as defined in statute,[1] encompasses U.S. territory north of the Arctic Circle with over 46,600 miles (75,000 km) of shoreline in Alaska, including the Aleutian Islands.[2] Three Arctic seas—the Bering, the Chukchi, and the Beaufort—border Alaska; the U.S. Arctic Exclusive Economic Zone contains 568,000 square nautical miles (SNM), of which less than half is considered by NOAA to be "navigationally significant." NOAA has designated 38,000 SNM of the navigationally significant areas as Arctic survey priority locations, and estimates that it could take up to 25 years to conduct modern hydrographic surveys in the priority locations if resources remain at their current level.[3]

Historically these seas are frozen for more than half the year, restricting the Arctic maritime season to June through October in a typical year, and limiting unaided navigation to an even shorter period. However, this pattern appears to be changing as ice-diminished conditions become more extensive during the summer months. On September 16, 2012, Arctic sea ice reached its lowest coverage extent then recorded, subsequently paving the way for the longest Arctic navigation season on record.[4] Ice coverage in 2019 tied with 2007 as the joint seventh smallest winter maximum in the 40-year satellite record; ice coverage in 2017 and 2018 have been the first and second smallest on record, respectively.[5]

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[1] The Arctic Research and Policy Act of 1984, as amended (Public Law 98-373); The Arctic region is the area north of the Arctic Circle, North Latitude 66.5622°. The Arctic Ocean dominates the Polar region, covering six million square miles (15.6 million square kilometers). Arctic temperatures range from an average winter temperature of –40° F (–40° C) to an average summer temperature just under 32° F (0° C).

[2] Alaska ShoreZone: Mapping over 46,000 Miles of Coastal Habitat. (2018) NOAA, Office of Response and Restoration, sourced from https://response.restoration.noaa.gov/about/media/alaska-shorezonemapping-over-46000-miles-coastal-habitat.html on October 10, 2018.

[3] NOAA National Ocean Service, https://oceanservice.noaa.gov/economy/arctic/, accessed May 21, 2018.

[4] Jeffries, M. O., J. A. Richter-Menge and J. E. Overland, Eds., 2012: Arctic Report Card 2012; see https://www.bbc.com/news/science-environment-20454757

[5] See https://nsidc.org/arcticseaicenews/2019/03/arctic-sea-ice-maximum-ties-for-seventh-lowest-in-satellite-record/

The melting of Arctic sea ice raises the possibility of far shorter voyages and substantial cost savings for ocean carriers sailing between major trading blocs (i.e., Russia, northern European nations, Asian/Pacific nations, and the United States and Canada). In 2018, Russian President Vladimir Putin signed a decree ordering an annual Northern Sea Route cargo goal of 80 million tons a year starting in 2024.[6] While present cargo ship traffic in the Arctic is mostly regional, not trans-Arctic, the ramifications could extend far beyond the region if the Arctic were to become a viable shipping route.

In addition to allowing for more vessel transits through the region, rising temperatures in the Arctic will likely enable more exploration for oil, gas, and minerals. Melting permafrost could pose challenges to onshore exploration activities. Increased oil and gas exploration, shipping, and cruise tourism in the Arctic will likely increase the risk of maritime accidents and pollution in the region. Effective strategies for cleaning up oil spills in ice-covered waters have yet to be developed and remain a subject of industry research and testing.

THE POLAR CODE AND ARCTIC SOVEREIGNTY

International cooperation in the Arctic is facilitated largely through the Arctic Council, established in 1996. The Council is made up of the eight Arctic nations (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States), and 13 non-Arctic Nations with observer status.[7] The Council is a consensus-based, intergovernmental forum that works to promote environmental, social, and economic aspects of sustainable development in the Arctic. Iceland chairs the council until 2021.

In 2009 the Arctic Council called upon the International Maritime Organization (IMO) to formulate and adopt the International Code for Ships Operating in Polar Waters, referred to as the Polar Code. The Polar Code went into effect on January 1, 2017, and enacts mandatory requirements intended to improve vessel safety and prevent pollution from vessels transiting in the Arctic, including ship construction, navigation, crew training, and ship operation.[8] The Code applies to passenger and cargo ships of 500 gross tons or more engaged in international voyages.

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[6] See https://thebarentsobserver.com/en/arctic/2018/05/its-order-kremlin-shipping-northern-sea-route-increase-80-million-tons-2024, accessed April 17, 2019.

[7] See http://www.arctic-council.org/index.php/en/about-us/arctic-council/observers, accessed May 21, 2018.

[8] "Polar Code." Polar Code, International Maritime Organization, 2019, *available at* www.imo.org/en/MediaCentre/HotTopics/polar/Pages/default.aspx.

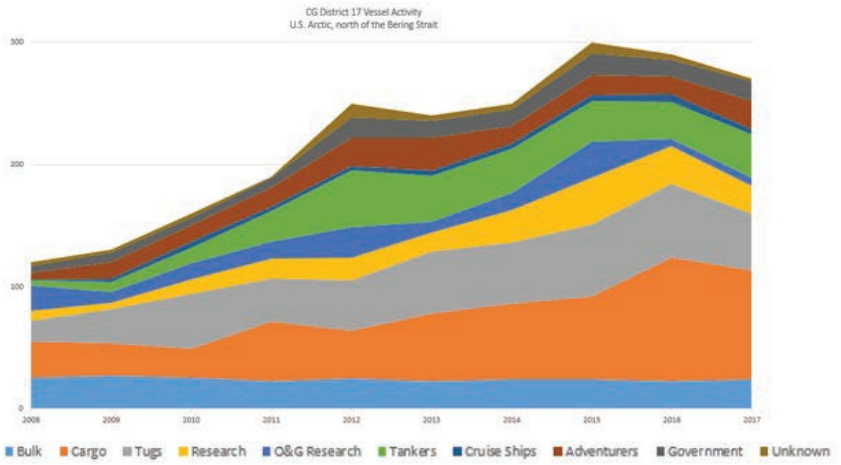

Figure 1. Vessel transits in the U.S. Coast Guard's D17 Arctic area of concern. The "D17 Arctic area of concern" is defined as an area north of the Bering Strait to the North Pole, east into the Canadian Arctic to Banks Island and west into Russia past the Russian port of Pevek. Source: Modified with data provided by the U.S. Coast Guard and from Figure 5 in the U.S. Coast Guard. Port Access Route Study: In the Chukchi Sea, Bering Strait, and Bering Sea. Preliminary Findings. 23 December 2016. Docket Number USCG-2014-0941 and USCG-2010-0833.

U.S. Coast Guard Arctic Assets

While several U.S. agencies have a physical presence and substantial interests in the Arctic, the Coast Guard's experience, material assets, and installations located throughout Alaska establish it as a key presence in the region. The Coast Guard's significant presence in Alaska is anchored by the Seventeenth District offices in Juneau and the Service's largest command, Air Station Kodiak.[9] In addition to continuous operations from year-round facilities throughout the state, the Coast Guard conducts seasonal operations, as part of its Operation Arctic Shield, in locations such as Kotzebue, Nome, and Utqiagvik (formerly Barrow).[10] However, with no assets permanently stationed above the Arctic Circle the Service's seasonal presence includes employing mobile command and control platforms such as large cutters and ocean-going ice-strengthened buoy tenders, and establishing seasonal air and communications capabilities by leasing facilities. These mobile and seasonal capabilities facilitate search and rescue, maritime border security, intelligence gathering for maritime domain awareness, emergency response, and marine environmental protection and law enforcement.

Since 2012, the Coast Guard has implemented Arctic Shield operations to perform Coast Guard missions, broaden partnerships, and enhance and improve preparedness, prevention, and response capabilities. For example, the Service deployed a number of assets as part of its Arctic Shield 2017 operations including: Coast Guard Cutter (CGC) HEALY, a medium icebreaker; CGC SHERMAN, a high endurance cutter; CGC ALEX HALEY, a medium endurance cutter; CGC MAPLE, a seagoing buoy tender; and two Coast Guard MH-60 Jayhawk helicopters from Air Station Kodiak, Alaska. Arctic Shield 2017 included Operation Arctic Guardian, an oil spill exercise near Utqiagvik, Alaska, engagement with nine remote Alaskan villages, a historic transit of the Northwest Passage by CGC MAPLE and joint operations with the Royal Canadian Navy, as well as the completion of 28 search and rescue cases that resulted in 20 lives saved. Compared to Russia's 46-vessel icebreaker fleet, with

[9] The 17th District encompasses over 3,853,500 sq. miles and over 47,300 miles of shoreline throughout Alaska and the Arctic.

[10] https://www.pacificarea.uscg.mil/Our-Organization/District-17/17th-District-Units/Air-Station-Kodiak accessed April 18, 2018.

12 more ships under construction,[11] the U.S. Coast Guard is forced to stretch assets and capabilities to secure a wide mission set with limited resources.

A decade-long effort to provide the United States with the capabilities necessary for assured year-round access to the polar regions has recently found footing in Congress, and substantial progress has been made to deliver by 2024 the Nation's first new heavy icebreaker in more than 40 years. The Coast Guard and Navy have established a Joint Program Office to capitalize on experience and best practices from both Services. In FY 2019, Congress appropriated an additional $675 million to fund the detail design and construction of a new heavy icebreaker, the Polar Security Cutter. On April 23, 2019, the Coast Guard awarded a $745.9 million fixed-price incentive-firm contract to VT Halter Marine Inc., a Pascagoula, Mississippi shipyard, for the construction of the first icebreaker with options to extend the contract for two additional vessels. The construction of the third icebreaker will most likely provide a dedicated Arctic asset. The primary mission of Polar Security Cutters 1 and 2 will be to take over the Coast Guard's existing responsibilities in the Antarctic to ensure a self-rescuing capability.

While much of the Nation's focus regarding the Arctic in recent years has been on the critical need for new heavy icebreakers, new vessels are far from the only need in the region. A report conducted by the Homeland Security Operational Analysis Center identified four major gaps in Coast Guard Arctic Capabilities including unreliable communications, lack of adequate maritime domain awareness, scarcity of available assets (especially ice-resistant air support and icebreakers) and supporting infrastructure, and institutional difficulty to identify, articulate, and close capability gaps.[12] The report states that if these capability gaps are not closed by the 2030s, the Coast Guard risks facing substantial vulnerabilities in several of its missions in the Arctic including search and rescue, marine safety, ice operations, marine environmental protection, and ports, waterways, and coastal safety.[13]

The Coast Guard's ability to exercise both military and civil authorities is uniquely suited to address the inter-jurisdictional challenges of the Arctic. In its revised Arctic Strategic Outlook, released April 2019,[14] the Coast Guard highlights three areas of necessary improvement to secure mission success: enhancing capability through asset acquisition, improved communications infrastructure, and Arctic Domain Awareness; strengthening rules-based order to establish Arctic maritime norms; and adapting the Coast Guard mission set to the Arctic through new practices and technologies. These conclusions generally address capability gaps identified in a 2016 GAO study.[15] The Coast Guard must adapt to enforce evolving regulatory frameworks for maritime activity in the Arctic and a changing strategic context, and will do so by forming new partnerships to promote rule of law.

ARCTIC INFRASTRUCTURE CHALLENGES

Numerous governmental and academic reports have identified infrastructure and operational challenges to maritime transportation in the U.S. Arctic. Liabilities mentioned include limited satellite coverage and architecture to support voice and data communications, the lack of a deep-draft port (i.e., depths greater than 35 feet), hazardous weather and ice conditions, and the lack of channel marking buoys and other floating visual aids to navigation, which are not possible due to continuously moving ice sheets.[16] In addition, to ensure safe and efficient maritime transportation in the region, it is necessary to conduct surveys to improve nautical charts, improve communications capabilities, improve weather forecasting and modeling, construct a deep-draft U.S. Arctic port, and develop community and regional emer-

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[11] Ronald O'Rourke, Congressional Research Service. *Coast Guard Polar Security Cutter (Polar Icebreaker) Program: Background and Issues for Congress*. Updated March 1, 2019.

[12] Homeland Security Operational Analysis Center (2018) *Identifying Potential Gaps in the U.S. Coast Guard Arctic Capabilities* [https://doi.org/10.7249/RR2310].

[13] Ronald O'Rourke, Congressional Research Service. *Changes in the Arctic: Background & Issues for Congress*. April 24, 2018.

[14] United States Coast Guard Arctic Strategy (Washington, D.C.: April 2019).

[15] U.S. Government Accountability Office (2016) *Arctic Strategy Is Underway, but Agency Could Better Assess How Its Actions Mitigate Known Arctic Capability Gaps*.

[16] Arctic Council (2009) *Arctic Marine Shipping Assessment*; U.S. White House (2013) *National Strategy for the Arctic Region*; U.S. Government Accountability Office (2014) *Maritime Infrastructure: Key Issues Related to Commercial Activity in the U.S. Arctic over the Next Decade*; Alaska Arctic Policy Commission (2015) *Final Report*; U.S. Committee on the Marine Transportation System (2016) *A Ten-Year Prioritization of Infrastructure Needs in the U.S. Arctic*; Council on Foreign Relations (2017) *Arctic Imperatives, Reinforcing U.S. Strategy on America's Fourth Coast*; Center for Strategic and International Studies (2017) *Maritime Futures, the Arctic and the Bering Strait Region*.

gency response networks in preparation for vessel and aircraft accidents and environmental damage related to increased ship traffic and industrial development.

In addition to known infrastructure requirements, the Coast Guard is exploring the need for the creation of new vessel routing measures to reduce the risk of marine casualties and increase the efficiency and predictability of vessel traffic in the U.S. Arctic.[17] The Coast Guard is also conducting several Arctic-focused research projects in collaboration with academia at the Arctic Domain Awareness Center, including methodologies to minimize environmental damage from spilled oil in extreme cold, enhanced navigational capabilities in the Arctic, establishing exposure limits for Search and Rescue team members in extreme cold, and developing a classification system of ice conditions.[18]

Other efforts to improve Arctic capabilities include the International Arctic Ocean Buoy Program, which maintains an international network of drifting buoys in the Arctic Ocean to provide meteorological and oceanographic data for real-time operational and research purposes. Additionally, H.R. 1314, the Integrated Coastal and Ocean Observation System Act Amendments of 2019, has been re-introduced in the 116th Congress to reauthorize funding for the U.S. Integrated Ocean Observing System (IOOS), both for observation data in the Arctic and other U.S. regions.

EXISTING INFRASTRUCTURE, NEAR-TERM RECOMMENDATIONS

The U.S. Committee on the Marine Transportation System (CMTS) is a Federal Cabinet-level, inter-departmental committee that creates a partnership of Federal departments and agencies with responsibility for the Marine Transportation System (MTS). In 2010, the CMTS was directed by statute (PL 111-281, Section 307(c)) to coordinate transportation policy in the U.S. Arctic for Safety and Security. Since then, they have published recommendations for Arctic infrastructure needs in 2013 and 2016, and revised those recommendations in 2018. The CMTS recently released its findings and recommendations to prioritize infrastructure needs and secure sovereignty in the Arctic (summarized in Appendix I). These recommendations span five key categories integral to the Arctic MTS, including: (1) navigable waterways, (2) physical infrastructure, (3) information infrastructure, (4) emergency response, and (5) vessel operations.

The CMTS recommendations from 2016 remain largely unchanged except for recommendation for the Coast Guard to finalize a new Port Access Route Study for the Bering Strait. Outstanding near-term recommendations from 2016 emphasize the urgency of congressional authorizations and appropriations to support prioritized Arctic infrastructure projects across the five categories.

WITNESS LIST

PANEL I

- Admiral Charles W. Ray, USCG, Vice Commandant, United States Coast Guard

PANEL II

- Rear Admiral Shepard Smith, Director, NOAA Office of Coast Survey
- Colonel Phillip J. Borders, Commander of District Alaska, U.S. Army Corps of Engineers

PANEL III

- Ms. Heather A. Conley, Senior Vice President, Europe, Eurasia, and the Arctic, Center for Strategic and International Studies
- Ms. Abbie Tingstad, Ph.D, Senior Physical Scientist, RAND Corporation
- Admiral Thad Allen, USCG ret., Senior Executive Advisor, Booz Allen Hamilton
- Hon. Mead Treadwell, Co-Chair, Polar Institute Advisory Board, Woodrow Wilson Center

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[17] U.S. Coast Guard. Port Access Route Study: In the Chukchi Sea, Bering Strait, and Bering Sea. Preliminary Findings. 23 December 2016. Docket Number USCG-2014-0941 and USCG-2010-0833.

[18] U.S. Coast Guard. Acquisition Directorate. Research, Development, Test & Evaluation. *FY18 RDT&E Project Portfolio*. March 2018. Examples: Next Generation Arctic Navigational Safety Information System (proj #6211), Arctic Operations Support (proj #6210), Robust Maritime Arctic Communications (proj #6213), Safety Parameters for ICE Operations (proj #5301), Response to Oil in Ice (proj #4701), Ice Condition Risk Assessment Tool (proj #6512), and Arctic Technology Evaluation 2018 (proj #62101).

APPENDIX I: NEAR-TERM RECOMMENDATIONS FROM THE CMTS ARCTIC INFRASTRUCTURE NEEDS REPORT †

Near-Term Recommendations

Navigable Waterways	Designate Port Clarence as an Arctic Maritime Place of Refuge.
	Review Port Clarence facilities to assess whether adequate support facilities are available at Port Clarence or in the region for a ship in need of assistance.
	Leverage existing data-sharing frameworks, such as Data.gov, the Alaska Regional Response Team, and Alaska Ocean Observing System, to facilitate waterways planning and response to environmental emergencies.
	Support Arctic Waterways Safety Committee efforts to bring stakeholders together.
	Work with stakeholders to coordinate research efforts to de-conflict research within commercial and subsistence use areas.
	Leverage international partnerships supporting waterways coordination.
	Designate M-5 Alaska Marine Highway Connector to connect the Arctic Ocean and the western section of the Northwest Passage.
Physical Infrastructure	Prioritize the need for Arctic port reception facilities to support international regulatory needs and future growth.
	Expand Arctic coastal and river water-level observations to support flood and stormsurge warnings.
	Co-locate new Continuously Operating Reference Stations and National Water Level Observation Network stations to significantly improve the Arctic geospatial framework with precise positioning and water levels.
	Review U.S. Arctic maritime commercial activities to identifying major infrastructure gaps that should be addressed to promote safe and sustainable Arctic communities.
Information Infrastructure	Expand partnerships to provide new satellite Automatic Identification System (AIS) capabilities for offshore activity information.
	Advance Arctic communication networks to ensure vessel safety.
	Place hydrography and charting of the U.S. maritime Arctic among the highest priority requirements for agency execution.
	Improve weather, water, and climate predictions to an equivalent level of service as is provided to the rest of the nation.
	Implement short-range, sea-ice forecasting capability.
MTS Response Services	Continue collaboration with State and local authorities to ensure readiness of Arctic maritime and aviation infrastructure for emergency response and Search and Rescue (SAR).
	Develop a plan to transport critical response equipment from the contiguous U.S. into the Arctic area in the event of a catastrophic event.

† https://www.cmts.gov/downloads/NearTermRecommendationsArctic2018.pdf

Near-Term Recommendations—Continued

	Continue coordination through international fora to provide significant opportunities for engagement across the Federal Government and the international Arctic response community.
	Support Pan-Arctic response equipment database development, best practices recommendations, and information sharing for continued development of guidelines for oil spill response in the Arctic.
	Evaluate facilities currently available on the North Slope for use as seasonal staging areas by those engaged in readiness exercises or research.
Vessel Operations	Expand U.S. icebreaking capacity to adequately meet mission demands in the high latitudes.
	Finalize the Port Access Route Study for the Bering Strait and continue efforts to provide routes for vessel traffic in the U.S. Arctic.
	Update domestic law to implement the mandatory provisions of the Polar Code and the Convention on Standards of Training, Certification and Watchkeeping for Seafarers.
	Examine existing training and safety standards applicable to the U.S. fishing fleet with respect to the new Polar Code requirements.

THE COST OF DOING NOTHING: MARITIME INFRASTRUCTURE VULNERABILITIES IN AN EMERGING ARCTIC

WEDNESDAY, MAY 8, 2019

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON COAST GUARD AND
MARITIME TRANSPORTATION,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:13 p.m. in room 2167, Rayburn House Office Building, Hon. Sean Patrick Maloney (Chairman of the subcommittee) presiding.

Mr. MALONEY. Listen, thank you all for being here. I am sorry for the late start. We had just come off the House floor. We appreciate that the Vice Commandant is here. We had an opportunity to spend some time together in southern Florida recently, got to participate in an event where USS *Bear*—excuse me, the U.S. Coast Guard vessel *Bear*—was able to bring back about $70 million in confiscated cocaine and marijuana, so I want to, before we even begin, thank Admiral Ray for all the help he provided when I was in Florida, and all the great men and women who I was able to learn from.

Well, good afternoon, we will come to order, this afternoon's hearing is on Arctic maritime infrastructure, both what is needed now and what is needed in the near future.

The simple truth is that the Arctic is warming. The statement is not conjecture, but measurable and observable fact. Melting sea ice and the opening of navigable waters make shorter voyages and substantial cost savings possible for ocean carriers sailing between major trading blocks. So today we will explore what infrastructure is necessary to safely and reliably sustain increased levels of commercial and governmental activity in this remote and inhospitable region.

Similarly, increased oil and gas exploration, commercial shipping, and adventure tourism in the Arctic are likely to increase the risk of maritime accidents and create new sources of pollution in what still remains a mostly unspoiled domain. Yet, at present, harbors of refuge are few and far between. Despite several surveys, no deepwater port facility has been built to support high-latitude maritime operations.

The U.S. Coast Guard is tasked with maintaining maritime safety, search and rescue, emergency response, and law enforcement across this vast area, but is asked to undertake these missions

with limited resources or, in the worst of circumstances like the Government shutdown, without being paid.

Certainly it was great news 2 weeks ago when the Coast Guard announced the award of a contract to finalize design and begin construction of the first new heavy icebreaker in over 45 years. But the reality remains that Coast Guard District 17, the district responsible for Alaska and the U.S. Arctic, has pressing air support deficiencies and substantial unmet shoreside infrastructure needs that pose considerable challenges to the Coast Guard capabilities and mission readiness.

As much as the Arctic is a uniquely challenging environment, it is also uniquely vulnerable. We currently rely on the international cooperative efforts for coordinated search and rescue, navigational safety, and environmental safety for oversight and response in the high north. Strong U.S. involvement in the Arctic Council and International Maritime Organization can help mitigate risks and ensure the safety of maritime operations.

But at what point do we become too reliant on a shared infrastructure and capabilities offered by our Arctic neighbors?

For several years now this subcommittee has examined the rapid emergence of the U.S. Arctic as a genuine new frontier, a frontier filled with grand promise, but great peril, too. I look forward to hearing from our expert witnesses this afternoon, to gather their recommendations on how best to secure our sovereign presence in the Arctic by making a strategic and sustained commitment to address our present and future maritime infrastructure needs.

[Mr. Maloney's prepared statement follows:]

Prepared Statement of Hon. Sean Patrick Maloney, a Representative in Congress from the State of New York, and Chair, Subcommittee on Coast Guard and Maritime Transportation

Good afternoon, and welcome to this afternoon's hearing on Arctic maritime infrastructure; both what is needed now, and what will be needed in the near future.

The Arctic is warming. That statement is not conjecture but a measurable and observable fact.

Melting sea ice and the opening of navigable waters make shorter voyages and substantial cost savings possible for ocean carriers sailing between major trading blocs. Today, we will explore what infrastructure is necessary to safely and reliably sustain increased levels of commercial and governmental activity in this remote and inhospitable region.

Similarly, increased oil and gas exploration, commercial shipping, and adventure tourism in the Arctic are likely to increase the risk of maritime accidents and create new sources of pollution in what still remains a mostly unspoiled domain. Yet, at present, harbors of refuge are few and far between. Despite several surveys, no deepwater port facility has been built to support high-latitude maritime operations.

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Mr. MALONEY. I now call the ranking member for any opening remarks.

Mr. GIBBS. Thank you, Chairman Maloney.

The United States defines the Arctic as an area north of the Aleutian Islands. That area includes 568,000 square nautical miles of the United States exclusive economic zone, but very little maritime transportation infrastructure exists there. Extreme weather and sparse populations have kept maritime transportation in the area to a minimum. Fisheries and limited coastal transport occur there, and large commercial vessels skirt the southern part of the area, following the great circle route.

The Arctic has new and promising prospects for routine commercial vessel operations, resource extraction, and fisheries further to the north. In the last several years a small number of recreational and passenger vessels have begun to venture into the far north.

The Coast Guard has no year-round presence north of the Aleutian Islands since abandoning its loran station in 2008. Cutters and air assets do venture into the area during the summer and the *Healy* conducts research north of the Bering Strait. Unfortunately, as the GAO pointed out in 2016, the Coast Guard has no plan for or assets to address increased vessel traffic and other maritime uses of the Arctic. This is troubling, since vessel traffic and other uses seem certain to increase significantly over the next two decades, and even more troubling, given the interests of Russia and China in the Arctic.

The United States needs to be able to fully assert its sovereignty in the Arctic, as well as carry out its search and rescue maritime safety, living marine resources, and environmental protection responsibilities. Of course, this nearly blank slate gives us the opportunity to carry out these missions in new and innovative ways.

I look forward to hearing from the witnesses today in what they believe we need to do to assert our sovereignty in the north to ensure a safe and efficient maritime transportation system there.

Thank you, Chairman. I yield back.

[Mr. Gibbs's prepared statement follows:]

Prepared Statement of Hon. Bob Gibbs, a Representative in Congress from the State of Ohio, and Ranking Member, Subcommittee on Coast Guard and Maritime Transportation

The United States defines the Arctic as the area north of the Aleutian Islands. That area includes 568,000 square nautical miles of the United States Exclusive Economic Zone, but very little maritime transportation infrastructure exists there.

Extreme weather and sparse population have kept maritime transportation in the area to a minimum. Fisheries and limited coastal transport occur there, and large commercial vessels skirt the southern part of the area following the Great Circle Route.

Diminishing sea ice for longer periods of the year is making travel in the Arctic a more promising prospect for routine commercial vessel operations, resource extraction, farther North fisheries and even recreation. In the last several years, a small number of recreational and passenger vessels have begun to venture into the far North.

The Coast Guard has had no year-round presence north of the Aleutians since abandoning its three LORAN stations in 2008. Cutters and air assets do venture into the area during the summer, and the HEALY conducts research north of the Bering Strait.

Unfortunately, as GAO pointed out in 2016, the Coast Guard has no plan for, or assets to address increased vessel traffic and other maritime uses of the Arctic.

This is troubling since vessel traffic and other uses seem certain to increase significantly over the next two decades, and even more troubling given the interest of Russia and China in the Arctic.

The United States needs to be able to fully assert its sovereignty in the Arctic as well as carry out its search and rescue, maritime safety, living marine resources, and environmental protection responsibilities.

Of course, this nearly blank slate gives us the opportunity to carry out these missions in new and innovative ways. I look forward to hearing from the witnesses today about what they believe we need to do to assert our sovereignty in the north, to assure a safe and efficient maritime transportation system there.

Mr. MALONEY. I thank the gentleman. I would now like to recognize the gentleman from Oregon's Fourth District, the chairman of our committee, my friend Peter DeFazio, for any opening remarks you would like to make.

Mr. DEFAZIO. Thank you, and thanks for holding this incredibly important hearing. This has been a topic that has escaped the notice of past administrations and the Congress itself, and we really need to begin to plan more quickly than any of us ever thought for the opening of the Northwest Passage.

In fact, I don't know where I was, because I have been doing a lot of travel and talking to a lot of people over the weekend, but I talked to someone who was going on a cruise, and they expect to try and get across.

And I said, "Well, I hope you are in touch with the Canadians and our Coast Guard, because, you know, we don't have a lot of capability up there." But it is a sailing ship out of, I think, Denmark or something. It is a known cruise company.

In any case, the future is here, potentially. And, you know, we have got to begin to deal with it much more pragmatically and strategically. That is why we have the Coast Guard here today.

I am thrilled we are finally on track for an icebreaker, hopefully to be followed by five more. And, you know, begin to be able to deal with both the challenges of our duties at the South Pole and in the Arctic. And the Great Lakes need a little help, too, with ice breaking. I don't want to neglect the Great Lakes.

You know, I applaud the Coast Guard for releasing the 2019 Arctic Strategy. I think that that is a great step forward. And you know, we look forward to your testimony today and whatever other recommendations you might provide to the committee.

And also I know the—we have a number of other witnesses on the second panel, and I think the chairman has done a great job of assembling a group of folks who will help instruct us on whatever we might need to do in a Coast Guard reauthorization or other bills to move forward productively in the Arctic.

So with that I yield back the balance my time.

[Mr. DeFazio's prepared statement follows:]

Prepared Statement of Hon. Peter A. DeFazio, a Representative in Congress from the State of Oregon, and Chair, Committee on Transportation and Infrastructure

Earlier this year, the Transportation and Infrastructure Committee convened two hearings to examine how Federal infrastructure policy could help mitigate and adapt to climate change.

Today, the Coast Guard and Maritime Transportation Subcommittee tackles a topic that has for the most part escaped the notice of Congress. And that topic is the need to look both strategically and pragmatically at maritime infrastructure needs in a rapidly evolving Arctic environment.

First off, I want to thank Chairman Maloney for devoting the subcommittee's time and attention to this issue of growing national importance. I also want to commend him for assembling a panel of expert witnesses that are second to none.

Whether you agree about the science of global warming or not, the plain fact is that the Arctic has emerged as a region in flux due to rising temperatures. Decreased sea ice coverage, melting of permafrost and glaciers, and accelerated erosion of coastal areas now exposed to increased wave action—the effect of a warming climate is real, measurable, and fundamentally changing the Arctic environment.

Now, it is not only conceivable, but likely, that the Arctic Ocean will become passable, at least on a seasonal basis, for maritime commerce and resource exploration and development in the next fifteen or twenty years.

Moreover, based upon experience which shows that the actual rate of observed physical environmental change in the Arctic commonly exceeds the rates forecast by model projections, we would be wise to assume this new future will arrive much, much sooner than anticipated.

Unfortunately, the Federal Government has been far too complacent over the past twenty years in confronting this substantial challenge through national and international policy. Modest "whole of government" planning efforts have fallen short of addressing current infrastructure needs.

We have seen the Coast Guard's fleet of heavy icebreakers wither away. Furthermore, little demonstrable progress has been made in the construction of a deep water port, installation of telecommunication and navigation systems, and investment in other infrastructure necessary to support maritime transportation in this hostile and forbidding region.

Recent positive events indicate that maybe, just maybe, the Federal Government is starting to turn the corner and give the emerging Arctic the attention it is due.

I applaud the Coast Guard for releasing its 2019 Arctic Strategy and updating its policies and priorities in this region of growing geopolitical tension and challenge.

I also was pleased to see the Coast Guard and U.S. Navy Integrated Program Office award the first contract in over 40 years to VT Halter Marine to finalize design and to construct the lead hull of what I hope will be a fleet of six new heavy icebreakers. This was very good news indeed!

Yet there is so much more that must be done. Today, I want the witnesses to offer pragmatic, yet effective, recommendations for the types of Arctic maritime infrastructure investments the Congress should support, and a strategy and timetable for when we should commence to undertake this substantial work.

In closing, I appeal to members on both sides: we gain nothing by failing to recognize the awakening of an accessible and exploitable Arctic. The last thing we can afford to do is wait until we are forced to act; an outcome that will surely be far more costly, far more difficult, far less thoughtful, and with many more unintended consequences.

Let's use this hearing constructively and build on what we learn today to ensure that we avoid just such a scenario. Thank you.

Mr. MALONEY. I thank the gentleman and, seeing the ranking member, proceed to our first witness.

We are very fortunate to be joined by Admiral Charles W. Ray, Vice Commandant of the United States Coast Guard.

Thank you, sir, for being here today. We look forward to your testimony. I did mention the *Bear*; I should probably mention that we were also on the *Isaac Mayo* before I get myself in trouble. I want to thank those remarkable men and women, as well, and for all the work you do.

And we are in possession of your written statement. So if we could ask you to keep your opening remarks to 5 minutes, that would help the Members proceed to their questions.

Go ahead, sir, you may proceed.

TESTIMONY OF ADMIRAL CHARLES W. RAY, VICE COMMANDANT, U.S. COAST GUARD

Admiral RAY. Good afternoon, Chairman Maloney, Ranking Member Gibbs, Chairman DeFazio, distinguished members of the subcommittee. I appreciate this opportunity to address you as the 31st Vice Commandant of the Coast Guard, and thank you for entering my written comments in the record.

Before I move on to the Arctic, sir, I wanted to just thank this committee for your support for the Pay Our Coast Guard legislation, and thank Chairman DeFazio for the same support. As I travel around, as I have with you down in Miami, out to the west coast to L.A., up to Kodiak, and down to Puerto Rico, this is one of the most frequent subjects that comes up with our folks that are out doing the work of the Nation and the Coast Guard. And so I thank you for your support moving forward, and we really need to get this across the goal line. Thank you.

Moving on to the Arctic, Admiral Schultz and I look forward to continuing to work with this committee to advance our Nation's security sovereignty and economic interests in the Arctic. As you all know, the United States is an Arctic nation, and the Coast Guard has been the lead Federal agency up there for over 150 years.

As the Nation's only surface presence in the region, the Coast Guard advances our national interests with a unique blend of polar operational capability, regulatory authorities, and international relationships. Over the past decade, as the chairman stated, as accessibility has improved, global competition has increased. The Arctic is involved in an increasingly important geostrategic region that requires a whole-of-government approach.

Today nations seek to shape the security environment to their own advantage. Our two near-peer competitors, Russia and China, have declared the Arctic a strategic priority and continue to aggressively develop the capability and infrastructure to expand their influence.

Even in the face of this increased competition, U.S. interests are well served by working with the eight Arctic nations. The Coast Guard continues to build trust and diplomacy with allies, partners, Native residents, and international bodies like the International Maritime Organization and the Arctic Coast Guard Forum to promote our Nation's influence in this critical region.

Our recently published Arctic Strategic Outlook reaffirms our commitment to American leadership. It establishes three lines of effort to achieve long-term success. First will be our—we will enhance our capability to operate effectively in the dynamic Arctic domain. We will strengthen rules-based order and an adherence to the rule of law. Thirdly, we will innovate and adapt to promote resiliency and prosperity.

For the United States to lead in the Arctic we must maintain a physical presence. The foundation of this presence is the Coast Guard's icebreaking fleet, and I want to thank this committee—I

can't thank you enough; it was 43 years in the making for us to get where we are today—for your support to begin long-overdue recapitalization of our only heavy icebreaker. And as you all know, we awarded that contract in 2013, and we hope it is the first of several that we need to do the Nation's business in the polar regions.

Our presence also includes the operation in communities in the polar regions and in the Arctic and waters across the region, most notably every year we have a year-long operation called Operation Arctic Shield that includes deploying ships, aviation assets, and Coast Guard crews to the Arctic to conduct research and operations, law enforcement, marine safety, and engage with the communities. Part of this is facility and vessel inspections. Part of it is contingency response exercises.

We are focused on the Marine Transportation System. For over 150 years your Coast Guard has operated in the Arctic and served Alaska communities. We are committed to this vital region, and currently we maintain shore infrastructure in Alaska, all across Alaska, and that is the stepping-off point—Kodiak is—for most of our work in the actual Arctic. And so we appreciate your support for infrastructure where we will soon—the next few years—homeport six Fast Response Cutters and two Offshore Patrol Cutters.

As you know, the Coast Guard faces an extensive shore infrastructure backlog that we last tracked at about $1.7 billion. A big part of that is across Alaska, where we need to work on piers and wharves and houses and community centers for our people.

In closing, a strong presence in Alaska enables the Coast Guard to safeguard our national interests in the Arctic. I thank this committee for your unwavering support as your Coast Guard invests in our Alaska fleet and infrastructure. Thank you for this opportunity to testify, and I welcome your questions.

[Admiral Ray's prepared statement follows:]

Prepared Statement of Admiral Charles W. Ray, Vice Commandant, U.S. Coast Guard

INTRODUCTION

Good afternoon Mr. Chairman and distinguished Members of the Subcommittee. It is my pleasure to be here to discuss the U.S. Coast Guard's strategy and operations to advance safe and secure maritime activity, including the opportunities and challenges of Arctic infrastructure.

The Coast Guard has been operating in the Arctic since 1867, when the United States purchased Alaska from Russia. As in all U.S. waters, our missions include enforcing laws and regulations, conducting search and rescue, and advancing navigation safety and environmental stewardship. As the Nation's visible maritime presence in the Arctic, the Coast Guard is also addressing the region's broader national security interests, including: economic security, environmental security, food security, geopolitical stability, national defense, and sovereignty.

Our Nation's security demands on the Coast Guard in the Arctic are both pressing and enduring. The Arctic is one of the world's most challenging operating environments due to the extreme weather, vast distances, and lack of infrastructure. Additionally, as nations, industry, scientists, and the public explore and pursue emerging opportunities, the region is experiencing rising geopolitical interest and expanding human activity. Ensuring safety and security in this dynamic region requires a whole-of-government approach, in which the Coast Guard stands ready to play a significant role. The Coast Guard's vision for the Arctic is a cooperative environment that balances the needs and requirements of the region's diverse group of stakeholders.

Our recently published Arctic Strategic Outlook reaffirms our commitment to American leadership in the region through partnership, unity of effort, and continuous innovation, and establishes three lines of effort to achieve long-term success. First, we will enhance capability to operate effectively in a dynamic Arctic domain; second, we will strengthen the rules-based order; and third, we will innovate and adapt to promote resilience and foster prosperity.

NATIONAL INTERESTS IN THE ARCTIC REGION

The United States is an Arctic nation with extensive sovereign rights and responsibilities in this region. As access to the Arctic evolves, many nations across the globe aspire to assert or expand their role in governing the region. The United States must be vigilant in protecting its national interests to ensure other nations do not develop their competing interests in the Arctic at our expense.

Actions and intentions of Arctic and non-Arctic States are shaping the security environment and geopolitical stability of the region. In particular, our two nearest-peer competitors (Russia and China) have both declared the Arctic a strategic priority. Twenty percent of Russia's landmass is north of the Arctic Circle, and both onshore and offshore resource (minerals, oil, and gas) development is crucial to the Russian economy. Russia is also advancing the growth of the Northern Sea Route (NSR) for trans-Arctic shipping and other commercial opportunities. The NSR reached a new shipping record last year with 9.74 million tons of goods transported along the route, and Russia advertises that number could increase ten-fold by 2030. The Russian government is currently rebuilding and expanding military bases that had previously fallen into disuse. These renewed capabilities include air bases, ports, weapons systems, troop deployments, domain awareness tools, and search and rescue assets. Additionally, Russia has the world's largest number of icebreakers. With nearly 50 icebreakers that include four operational, nuclear-powered heavy icebreakers, and three new heavy, nuclear-powered icebreakers currently under construction, Russia maintains the capabilities, capacities, experienced crews, and infrastructure necessary to operate into the Arctic year-round and surge as required.

China has recently taken an active role in Arctic development, pursuing economic investments with every Arctic nation in key strategic areas, such as oil and gas development, ports, railways, and infrastructure. With the release of their Arctic Policy in January 2018, they have declared themselves a nation intrinsically tied to the Arctic, and signaled their intention to play a security and governance role in the region. China has directed Chinese companies and government agencies to become more involved in Arctic affairs, and is rapidly developing its ability to operate in the region. China is also launching its first home-built icebreaker, XUE LONG II, and has begun designing a nuclear icebreaker expected to have twice the icebreaking capability of its conventional icebreakers.

The United States also has economic and environmental interests in the Arctic, which are linked to the changing and expanding Arctic activity. Significant increases in natural resource extraction in the American Arctic have not yet materialized, but industries continue to explore opportunities to leverage emergent economic prospects. Tourism and transpolar flights are also increasing, both of which could potentially increase search and rescue demands and environmental risks. Additionally, we have observed steady but measured growth of shipping through the Bering Strait over the past ten years.

As the Arctic continues to experience longer and larger periods of reduced or ice-free conditions, industry and other nations will likely continue to explore the possibility of seasonal trans-Arctic commercial shipping through the three Polar routes: the Northern Sea Route through the Russian Arctic, the Northwest Passage through the Canadian Arctic Archipelago, and the Transpolar Route through the central Arctic ocean. These routes could offer considerable savings between northern ports in Asia, Europe, and North America over traditional routes. However, the high variability of environmental conditions and limited shore infrastructure in the North American Arctic will pose a danger to even seasoned operators and likely increase the demand for Coast Guard services.

COAST GUARD OPERATIONS IN THE AMERICAN ARCTIC

Operation ARCTIC SHIELD is the Coast Guard's year-round planning and operational endeavor which provides mobile and scalable presence in the Arctic domain. In 2018, ARCTIC SHIELD operations advanced national and Coast Guard strategic goals by aligning operations to mitigate real-world threats and leveraged opportunities of strategic interest. This involved staging helicopters at a forward operating location in Kotzebue, AK, and deployment of major cutters, air assets, communication equipment, personnel, and logistics to support Coast Guard operations. The

Coast Guard also deployed the medium icebreaker HEALY to conduct maritime patrols and support scientific operations. A high endurance cutter and a medium endurance cutter operated in the Bering, Chukchi, and Beaufort Seas, conducting maritime patrols and serving as forward deployed response assets. Additionally, the Coast Guard worked collaboratively with multiple agencies to enhance prevention and response plans at all levels of government.

Our 2018 operational highlights include: completion of two dozen search and rescue cases (saving or assisting over 50 lives); conducting multiple exercises and training evolutions; hosting oil spill response drills; visits to numerous remote villages (educating more than 4,000 children in boating and water safety programs); as well as exchanges and joint operations with the Royal Canadian Navy and Coast Guard.

This year, ARCTIC SHIELD 2019 shoreside operations are currently underway, with a focus on western Alaska and the Bering Strait. A three-pronged approach of outreach, operations, and assessment of capabilities will support marine safety, search and rescue, law enforcement, and other Coast Guard statutory missions in the Arctic. Consistent with our recently updated Arctic Strategic Outlook, our goal is to further develop a comprehensive understanding of the capabilities required to operate in this austere environment, as well as to broaden partnerships in support of Arctic operations.

In 2019, operations will continue to be supported with increased cutter, aircraft, and shoreside presence across Alaska. Specific activities include facility and vessel inspections, gold dredge fleet inspections, maritime safety compliance enforcement, ice rescue training, marine mammal protection enforcement flights, sovereignty patrols, and scientific research. Planned activities include an oil spill preparedness and response exercise on the North Slope and a joint marine pollution contingency exercise with international partners. Year-round outreach efforts will continue to deliver education and awareness services to Arctic communities and outlying native villages.

ICEBREAKING CAPACITY AND ACQUISITION STATUS

The ability for the United States to lead in the Arctic, both diplomatically and operationally, hinges on having the capabilities and capacities to ensure national security and uphold sovereignty. Purpose-built U.S. icebreakers enable American influence through assured access to the polar regions, safeguarding our national interests. These platforms deliver Coast Guard authorities anytime, anywhere, and without these capabilities, we risk significant gaps in our ability to respond to regional contingencies.

The current Coast Guard icebreaker capacity is one heavy polar icebreaker, CGC POLAR STAR—commissioned in 1976, and one medium icebreaker, CGC HEALY—commissioned in 2000. The primary differences between heavy and medium icebreakers are endurance and power. The Coast Guard considers a heavy icebreaker to be one that can break at least six feet of ice at a continuous speed of three knots and operate year-round in the Arctic, with the necessary systems and endurance to protect its crew in the event it has to "winter-over" in substantial ice conditions. Conversely, medium icebreakers are designed to operate seasonally in the Arctic.

Due to the strong support of the Administration and Congress, the FY 2019 appropriation included full funding for acquisition of our first Polar Security Cutter (PSC), and some long lead time materials for the second. This investment sends a strong message that the Nation is serious about our interests in the Arctic. Just two weeks ago, the joint Coast Guard and Navy Integrated Program Office (IPO) awarded VT Halter Marine Inc., of Pascagoula, Mississippi, a fixed price incentive (firm) contract for the detail design and construction of the lead PSC. We are as close as we have been in over 40 years to recapitalizing our icebreaking fleet, and continued investment will ensure we meet our Nation's growing needs in the rapidly evolving and dynamic polar regions.

In order to conduct the full range of Coast Guard missions, Coast Guard icebreakers must be fully interoperable with interagency and international stakeholders, including the Department of Defense (DoD), to carry out national defense operations. Thus, the new PSC will include sufficient space, weight, and power to conduct the full complement of multi-mission activities that support our Nation's current and future needs in the Arctic.

The Coast Guard also understands that we must maintain our existing heavy and medium icebreaking capability while proceeding with recapitalization. Construction on the first PSC is planned to begin in 2021 with delivery planned for 2024; however, the contract includes financial incentives for earlier delivery. Maintenance of POLAR STAR will be critical to sustaining this capability until the new PSCs are delivered. Robust planning efforts for a service life extension project on POLAR

STAR are already underway and initial work for this project will begin in 2020, with phased industrial work occurring annually from 2021 through 2023. The end goal of this process will be to extend the vessel's service life until delivery of at least the second new PSC.

SHORE INFRASTRUCTURE

In addition to having the necessary platforms to maintain our presence in the Arctic, the Coast Guard maintains a robust shore infrastructure laydown in Alaska. Shore facilities support all Coast Guard operations and personnel, as well as provide required infrastructure to support the needs of the Service's operational communities. Investments in shore infrastructure are critical to modernizing the Coast Guard and equipping our workforce with the facilities required to meet mission.

With approximately 10% of the Coast Guard's real property inventory located in Alaska, the need for proper capital investments is all the more critical given the vast distances between shore facilities in that region. We are currently building waterfront facilities and shore infrastructure to support the delivery of six new Fast Response Cutters (FRC) and two Offshore Patrol Cutters (OPC) to Alaska, as well as the critical housing and family support facilities to accommodate the additional personnel and their families to operate and maintain these new assets. Additionally over the last few years, we have built a new hangar to support forward deployed helicopters in Cold Bay, 20 new housing units in Kodiak, as well as new facilities in Kodiak to enable our transition from C–130H to C–130J aircraft. These efforts reaffirm our commitment to the region and our need for infrastructure to support Arctic operations.

CONCLUSION

The Coast Guard will continue to lead across the national and international landscape to help shape the Arctic domain as a cooperative environment while preserving our sovereign rights. We understand the significant investment required to secure the Arctic, and we appreciate and embrace the trust the Nation has placed in the Service to accomplish this. Thank you for the opportunity to testify before you today and for all you do for the men and women of your Coast Guard. I look forward to answering your questions.

Mr. MALONEY. Thank you, Admiral Ray. I will now proceed to Members' questions, which will be limited to 5 minutes. I will begin by recognizing myself.

Admiral, first let me start by saying—because the focus of today's hearing is on the Arctic and Alaska in many ways, you know—I should mention that we lost a member of the Coast Guard community in Alaska, a young man named Michael Kozloski, who was actually a resident of my district, whose family lives about 8 miles from my house. His wife, Brie, and their kids—at least grew up there, I should say. And that is a loss we felt very acutely in the Hudson Valley.

I want to thank the Commandant for coming up for the funeral and for the extraordinary support that the Coast Guard has shown to Mr. Kozloski's family. We hate to see these things happen, but it is a reminder of the sacrifices the members of the Coast Guard make every day. So we thank the Coasties for that.

Let me ask you about the—I am interested in the Polar Security Cutter. You talk about—can you describe for us the capabilities that that vessel is going to provide, how many ships we need, how that compares to the fleets that we see from the Russians and from others?

Admiral RAY. Yes, sir. Thank you for your question. Thank you for attending Boatswain Kozloski's funeral. It is part of the inherent nature—the dangerous nature of our business. Well, we thank you for your support. It meant a lot.

With regards to the Polar Security Cutter, the Commandant has been saying—and we have all been saying this—we did a study a few years ago called the High Latitude Study which did analysis on the Coast Guard's 11 mission areas, which ones apply to the Arctic, the Antarctic. And it kind of arrayed where we need to be, and when. And a long story short, we need the ability to project year-round presence in the Arctic. And that is possible with the right kind of icebreakers. It is possible to be up there summertime and wintertime.

And so, when we do the math—and it is fairly straightforward—and you do what it takes to do that, when you consider shipyard availabilities, we need six overall icebreakers. Three of those need to be heavy icebreakers to be able to project our presence in the Arctic and do our yearly duty to break out the National Science Foundation station in McMurdo, which is also vital to the Nation's interests down in Antarctica.

And then we need three medium icebreakers that do any number of things, from scientific research to projecting sovereignty in places where there are boundary areas. They will be Polar Security Cutters, as well. And it is important that we talk about them as security cutters, as opposed to just icebreakers, because all Coast Guard ships are multimission, and they can be doing one mission one day and the next day they could be doing search and rescue, law enforcement, or any of the others.

So six and three is how we have been shaping this up. But we are really excited about the first one, now that we have got that off the ways and going, and we expect to—great things from Halter down in Pascagoula. They have got a great record.

And if that answered your question, sir——

Mr. MALONEY. Yes. I am also interested in how our capabilities compare to those of other great powers who may be thinking strategically about the Arctic, particularly Russia, China. Could you say a word about that, and what kind of comparison would you make between our capabilities right now and those of those two countries?

Admiral RAY. As we say in the maritime services, we are in a big stern chase with the Russians, sir. I mean, they have got 50 icebreakers of various classes. Four of them are nuclear-powered heavy icebreakers. They have been committed to a rebuilding program for their icebreaker fleet for many years without fail.

The Chinese just this year launched their second icebreaker, which is approaching a heavy icebreaker, which is *Xue Long 2*. And they are extremely aggressive with how they sail these. The *Xue Long 1*, which was their first icebreaker, has been to the Arctic every year for the past five or six—our Arctic—off of our—and they are not an Arctic nation. And so the *Xue Long 2*, the expectation is they will be similarly in their way that they sail and engage around the planet.

Of course in the Baltic states—I am sorry, in the Scandinavian states there are multiple icebreakers, but they are mainly littoral close-in, they are not projecting over the horizon. So when we think of other nations' icebreakers, we primarily think of the Russians and the Chinese; the Swedes have some long-distance icebreakers,

but, other than that, that is kind of the—that is the ones that we talk about.

Mr. MALONEY. And if I could get you to say a word about the shoreside infrastructure that we are also going to need.

Admiral RAY. Yes, sir. With regards to Coast Guard shoreside infrastructure, our current focus is where all of our people depart from to go to the Arctic. That is the Kodiak, that is our northernmost place. And so that is where we have the most plans and the most specifics about investment.

Our approach, as you know, to operating in the Arctic, given the dynamic nature of it, is we will take these icebreakers—when we get sufficiently built out, we can move them wherever the fight is. And "fight" is just a term of art. Wherever the action is we will move those icebreakers. So it could be as far south as, you know, approaching the Bering Sea, or as far east as our border with Canada. And so that is our approach, is mobile infrastructure that will deploy. And that is why icebreakers, or Polar Security Cutters, are so important. That region is not ice free. There is just less multiyear ice than there has been in the history of the world.

But—so the ability to move and operate in ice-covered waters, whether it is just a year's worth of ice or a couple of years, that is our approach, operationally. The preponderance of our infrastructure requests for the U.S. Coast Guard are in Kodiak and other parts of Alaska, where we support that region.

Mr. MALONEY. I thank the gentleman.

Mr. Gibbs?

Mr. GIBBS. Thank you.

First of all, Admiral, and all the men and women who serve under you, I want to thank you, gratitude of the country, because the Coast Guard is doing great work in drug interdiction and everything else you do—and security. So I want to make sure you—we appreciate what you all do.

My first question, when we are talking about the Polar Security Cutter, the PSC—and we got that going now—I guess one of my first questions, you are talking down the road if we get the first one—it has been 40 years, I guess, whatever it was you said—to getting, you know, a second or third one. And would it be more economical to maybe work on—to get the production line set up to—just to do, like, five heavies, instead of doing any medium icebreakers, and just—you know, could we save dollars by making a long-term commitment to make all heavies and not change the production cycle, the production assembly line, and all the work that goes into developing a whole new—you know, a different-sized ship? But—go ahead.

Admiral RAY. It could be, sir. I mean there is no doubt that there are economies of scale when it comes to producing the same class of ship from the same yard over.

I think every—all the bodies that have studied this agree that we need at least three of these heavies.

Mr. GIBBS. Yes.

Admiral RAY. So—and the 43 years I referred to earlier, that is the last time we built a heavy icebreaker. Look forward; we can't wait 43 years. We are looking to having her in the water in 2024,

at the latest, with incentives on the contract to do it sooner than that, 2023, which is fairly rapid for this class of ship.

So—and we intend to continue to seek Polar Security Cutter 2 and 3 moving forward, and then we will be in a position to decide how things are shaping up.

Mr. GIBBS. Yes, I just wanted to raise the question. And, you know, you have to get that production set up, maybe, to transition to a different class. Maybe that doesn't make sense, and the heavies can do more, anyways.

On this first one, when it is operational—of course, a lot of the time it is going to be spent down for the National Science Foundation, the McMurdo Station in Antarctica. What do you look—do you anticipate how many days that would be up in the Arctic?

Admiral RAY. Sir, when I first came in the Service in 1981 we had down, I want to say, five icebreakers. And we did Arctic East, Arctic West, we did an Antarctic patrol. So when we have the capacity that we need, we will send these ships north and south, and they will be—we will be operating in places that we traditionally operated, but we haven't had the capacity to do lately.

So with regards to when we would send in the Arctic, we will need to get—we are doing work to extend the service life of *Polar Star*. We are starting that next year, because we need to extend her out until we get a second heavy icebreaker. When we have two heavy icebreakers, then we can talk about—in operation—we can talk about sending one north. And that one could be—that will not be before 2023.

[A post-hearing clarification of Admiral Ray's remarks follows:]

Post-hearing clarification of remarks from the U.S. Coast Guard

The goal of *Polar Star*'s SLEP is to extend her service life until delivery of the second PSC to ensure self-rescue capability. The Coast Guard does not intend to expand the CGC *Polar Star*'s operations beyond current operational tempo (OPTEMPO) following service life extension activities. Once the first PSC is delivered, the Coast Guard will continue to operate *Polar Star* to ensure self-rescue capability. Since capacity of the icebreaking fleet will increase by the addition of a PSC, while one of the Coast Guard's heavy icebreakers is conducting the Antarctic mission, the other will have capacity to conduct other missions, including Arctic operations.

Mr. GIBBS. OK, I want to talk a little bit about gaps. I know in panel 3 they will talk about some of the gaps, I guess shortfalls, and they should discuss navigable waters, physical infrastructure information, infrastructure responsibilities, vessel operations, and also the GAO report of the Coast Guard studies; the gaps would be communications, Arctic, Maritime Domain Awareness, infrastructure, training, exercise opportunities in ice breaking.

Can you kind of relate to us how you are trying to fill these gaps, and what our operational status is, I guess, on—when you talk about these challenges you have, and the gaps?

Admiral RAY. Yes, sir. We have—with regards to the waterways—kind of just going down top to bottom, if you don't mind—we have worked with the Waterways Safety Committee to study the waterways, starting from the Unimak Pass, which is down in the Aleutians, all the way up to the Bering Strait.

And so, understanding—we developed, working with the Russians, a port access route study, which is, in essence, the prequel for a traffic separation scheme that has been both coordinated with the Native community with regards to the migratory patterns of their subsistence lifestyle, and then with the draft—and worked with NOAA and others. So I guess on the front end of prevention work on the waterways, I think we have moved down the road with that.

With regard to physical infrastructure, as I said, thanks to this committee we have got a good start on infrastructure that we need to be able to sail and operate from Kodiak. That is our center of gravity in Alaska. Just about everyone that goes to the Arctic, their last stop is in Kodiak before they go there. So we are making progress to do that. And that is where their families live, that is where their kids go to school, that is where—that is our center of gravity. So that is our part with regards to physical infrastructure.

With regards to the information infrastructure, there is several things going on. We are working with the Department of Defense to get access to MUOS, which is an updated Department of Defense satellite communication, and we are making progress to where we can communicate reliably with satellite communications up to the 85th latitude, which is further than we have ever been able to do before. We have been somewhat constrained to either line-of-sight communications and/or HF communications, which is a little bit intermittent up there.

And then we launched this year two CubeSats that we—in cooperation with other Government agencies—to do a polar orbit to receive emergency signals. And so, when you put those together, we are working on the communications part.

And then lastly, with regards to our vessel operations, we have talked about the icebreaker or the National Security Cutter. And to us that is the most fundamental leap forward.

Mr. GIBBS. OK. Thank you, Chairman.

Mr. MALONEY. Mr. Brown?

Mr. BROWN. Thank you, Mr. Chairman.

Admiral Ray, let me start by saying thank you very much for your service and your leadership of the fine men and women that serve in the Coast Guard. I have an opportunity, the privilege, to serve on the House Armed Services Committee, where we have oversight of the Army, Air Force, Navy, and Marines, so this term, being appointed to the Transportation and Infrastructure, it is a real honor to kind of round out all of the components that work together in defense of our Nation and our Nation's interests, both home and abroad.

In your testimony you mentioned Operation Arctic Shield as the Coast Guard's year-round planning and operational endeavor which provides mobile and scalable presence in the Arctic domain. You also mentioned the Coast Guard's goals to further develop a comprehensive understanding of the capabilities required to operate in the Arctic, as well as the broadened partnerships in support of Arctic operations.

My questions, there are two, are related. Can you talk about what those partnerships are, and explain their value? How do we

better leverage them to ensure we are meeting our operational needs?

And related to that, how can we upscale or strengthen or improve your relationship with the Navy to fill existing gaps in our capabilities?

Admiral RAY. Yes, sir. Thank you for the question. Thank you for your service across the armed services. You have covered the whole gamut now. Thank you.

Well, our partnerships—it is really—this Arctic Shield, I am really proud of this. We have been doing it for several years now. It starts, literally, at the village level. We engage with village elders and across multiple villages across the North Slope, and we—our people go up there all year round, but we particularly surge in the summer when it is ice out.

And we engage it at the school-kid level. We educated over 400 kids from the North Slope, and that is a lot of kids on the North Slope. We educated 400 of them in, you know, kind of water safety and things like that.

And then you work your way up to the Native corporation level, which are really significant elements of governance there in Alaska and in the Arctic, all the way up to the State and then, of course, the Federal level. We work across all partners.

Our specific partners for Arctic Shield are the Department of Defense. We work with the Northern Command. They do—and the Alaska—folks in Alaska down in Elmendorf, they do a lot of our transport of our equipment up there, and so we interact. Our helicopters are housed in an Alaska Air National Guard hangar in Kotzebue, which I think we rent for about $1 a year, which is a pretty good deal in Alaska. And we—so great cooperation across the way.

With regards to the Navy, we are consistently at the table, planning with the U.S. Navy. We would not be where we are today with our Polar Security Cutter program, were it not for our integrated program office with the U.S. Navy. I meet with Assistant Secretary Geurts, who is just an incredible servant of the Nation with regards to acquisition. He is one of the best we got. And were it not for him and his crew, we wouldn't be where we are with Polar Security Cutter—of course with your support, as well, but the ability to execute that.

Our Commandant and CNO are engaged with regards to the requirements for strategic planning. We have provided input to the Navy, and they have accepted that. They are leaning forward to meet their requirements with regards to the NDAA.

Mr. BROWN. Thank you. Let me ask this question. In your testimony you also talked about the need for the Coast Guard to maintain a robust infrastructure in Alaska to support operations and capacity needs. You also state that approximately 10 percent of the Coast Guard's real property inventory is located in Alaska.

The questions: with the reduced ice conditions, or certainly the changing ice conditions in the Arctic, and free-flowing seas that create erosion, are there any Coast Guard installations that are currently at risk as a result of the changing landscape? And is the Coast Guard tracking which installations may be at risk in the fu-

ture? And if you need to take that for the record, that is fine, as well.

Admiral RAY. Sir, I think I can answer that. The weather in the Kodiak region, which is about our furthest north and west place, has been pretty consistent over the past few years. I mean it—there is bad weather there, and a big tidal range, and you are just one storm away from having a problem, but with regards to the durability and resiliency, we are in there—that is why this recapitalization of our shore infrastructure is so important. It is a consistent drumbeat.

We are literally updating World War II-era buildings to modern resiliency standards. And when we do that they will last for 50 or 70 years. But north of that we are generally operating out of temporary facilities. We are doing it—that we are moving on our ships and in our aircraft to different places.

So I will do a review and get back to you if there is any other ones that we need to track, but I am not aware of any right now.

Mr. BROWN. Thank you, Admiral. Thank you, Mr. Chairman. I yield back.

Mr. MALONEY. I thank the gentleman.

Mr. Weber?

Mr. WEBER. Thank you, Mr. Chairman. Admiral, we appreciate you being here. And in full disclosure, my uncle, the last of five surviving boys, was a Coastie. And so we sure appreciate what you all do.

The Bering Strait width, offhand, do you know how wide that is across there?

Admiral RAY. The closest point is—I have to—I have looked at this several times, and you hear between 50 and 75 nautical miles. But it is not any more than 75.

Mr. WEBER. So safe to say you don't go summer camping up there.

Admiral RAY. No, sir. But, I mean, I have been through it several times. But I have read it, this comes up pretty regularly. And in fact, I made a note to myself last night to recheck what the latest estimate—the last estimate I saw was about 70 nautical miles.

Mr. WEBER. Did you put that note in your iPhone?

Admiral RAY. No, sir. I wrote it a little green book.

Mr. WEBER. Well, that is the way we normally do it, you know, at our age.

Do you expect—how many days away, when you get the first PSC, do you expect them to be at sea on task, so to speak, on the mission?

Admiral RAY. Our general planning factor for our cutters, major cutters, is 185 days away from home port. That is general planning. We exceed that with some degree of regularity. Rarely do we not meet that, unless there is a maintenance issue. And with some of our older cutters now, that is a little bit of a problem.

So 185 days away from where home port is. For instance, when the *Polar Star* goes south through Antarctica, it is about a 100-day mission, more or less, maybe approaching 120. And then, when *Healy* goes north, it is at least a 3- or 4-month patrol up north in the Arctic. So that is kind of the standard planning factor.

Mr. WEBER. Would those numbers be the same for the second PSC?

Admiral RAY. Yes, sir.

Mr. WEBER. Third?

Admiral RAY. Yes, sir. I mean, that is—we will look at it. We look at it quite frequently. In fact, with the National Security Cutters we just went through a pretty extensive review a couple of years ago about how many days away from home port was recommended. Because the flipside of that is you got to do maintenance on them when they are back in. And we need people to continue to want to go to sea, so they got to have a little bit of time to see their family. So there is a flip side.

But generally speaking, 185 days is our planning factor, and we revisit it every few years.

Mr. WEBER. Absolutely. Do you see a Chinese and a Russian presence up there around the Bering Strait? Have you been able to determine who is there the most?

Admiral RAY. Yes, sir. There they are there, the Russians—I mean the transits through the Bering Strait have been—a lot of it has been as a result of the Russian kind of growth in their petroleum exploration on the North Slope of Russia. And so there is a—and more transit is expected. That growth is going to continue as they go down to Asia.

With regards to the Chinese, thus far, other than their commercial enterprises, where they are engaged with the Russians—and they are, to a degree—their independent icebreaker operations are primarily—they will call it research, we call it other things when they go up north above——

Mr. WEBER. Reconnaissance?

Admiral RAY. Yes, sir. And so that is generally—and they are there from the shoulder seasons, we call it, early summer to late fall, all the way through the summer, depending on what their operational plan is.

Mr. WEBER. Did I understand you to say the Russians have 50 icebreakers, 4 of which are nuclear?

Admiral RAY. Yes, sir.

Mr. WEBER. Are you able to identify those going through, what percentage——

Admiral RAY. They are generally working, staying up on the North Slope, those—their Northern Sea Route. They do not venture south. Most of the time their operations are from the northern part of the—just north of the Bering Strait over west, all the way to Europe.

Mr. WEBER. So those nuclear vessels could stay out a lot longer than the traditional vessels.

Admiral RAY. Yes, sir.

Mr. WEBER. OK. And then you said something that caught my attention. You said you have, generally, line-of-sight communications?

Admiral RAY. Well, there are multiple frequencies that we use for operational communications. We do sat phones, everybody is informed of that. A lot of the smaller vessels that are—and there are small vessels that you wouldn't think would be up in the Arctic that are up there now.

Mr. WEBER. So you try to hail them by radio.

Admiral RAY. Yes, sir FM radio is what—that is line-of-sight radio.

Mr. WEBER. Oh, that is line of sight.

Admiral RAY. Yes, sir.

Mr. WEBER. OK, I got you. OK, I misunderstood that.

Admiral RAY. So, depending on how high your antenna is is how far your line of sight is.

Mr. WEBER. I got you. OK. Well, I appreciate that, Admiral.

And Mr. Chairman, I yield back.

Mr. MALONEY. I thank the gentleman.

Mr. Larsen?

Mr. LARSEN. Thank you, Mr. Chairman. Mr. Chairman, to start I would like to ask unanimous consent to enter into the record testimony of Willie Goodwin, the chairman of the Arctic Waterways Safety Committee.

Mr. MALONEY. Without objection.

[The information follows:]

Statement of Willie Goodwin, Chairman, Arctic Waterways Safety Committee, Submitted for the Record by Hon. Larsen

EXECUTIVE SUMMARY

The Arctic Waterways Safety Committee (AWSC) appreciates this opportunity to submit testimony to the Subcommittee on this topic of extreme importance to mariners of the far north.

Our goal in submitting this testimony is to help educate the Members of the Subcommittee on the very serious challenges confronting northern communities, marine mammal subsistence hunters, and other northern mariners as a result of the increases in large-vessel marine traffic we are seeing in our northern Alaskan coastal waters. We also wish to highlight the tremendous risk created by the lack of communications and other infrastructure to support the maritime interactions of these disparate user groups, as well as the lack of infrastructure to support disaster response in this remote and treacherous region.

As America's Harbor Safety Committee for the waters from the Bering Strait Region to the border with Canada, the AWSC is charged with responsibility for ensuring a safe maritime environment for all mariners working in or transiting through these waters. Through local efforts and the largely unfunded work of the AWSC, we are identifying and developing traffic-management measures to address the increase in maritime risks accompanying this traffic. However, it is imperative that our federal government become more engaged on these matters to help ensure the ongoing success of our work and the safety of all mariners in America's northern waters.

TESTIMONY

Who Are the Mariners of America's Northern Waters?

For millennia, virtually the only mariners in the waters from the Bering Strait Region to Canada were marine mammal subsistence hunters. Today, these hunters, traveling or hunting in small 6-8 person skiffs, continue to constitute the largest class of mariners found in these waters. The subsistence food economy of northern Alaska, which also helps to feed Native residents throughout the state, is heavily dependent on seasonal marine mammal harvests.[1] In some communities, 90 percent of the food supply comes from the ocean. The principal marine resources are the five main arctic marine mammals: the bowhead whale, beluga whale, walrus, ice seals, and polar bear. These large mammals are so important to Alaska Native food security that subsistence hunters have come together to create five tribally-authorized

[1] BurnSilver S, Magdanz J, Stotts R, Berman M, Kofinas G (2016) Are mixed economies persistent or transitional? Evidence using social networks from arctic Alaska. American Anthropologist 118(1):121-129. *See also*, graphics showing subsistence sharing networks and outflows from two northern Alaskan villages, included with testimony.

hunter groups to work with the Departments of Commerce and Interior on harvest management and habitat protection under the Marine Mammal Protection Act.

Failure of the harvests for these animals, for any reason, threatens food security and can spell hunger for many.

In addition to the above, given the absence of a road system in northern Alaska, the coastal waterways are central to travel among communities. For all mariners, nature itself presents serious challenges, from the treacherous waters of the Bering, Chukchi, and Beaufort Seas to seasonal ice, rapidly changing weather patterns, high winds, heavy fog, and whiteouts. As the Subcommittee is learning, these natural risks are now compounded by the presence of large ocean-going vessels entering the Arctic for reasons related to marine research, as well as tourism, and commercial, industrial, and international transit.

Arctic Residents Have Valuable Experience with Large Vessel Traffic and Coastal Industrial Activities.

Northern residents, especially the bowhead whale subsistence hunters of the Alaska Eskimo Whaling Commission (AEWC), have been working with offshore oil and gas operators since the 1980s, to address impacts of exploration and development activities on the marine environment, marine resources, and subsistence hunting activities. Through the annual process of the Open Water Season Conflict Avoidance Agreement, initiated in 1985, the whaling captains of the AEWC have developed a highly successful collaborative process through which the ocean is shared, using an agreed ship-to-shore communications protocol and time-area arrangements, and with requirements for sound environmental management. Reliance on this process has facilitated successful offshore development in the Beaufort Sea, while ensuring maritime safety, a healthy marine ecosystem, and unaffected subsistence harvest opportunities.[2]

Similar approaches to collaborative management have enabled operations at the Red Dog Mine to co-exist with marine and terrestrial subsistence hunting activities in the NANA Region.

In 2012, as the reality of ice retreat and increasing arctic maritime traffic became apparent, the five arctic marine mammal hunter groups,[3] in consultation with the U.S. Coast Guard's District 17, began working together to form the Arctic Waterways Safety Committee. The 15-member AWSC was incorporated as a not-for-profit entity in October 2014. This is yet another example of the commitment of northern residents to collaborative problem solving and management.

The Arctic Waterways Safety Committee Has Oversight of the Waters from the Northern Bering Sea to the Canadian Border.

The AWSC is the largest Harbor Safety Committee in the United States, by area. And it is the only Harbor Safety Committee that includes subsistence hunters. This is because, in Alaska, the greatest number of marine users are subsistence hunters, working from small skiffs to gather marine food resources for their communities and for subsistence sharing with Native families throughout the state.

In other areas of the country, hunting tends to be more of a recreational activity. In the Arctic, hunting sustains life. Thus, in northern Alaska, a hunter is someone who gets things done. In this case, the marine mammal hunters took the initiative, with the Coast Guard's guidance, to identify the key maritime interests and bring them together.

The 15 members of the AWSC include one seat for a representative from each of the five marine mammal hunter groups, as well as the North Slope Borough, the Northwest Arctic Borough, the City of Nome, the Alaska Marine Pilots Association, Marine Research (vessel operators and research funders), Cruise Tourism, Tug and Barge Operators, Oil and Gas/Mining, Fishing, and Regional Tribal Entities.[4]

Immediately following its formation, the AWSC began to work closely with the Coast Guard, NOAA, and the Alaska Delegation to Congress to advocate for bathymetric surveys through the Bering Strait and along norther coastal areas. The AWSC engaged with District 17 in their work on the Port Access Route Study for the Bering Strait Region and is in the process of engaging in the Chukchi Sea/Beaufort Sea PARS. The Committee is engaged with NOAA and Coast Guard District

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[2] Lefevre, J, (2013) A Pioneering Effort in the Design of Process and Law Supporting Integrated Ocean Management, Environmental Law Reporter, 43 ELR 10893-10908.

[3] The bowhead whale subsistence hunters of the Alaska Eskimo Whaling Commission, the beluga whale hunters of the Alaska Beluga Whale Committee, the walrus hunters of the Eskimo Walrus Commission, the seal hunters of the Ice Seal Committee, and the polar bear hunters of the Alaska Nanuuq Commission (now Nannut Co-Management Council).

[4] *See*, Arctic Waterways Safety Committee Brochure, included with testimony.

17, providing updates and additions to the Coast Pilot and Notice to Mariners, with seasonal notifications of subsistence hunting times and areas.

The AWSC is in the process of drafting the Arctic Waterways Safety Plan for its region of coverage. To create this Plan, the AWSC has consulted the well-established guidelines for offshore oil and gas activities, taken from the Alaska Eskimo Whaling Commission's Open Water Season Conflict Avoidance Agreement, as well as the guidelines from the NANA Region's work with Red Dog Mine. The AWSC is using the Puget Sound Waterways Safety Plan as a guide and consulting with District 17 whenever possible.

To address the substantial amount of marine research traffic, especially federal traffic, now working in the Arctic, the AWSC works very closely with NOAA, NSF, BOEM, Coast Guard, and the University of Alaska, Fairbanks to develop marine research protocols. The goal is to promote vessel safety and to help reduce interference with subsistence hunting. Standards of Care for Research Activities were completed in 2016 and are available on the AWSC website.

Another initial area of focus is tug-and-barge operations. The tug-and-barge guidelines are being put together in cooperation with Crowley Maritime, one of the principal tug-and-barge operators in northern Alaska.

Continuing to Build a Safe Maritime Environment in Alaska's Arctic Will Take Investment.

The AWSC has become the primary forum for arctic waterways-users to gather, exchange information, and coordinate their operations with each other and with subsistence hunters, with meetings now attracting more than 50 individual participants. Federal agencies, including Coast Guard, are enthusiastic about this public forum and certainly are making use of it. Academic researchers, environmental groups, and commercial and industrial vessel operators express their gratitude for the opportunity to participate in this collaborative venue. Working together, the Committee and its participants are making a difference on the water. The opportunity to meet, exchange ideas, raise concerns, and reach consensus on solutions creates the opportunity to increase safety for everyone using Alaska's northern coastal waters.

The AWSC's success and growing recognition in such a short time are remarkable. However, its success so far is small compared to the challenges presented by the growing presence of large vessels in waters that are home to thousands of mariners in small craft and to marine mammals who themselves must adapt to a rapidly changing ecosystem.

Already the incidents of ship-strikes and line entanglements on whales are rising noticeably. In 2017, the Committee was notified of 24 different research cruises planned for arctic waters in a three-month period. In 2016, Crystal Cruise Lines brought approximately 2,000 people to the Arctic on the Crystal Serenity for a cruise up the coast of Alaska and through the Northwest Passage. Smaller commercial and private cruise traffic is becoming a regular phenomenon. It is not unusual for vessels to anchor offshore and discharge foreign passengers into coastal communities. Residents report unidentified vessels hauling unknown cargo through Alaska's coastal waters.

Clearly the forum provided by the AWSC and the work it has been able to accomplish during its brief existence are worth continuing. However, unlike Harbor Safety Committees in other coastal areas, AWSC membership is largely representative of subsistence users. Thus, resources for supporting travel to meetings, meeting venues, and staff time needed for work on the Waterways Safety Plan, consultations with the USCG, researchers, and others, and even for preparation of this testimony must be found through outside resources or gained through volunteer efforts. Philanthropic groups generously assisted with the start-up of the Committee, but those resources are no longer available.

Multiple meetings of multiple groups are occurring in and about the Arctic, many with federal support. Growing numbers of "experts" are offering opinions and recommending plans for "The New Arctic." The Arctic Waterways Safety Committee is the only group that is actually making a difference on the water. It is imperative that our federal government invest in this critical consultative process as the AWSC works to conduct the traffic and infrastructure planning necessary to ensure safe navigation in Alaska's northern waters.

The Need for Coastal Communications Infrastructure in Northern Alaska Is Urgent.

Thanks to Mr. Ed Page and his team at the Alaska Marine Exchange, there is AIS coverage for most of the northern waterway, which means vessels can be tracked through the AIS system. However, since Shell's departure from the Arctic in 2015, there has been no infrastructure for ship-to-shore communications. Local

residents cannot warn transiting vessels if they are entering waters occupied by hunters or other local residents in small craft. Transiting vessels cannot communicate with potential sources of emergency assistance on shore if they are in distress.

When the Crystal Serenity passed along the northern coast, as it left Nome and headed for Greenland, an unexpected pan of ice offshore of Utqiagvik (Barrow), threatened to drive the 2,000-passenger ship into waters occupied by bowhead whale subsistence hunters conducting the critical fall harvest. To avert disaster, staff for the Alaska Eskimo Whaling Commission, on a Sunday morning, had to scramble to find a contact in the corporate offices of Crystal Cruise Lines who could establish communications with the skipper of the Serenity. This lack of communications infrastructure and the disregard for human life it demonstrates would not be tolerated anywhere else in the United States. Why is it tolerated in Alaska?

It is impossible to stress enough the risk to life caused by the lack of communications infrastructure covering these waters. It leaves local residents vulnerable to potentially deadly interactions with large vessels. It leaves transiting vessels without a means of seeking assistance from local mariners in the event of an emergency. Alaska is a very large state with an extensive area for the Coast Guard to cover. The Coast Guard station at Dutch Harbor is 700 miles from Nome and 1,200 miles from Pt. Barrow. That's greater than the distance from Washington DC to Omaha, Nebraska. If there were an emergency in these northern waters, local hunters might be the only responders on-sight for days.

When the Alaska Eskimo Whaling Commission and offshore oil and gas operators initiated the Open Water Season Conflict Avoidance Agreement in 1985, the first mitigation measure put in place to ensure maritime safety and preserve the bowhead whale subsistence harvest was a radio tower at Deadhorse. Through 2015, an elaborate system of radio towers with ship-to-shore capabilities using VHF and satellite phones supported real-time communications and marine safety, especially for subsistence hunters. Every community from St. Lawrence Island to the Canadian border had a radio tower staffed by individuals who coordinated the movements of large vessels with the activities of small subsistence hunting boats. Beginning with the radio tower at Dead Horse, this privately-funded communications infrastructure grew and expanded over the course of 30 years. Oil and gas operators funded and used this system. Tug-and-barge used it. Transiting vessels used it. Coast Guard used it.

Marine mammal hunters depended on this communications system as their lifeline to shore. The Arctic Ocean is a dangerous place at any time. Northern waters still experience sea ice. Wind, weather, and sea-state can change without warning. Storms with hurricane-force winds are not uncommon. Adding large ocean-going vessels to these waters, where people are already risking their lives to feed their families, can be a prescription for disaster. The risk is multiplied by the lack of sound, reliable communications and traffic management.

On any given day in any given area, there may be hundreds of people on the water in small craft, working and risking their lives to feed their communities and to support Alaska's subsistence food economy. Unknown numbers of ocean-going vessels are now transiting these waters. There is no ship-to-shore communications infrastructure.

AWSC representatives have reached out to the Coast Guard. We have reached out to the White House. We have reached out to the Committee on Marine Transportation Systems. We have looked for ways to attract private investors. We have briefed members of Congress.

SUMMARY

The Arctic is no longer opening. It is open. Our residents are subsistence hunters. We are hardworking people who get things done. We feed our communities and look for responsible ways to share our resources. But we aren't going to get much further protecting our coastal waters—or the resources that are vital to our survival, or our hunters and residents, or the people transiting along our coast—without resources and engagement from our federal government.

To summarize, here is the situation today. What we have as the Arctic opens and what we need.

This is what we have:

- At any given time and in any given location, we have hundreds of citizens transiting and hunting in our coastal waters in small craft.
- We have increasing numbers of large ocean-going vessels coming through those same waters, largely unaware of our hunters' presence.

- We have a public forum, the AWSC, where local, federal, and international maritime interests are working together to develop consensus measures for arctic transit and maritime safety, as well as critical maritime notifications and advocacy for infrastructure and additional critical safety measures.

This is what we need for maritime safety:

- We need resources to continue the work of the AWSC.
- We need a consistent Coast Guard presence in our waters.
- We need infrastructure for ship-to-shore communications with the vessels that are transiting our waters.
- We need infrastructure and other resources to support disaster response.
- We need modern ocean floor mapping for the vast majority of our waters.
- We need a way to ensure that mariners are aware of the traffic management measures so far agreed to under our Waterways Safety Plan.[5]

And that is the short list.

If you remember nothing else from this testimony, please remember this. The Arctic is home to thousands of U.S. citizens in coastal maritime communities working on the water in small craft. The Arctic also is a frontier where thousands of people are now traveling in large vessels in poorly charted waters. Without communications infrastructure. Without comprehensive traffic safety measures. Without disaster response infrastructure or even protocols. And with very limited Coast Guard coverage. Our federal government can work with us to support the approach we are taking, putting safety measures and infrastructure in place before the unthinkable happens. Or our federal government can take responsibility for addressing human disaster in one of the harshest environments on earth, without infrastructure or even communications capabilities.

I encourage you to choose the first option.

Thank you.

Mr. LARSEN. Thank you, Mr. Chairman, I appreciate that. And related to that my first question is about indigenous peoples. I wanted to highlight a little bit more about their indigenous needs amidst the traffic, increased traffic, of larger ships.

You mentioned North Slope cooperation. But obviously, transit is going north and then going, presumably, east or west. So how is the Coast Guard fully collaborating with indigenous groups in the U.S. Arctic to balance their sovereignty and subsistence hunting needs with the growing presence of larger vessels?

Admiral RAY. We—in fact, I know Mr. Goodwin, and thank you for—you know, for your entering his statements.

We pride ourselves on taking into account the perspective of the Natives when it comes to the use of the oceans adjacent to the lands that they have occupied for centuries. And we go about it in multiple ways. But primarily with regards—the Bering Straits port access route study was a good example. That was specifically designed with the migration routes of the whales that they hunt, of the walruses, and other animals that they use for their lifestyle.

And so we will do the same thing we have started. We have started the initial phases of an Arctic Coast port access route study, which will take the same things into, you know, into account.

We also engage with the elders with regards to just how to operate in the Arctic. And, you know, it is really an interesting situation to go up there as a person from the lower 48 and try to, you know, provide value. It is an important thing to go up and respect them, and we preach this. When—we have kind of instruction for our people that have never been to the Arctic, and we talk to them about the value of doing that, and respect of the elders. It sounds—

[5] The AWSC isn't even listed on the U.S. Coast Guard's Port Directory link on its Homeport website.

maybe it doesn't sound exactly that high tech, but it is really important.

And so we take their input into effect with regards to any scheme that we propose. And these are schemes that will go all the way to the International Maritime Organization. They have factored in the Native perspective.

Mr. LARSEN. We take the same approach to Representative Young.

[Laughter.]

Mr. LARSEN. How far along are you in putting together firmer operation plans in the Arctic? It sounds like you are doing some experimenting, but how much of this con ops is actually getting written into the Coast Guard's longer term operation plans?

Admiral RAY. Well, we are—you know, the Arctic is a place that you don't—when you need to operate there, it is too late. You need to be planning now to operate there. Everything is harder. When you go north it is harder. It is harder to fuel airplanes, it is harder to get airplanes started, it is harder to moor ships, it is harder to—everything we do is dangerous, as the chairman talked about. That was in Homer, Alaska. That is far south, compared to where I am talking about operating.

And so it is—we send new Coasties up there. Every year we go up there in Arctic Shield and they will rotate. We have air crews, we have crews from multiple ships we send up there. We send people to Nome and other places to do commercial vessel inspections. And so all these people are learning how to operate in the Arctic. And it is a yearly thing that we do, and we surge it during the summer months when there is more activity, so we are more ready.

So you get there—this operation is—it is ongoing. Last year alone we had 20 search and rescue cases. And the number that sticks in my mind is I think we had 35 lives saved. Now, some of this varied from caribou hunters out east of the North Slope to actual people in distress at sea. We are not—if we get a call, we will go wherever it needs to be to look for them. So——

Mr. LARSEN. Would you——

Admiral RAY [continuing]. We are doing the actual operations.

Mr. LARSEN. Would you assess that you are making now—you are at a point where you are making marginal changes, or you are still making larger changes to operation plans?

Admiral RAY. Well, the biggest——

Mr. LARSEN. If you could wrap, I have got another question, so just make it quick.

Admiral RAY. Yes, sir. We are making marginal changes that will go along—regarding capability.

Mr. LARSEN. All right. And finally, how does not being part of the Law of the Sea Treaty help or hinder the Coast Guard sovereignty operations in the Arctic?

Admiral RAY. The Law of the Sea could help us moving forward, and multiple people believe it would be a significant help when it comes to rights over extended continental seabed and other issues. The Coast Guard operates as if we were a party to it. And thus far, that has been effective for us.

Mr. LARSEN. Thank you. Thank you, Mr. Chairman.

Mr. MALONEY. Mr. Lowenthal?

Mr. LOWENTHAL. Thank you, Mr. Chair. And Admiral, thank you for coming to speak with us about the urgent need to improve our Coast Guard's Arctic capabilities, and to continue to protect our country's significant interests in this region.

As the Coast Guard's Arctic Strategic Outlook notes, sea water temperature rise has already begun to affect the migration pattern of fish stocks in the Arctic, creating new risks of illegal, unreported, and unregulated fishing that can undermine our efforts to maintain healthy fish stocks. I am proud that the U.S. brokered the Central Arctic Ocean Agreement to prevent over-fishing in the Arctic with a joint effort for scientific monitoring of fish migration in this region.

In addition to a moratorium on unregulated fishing, this effort will help to establish a scientific baseline measure for the Arctic Ocean ecosystems so we can measure the effects of climate change and fisheries activity.

But Admiral, these are just good intentions without the resources we need to protect American interests in the Arctic, both to enforce fishery laws and to conduct this important research. Admiral, can you tell us how the Coast Guard is working to support these scientific and fisheries enforcement missions now, and what capabilities the Service is investing in to ensure that we carry out these initiatives in the years going forward?

Admiral RAY. Sir, we support the science efforts of NOAA and NMFS and others with regards to understanding the fish stocks in the Bering and north. And we—and so—and we also work with the other Arctic nations to understand their assessment of fisheries, you know, progress, and their perspective on the fisheries.

I think the bottom line is the Coast Guard has maintained a presence in the Bering Sea continuously in my lifetime, and focused on fisheries, focused on enforcing fisheries.

There was a time a few years ago when we were nose to nose with the Russians over the fisheries in the Bering Sea. Those—we cooperate much better now than we did a few years ago. So we have a presence, we understand the fisheries, and we move our forces to be in a position to surveil and to, in some cases, rescue the fishermen that are working in those regions.

Mr. LOWENTHAL. I was just wondering—following up on the last point, what are the capabilities that the Service now is investing in to ensure that we carry out these initiatives in the future? Could you kind of target—tell us a little bit about exactly what you are investing in, what are the capabilities to carry out this venture in the future?

Admiral RAY. Yes, sir. Thank you. Thanks to this committee, we are—so we talked about the Polar Security Cutter. That will provide a platform to do fisheries enforcement from anywhere in the Arctic.

The second thing is National Security Cutters which we have been building for several years, and have had great effect on our enforcement missions. We will be home-porting two Offshore Patrol Cutters in Kodiak. They will have the reach to go all the way up to the ice edge, and they are not ice cutters, but they will have the ability to get to the ice edge.

So—and then H–60 helicopters. We are—once again, thanks to this committee, we are actually growing the fleet of those H–60 helicopters to be able to reach out to get to the fishermen. And our H–65 helicopters, we are extending the service life of those. Those are the ones that embark on our ships in the Arctic and in the Bering Sea.

Mr. LOWENTHAL. Thank you, Admiral, and I yield back.

Mr. MALONEY. Mr. Gallagher?

Mr. GALLAGHER. Thank you, Mr. Chairman.

Admiral, as you look at the Arctic as a zone of increasing competition, in the past year there has been a lot of reports that the Chinese Communist Party has attempted to secure a greater presence, not only Arctic in general, but in Greenland in particular. And we have had to work with our allies—Denmark in particular—to deny them that access.

Tell us a little bit about how you view the Chinese threat in that region in general, and then how we should be thinking about Greenland in particular.

Admiral RAY. Yes, sir. I was just in Finland about a month ago with the folks from Denmark and Greenland, and so kind of have pretty fresh perspective from them.

Of course, we have got a strategic United States base, Thule Air Force Base here in northwest—or north—or western, and that is critically important. And there is no doubt in my mind that part of the Chinese intent is to get as close to that as they can. And so we need to be mindful of that, I believe.

What our icebreaker fleet will allow us to do, speaking from a Coast Guard perspective, is it will allow us to have the capacity to patrol around Greenland, as we did, you know, in years past. And so, having that presence is important to our allies to be able to work there to support them. Because when you get east of Nuuk on the lower west side of Greenland, there is no humans around that side on the east side and north. And they need—you know, that is a partnership that we need to continue to develop, and that is our intent.

Mr. GALLAGHER. Do you think there is room for a greater U.S. presence in Greenland, going forward? I know—I believe it is finalized, that we have opened up a consulate in Nuuk, which I view as a great step forward, and long overdue. Do you think there is room to expand our presence?

Admiral RAY. Well, I won't speak to the terrestrial part of it, that is not my purview. But I do believe having the ships that are capable of sailing those waters is important, and there is room for advancement on that.

Mr. GALLAGHER. And then we had—I believe last week the Pentagon delivered its annual report on Chinese military capabilities, and there was a special section contained therein solely devoted to Chinese activity in the Arctic. Perhaps you could give us the Coast Guard's perspective on that report, or that section. I know it is related to my first question, but I just wanted to give you a chance because I am not sure that report has yet been widely read on the Hill, but I view it as particularly important.

Admiral RAY. My perspective on the Chinese activity in the Arctic is that it is not much different than Chinese activity in the rest

of world. They exert presence, they kind of sail where they can, and by maintaining—establishing a presence, they kind of—it almost becomes an acceptance of that.

I mean, to talk about the Chinese in the Arctic when the closest point of China to the Arctic is somewhere around 900 nautical miles, that is kind of a stretch. And so you heard our Secretary of State the last couple of days, and his comments about that, and we certainly concur with that.

I think in the Arctic what we see is they are doing exploration, they are doing science, but they are also doing exploration for economic purposes, and they are doing exploration for other purposes, as well.

Mr. GALLAGHER. And finally I just want to close by saying that you have some incredible young men and women in northeast Wisconsin that are representing the Coast Guard very well, and we appreciate their presence and they are a great part of our community. So thank you for being here today.

Admiral RAY. Thank you, sir. The Great Lakes are an important part of the Coast Guard. Thank you.

Mr. MALONEY. Would the gentleman like to yield 30 seconds to the ranking member for a question?

Mr. GALLAGHER. I would be honored to yield.

Mr. GIBBS. Thank you. Thank you for yielding.

Just a quick question, Admiral. The Coast Guard is finalizing its Bering Sea port access route study, and the implementation of that, shipping routes, and safety, and—in the Arctic region. And the concern I have—there is a study done 5 years ago in the Atlantic coast port access route study, and I believe nothing has really come about that, or implementation of that. Can we get a commitment that the study for—the Bering route study will be, you know, implemented?

Admiral RAY. Yes, sir. In fact, we have made great progress on that. That was, you know, ratified at the International Maritime Organization this past year, and it was kind of unprecedented cooperation between us and the Russians. It just shows there are things we could cooperate on when we don't cooperate on other things.

And the Coast Guard has prided ourselves through the North Pacific Coast Guard Forum and now the Arctic Coast Guard Forum, we find areas that we think have room for cooperation, and we focus on those and not others. And that access route study was one of those.

Mr. GIBBS. And we will work for implementation when we get it.

Admiral RAY. Yes, sir.

Mr. GIBBS. OK, thank you.

Mr. MALONEY. Well, thank you, Admiral. I want to, without objection, move on to the second panel, but I want to thank Admiral Ray for his time.

I also want to associate myself with the questioning and the remarks of the gentleman from Wisconsin. A lot of us are very concerned about the strategic threat posed by the Chinese in the Arctic and everywhere else. And so I want you to understand that there is broad-based concern here on their activities, and we would

be very interested in your ongoing perspective on that, and what are you seeing. It is something we are all very interested in.

Sir, thank you very much for your time. We would like to move to the second panel.

Admiral RAY. Thank you, Mr. Chairman, I appreciate it.

[Pause.]

Mr. MALONEY. I would like to now welcome our second panel of witnesses. We are joined by Rear Admiral Shepard Smith, Director of the Office of Coast Survey of the National Oceanic and Atmospheric Administration, NOAA, and Colonel Phillip Borders, Commander of District Alaska of the U.S. Army Corps of Engineers.

Thank you for being here, gentlemen. We look forward to your testimony.

Without objection, our witnesses' full statements will be included in the record.

As with the previous panel, since your written testimony has been made part of the record, the subcommittee requests that you limit your oral testimony to 5 minutes, if possible.

You may proceed, Admiral Smith.

TESTIMONY OF REAR ADMIRAL SHEPARD M. SMITH, DIRECTOR, OFFICE OF COAST SURVEY, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION; AND COLONEL PHILLIP J. BORDERS, COMMANDER, ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS

Admiral SMITH. Yes, sir. Good afternoon, Chairman Maloney, Ranking Member Gibbs, and members of the subcommittee. My name is Shepard Smith, and I am the Director of the Office of Coast Survey at the National Oceanic and Atmospheric Administration within the Department of Commerce. Thank you for inviting me to testify today on our work to support safe and efficient marine transportation in the Arctic.

The U.S. is an Arctic nation by virtue of Alaska's geography. The remote and harsh environment there results in short operating seasons and other unique challenges, requiring extensive collaboration with international and regional partners. To this end, NOAA cooperates with academic, regional, State, and indigenous stakeholders. We also rely on and support our Federal partners and the Coast Guard, Navy, Army Corps of Engineers, and the Departments of Interior and Energy, all of whom, including NOAA, are part of the interagency Committee on the Marine Transportation System.

NOAA's services and products related to navigation, weather, and emergency response science are featured heavily in parts of the CMTS 10-year prioritization of infrastructure needs in the U.S. Arctic.

We have been working to increase NOAA's presence in the Arctic since 1870, when the Coast and Geodetic Survey schooner *Yukon* surveyed Alaskan waters and our Arctic work began. I will give a general overview of NOAA's services, but focused mostly on our navigation services that support maritime commerce, emergency response, and environmental stewardship in the Arctic.

NOAA is committed to producing reliable marine transportation, weather, hazard assessment, and other services to safeguard life,

property, infrastructure, and security in the Arctic. This work also allows stakeholders and constituents to make informed decisions that protect Arctic communities, economies, and ecosystems. NOAA's navigation services—notably our nautical charts—are essential to moving goods and services safely and efficiently in the Arctic.

Nautical charts are built upon the core NOAA competencies and responsibilities: positioning tides and water level data, shoreline mapping, and hydrographic surveying.

NOAA supports accurate positioning through the National Spatial Reference System. This is the national coordinate system managed by our National Geodetic Survey that allows us to make precise spatial measurements. To continue our efforts to make the system more accurate, NOAA completed the collection of airborne gravity data on mainland Alaska last year. We are planning on returning to Alaska in 2020 to complete surveys of the Aleutian Islands.

Along the coast NOAA's National Water Level Observation Network provides long-term observations to inform the decisions of increasingly vulnerable Arctic communities. In cooperation with the Alaska Ocean Observing System, AOOS, NOAA is developing portable, low-cost systems to fill information gaps in the Arctic. This will allow the National Weather Service to provide improved storm surge warnings and forecasts in small coastal communities.

The scale of the hydrographic surveying requirement in Alaska and the Arctic is vast. Over the past 3 years NOAA and its contract partners acquired 1,500 square nautical miles of Arctic survey data. Our survey plans for 2019 include an extensive set of project areas in Kuskokwim Bay. NOAA's 51-year-old survey vessels and our survey contractors are an essential component of the balanced hydrographic survey program NOAA employs in Alaska and across the Nation.

NOAA continually works with our stakeholders to inform our survey priorities. Our Federal advisory committee, the Hydrographic Services Review Panel, convened in Juneau last year in August for just this purpose.

The CMTS 2015 report on vessel traffic through the Bering Strait predicts that it will increase 500 percent by 2025, along with the risk of oil and other hazardous material spills. NOAA supports the Coast Guard response by providing oil spill modeling tools and data management, including the Arctic Environmental Response Management Application, known as ERMA.

Last August NOAA participated in a mutual aid deployment exercise on Alaska's North Slope oil field, and provided oil spill response training to over 200 industry and State and Federal representatives.

With 3 percent of the Arctic Circle within Alaska, international cooperation is also critical for the success of our efforts. NOAA participates in the Arctic Council and its working groups, such as the Protection of the Arctic Marine Environment and Arctic Monitoring and Assessment Program. NOAA is also a member of the Sustaining Arctic Observing Network and the Arctic Regional Hydrographic Commission.

Thank you again for the opportunity to testify today and discuss NOAA's Arctic marine navigation and related services. I appreciate the subcommittee's time and attention, and look forward to answering your questions.

[Admiral Smith's prepared statement follows:]

Prepared Statement of Rear Admiral Shepard M. Smith, Director, Office of Coast Survey, National Oceanic and Atmospheric Administration

INTRODUCTION

Good afternoon Chairman Maloney, Ranking Member Gibbs, and Members of the Subcommittee. It is a pleasure to be here today with my U.S. Coast Guard and U.S. Army Corps of Engineers colleagues to discuss our work supporting safe and efficient marine transportation in the Arctic. The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) cooperates and coordinates on a regular basis with these agencies in support of the nation's economic and national security interests in the Arctic.

NOAA's Arctic responsibilities cut across every NOAA mission area, from weather and sea ice analyses, to navigation services and fisheries management. For over two hundred years, NOAA and its predecessor organizations have provided foundational data, products, and services to support safe, efficient maritime commerce across the nation. NOAA has a long history in the Arctic, including conducting research and providing weather and climate services, sea ice forecasting, nautical charting and other navigation services, natural resource management, and oil spill preparedness and response. Today, as sea ice diminishes and economic and maritime activity in the Arctic grows, NOAA remains committed to its work in the Arctic. For this testimony, I will focus on the NOAA components highlighted in the Committee on the Marine Transportation System's 2018 report on critical infrastructure investments necessary to support a safe and secure Arctic marine transportation system.

CMTS REPORT

In December 2018, the Committee on the Marine Transportation System (CMTS) issued an update [https://www.cmts.gov/downloads/NearTermRecommendations Arctic2018.pdf] on the near-term recommendations in its 2016 Ten-Year Prioritization of Infrastructure Needs in the U.S. Arctic [https://www.cmts.gov/downloads/NSAR__1.1.2__10-Year__MTS__Investment__Framework__Final__5__4__16.pdf].[1] The report's recommendations span five key categories integral to the Arctic Marine Transportation System (Arctic MTS), including: (1) navigable waterways, (2) physical infrastructure, (3) information infrastructure, (4) emergency response, and (5) vessel operations. As the report describes, even as sea ice retreat increases opportunities for navigation-related activities, the Arctic remains a challenging environment for marine transportation. There are still unpredictable ice floes, extreme weather conditions, and seasonal accessibility based on variation in ice location. NOAA's navigation products, as well as its weather, and emergency response science and services feature heavily in the physical, information infrastructure and emergency response sections of the report. The U.S. MTS Arctic Infrastructure Table at the end of the report is a good snapshot of current conditions and gaps in critical Arctic MTS infrastructure.

NOAA'S ARCTIC MTS SERVICES

Because most of the U.S. Arctic is not connected by road or rail, marine transportation is an essential means of transporting goods and people. NOAA's navigation, observation, and positioning services are important for safe and efficient maritime commerce, security, community re-supply of food and fuel, construction, and other commerce-related activities. Thus, nautical charts for Alaska and the Arctic are a key component of NOAA's nautical charting mission.

The major requirements for nautical charts are (1) accurate positioning, (2) coastal oceanography such as tides and water levels, (3) shoreline mapping, and (4) hydrographic surveying. As described below, NOAA is taking steps to improve the accuracy and reliability of these core capabilities in the Arctic and the nautical charting and navigation services they support.

[1] These reports are accessible online at https://www.cmts.gov/topics/arctic.

NOAA released its National Charting Plan in 2017 to improve chart coverage and take full advantage of the capabilities of today's technologies, including digital Electronic Navigational Charts (ENCs). This national plan updates and incorporates NOAA's older Arctic Nautical Charting Plan. These plans are based on extensive outreach to users. They also are designed to ensure NOAA continues to lead and implement international requirements for surveying and ENC charting.

Positioning and the National Spatial Reference System

Nautical charts rely on accurate shoreline information and precise positioning, elevation, tide, and water level data, all of which are dependent on an accurate land-based reference framework. NOAA's National Geodetic Survey (NGS) provides the authoritative framework for all positioning activities in the Nation, known as the National Spatial Reference System (NSRS). This authoritative coordinate system defines latitude, longitude, height, gravity, and shoreline information, which supports a wide range of important activities, including mapping and charting, navigation, transportation, infrastructure, flood risk determination, national security, and ecosystem management.

Land elevation and positioning data in Alaska currently have errors of up to a meter or more. To rectify this and modernize the NSRS, NOAA collects airborne gravity data under its Gravity for the Redefinition of the American Vertical Datum (GRAV-D) initiative. GRAV-D data collection for mainland Alaska was completed in 2018. GRAV-D plans on returning to Alaska in 2020 to complete surveys of the Aleutian Islands. NOAA is also working to provide improved positioning in Alaska through its network of Continuously Operating Reference Stations (CORS). These efforts are part of NOAA's 2022 update to the NSRS, which will enable up to centimeter-level accuracy for latitude, longitude, and height, using Global Navigation Satellite System survey techniques at any location.

Tides and Water Levels

As stated above, accurate water level data is essential for accurate nautical charts. NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) operates and maintains the National Water Level Observation Network (NWLON). In addition to providing data essential for surveying and charting, these long-term observations of coastal water levels improve understanding and predictions of coastal change, storm surge, and saltwater intrusion into freshwater systems that are urgently needed to inform decisions by increasingly vulnerable coastal communities in the Arctic. Presently, CO-OPS operates 27 long-term NWLON tide stations in Alaska, 10 of which are located in the Arctic. CO-OPS has identified over 30 gaps in NWLON coverage for Alaska, the majority of which are in the Arctic.

To supplement NWLON data, the Alaska Ocean Observing System (AOOS), which is a part of the NOAA-led Integrated Ocean Observing System (IOOS) program, has helped install portable, low-cost systems that help to fill observation gaps needed for NOAA's National Weather Service (NWS) storm surge warnings and forecasts in small coastal communities. NOAA is also collaborating with private industry to build a public data management system that parallels the CO-OPS website. This system will serve as an example for advancing nationwide access to external source water level data. Recently, the NWS funded CO-OPS to install an NWLON station in Unalakleet, Alaska, to provide real-time information for storm surge models, as well as navigation. The maintenance of this station, as well as others in Alaska, has been contracted out to a local Alaska company. NOAA also plans to replace the Port Moller station in the Aleutians, which burned down in 2017, with Fiscal Year 2019 dollars.

NOAA

Shoreline Mapping

Shoreline surveys are also critical to keeping nautical charts up to date. In 2018, NOAA updated 4100 miles of Arctic shoreline for its Continuously Updated Shoreline Product in conjunction with the rescheming of related NOAA ENCs. This data enables mariners to pinpoint their locations relative to the coast, navigate to and from ports safely, and find harbors of refuge when in need.

In conjunction with AOOS, the state of Alaska, and other partners, NOAA is also supporting the development of an Alaska Coastal Mapping Strategy for publication in 2019. This strategy will include Arctic priorities in its assessment of needs for coastal topography and nearshore bathymetry, along with other types of mapping. The effort is intended to identify state stakeholder priorities for new collections, the costs associated with mapping, and ways to leverage new mapping projects and partnerships.

Hydrographic Surveying

The scale of the hydrographic survey requirement in Alaska and the Arctic is vast, with 426,000 square nautical miles within the U.S. Exclusive Economic Zone and nearly half of that significant to navigation. Soundings on some nautical charts in the Arctic are still from Captain Cook.

Through the Office of the Coast Survey, NOAA continues to prioritize and undertake hydrographic surveying in the expansive, remote and harsh Arctic environment. Over the past three years, NOAA and its contract partners have acquired nearly 1,500 square nautical miles of hydrographic survey data in the Arctic. For 2019, our survey plans include an extensive set of project areas in Kuskokwim Bay. NOAA's survey contractors are an essential component of the balanced hydrographic survey program NOAA employs in Alaska and across the nation. The 51-year old NOAA Survey Vessel Fairweather will also survey around Cape Newenham.

NOAA also works with private sector partners and academia to develop and deploy unmanned surface vessels (USV) for chart-quality surveys. For the past two years, our contractor in Alaska has employed USVs to conduct hydrographic surveys. In August 2018, NOAA and researchers from the University of New Hampshire's Center for Coastal and Ocean Mapping made the first successful launch of a USV for an operational hydrographic survey from a NOAA vessel in the Arctic. NOAA also tested four Saildrone USVs in the Bering and Chukchi Seas and is further investigating the use of Saildrones as an additional, cost-effective survey capability. Based on the success of that mission, we are currently updating our Bering Sea charts with the USV data.

Weather and Sea Ice Forecasts

The ability to transmit timely weather and accurate information and sea ice forecasts depends heavily on the ability to predict inclement weather and changes in currents or ice cover and extent. One side effect of an ice-diminished Arctic is a reduction in the dampening effect of ice on waves. As spring and fall storms intensify, wave action increases due to a lack of ice cover. In addition, diminished fall and spring sea ice also has the potential to intensify high latitude storms as both moisture and heat are exposed with the open water. Thus, early warning of impending storms is important for both ships and coastal communities in the Arctic.

NOAA's NWS is increasing targeted in-situ observations, both surface-based and aloft, to improve model assimilation of observed data, situational awareness, and scientific understanding of the Arctic. NWS is also leveraging new remote sensing capabilities, such as unmanned aerial systems (UAS), unmanned aerial vehicles (UAV), and satellite technology in addition to next generation autolaunching, upper air systems at all NWS Alaska Region sites. The NWS Alaska Region has also proactively addressed both current and emerging operational forecast gaps by establishing and resourcing the Alaska Environmental Science and Service Integration Center, which will support both regional and international Impact Decision Support Services.

Moreover, NOAA is focusing on the science fundamentals to improve coupled water, ice, atmosphere models. Much of the focus of model improvements to date have been on the mid- and lower-latitudes. Areas of specific improvement are the stable Arctic boundary layer, interactions between the oceans, ice, and atmosphere in the marginal ice zone, riverine impacts to ice, and troposphere-stratosphere interactions. These activities will improve NOAA's ability to forecast the weather and Arctic sea ice.

The National Ice Center (NIC), a partnership among NOAA, the U.S. Navy, and U.S. Coast Guard, provides sea ice assessments for the Arctic. The NIC produces a daily, 48-hour Marginal Ice Zone forecast in text format. The NWS Alaska Sea Ice Program also produces a short-range, sea-ice forecasting capability with 5-day sea ice graphical and text forecasts. Besides short-range products, NOAA NWS is developing experimental weekly sea ice forecasts that include sea ice extent, concentration, and sea ice melt and freeze dates.

The NIC uses data from NOAA Joint Polar Satellite System and Geostationary Operational Environmental Satellites-West (GOES-West), and Department of Defense (DoD) weather satellites, as well as leverages data from European and Japanese, and purchases data from the commercial sector to support its mission. These data sets inform the timing and accuracy of weather and hazard forecasts out to seven days, including better predictions for fog, ice formations, and ice breaking in the Arctic. In addition, researchers at NOAA's Earth System Research Laboratory have developed a fully-coupled ice- ocean-atmosphere model focused on 0-10 day forecasts. Currently, this modeling team is working with the NWS to advance Arctic sea ice forecast capabilities.

Oil Spill and Hazard Preparedness and Response

Decreasing summer sea ice is contributing to growth in commerce, tourism, and energy exploration in the Arctic. According to another CMTS study of vessel traffic in 2015 (which the CMTS is now working to update as well), shipping transits through the Bering Strait are expected to increase 500 percent by 2025. This increased activity heightens the risk of accidents and discharges of oil and hazardous materials. NOAA's Alaska regional Scientific Support Coordinator provides scientific support to the federal on- scene coordinator for oil spills and other emergencies such as search and rescue. NOAA's contributions include modeling the fate and movement of spills, identifying natural resources at risk, and providing software, mapping tools, and data management capabilities. By law, NOAA is also a trustee for natural resources that have been injured by oil and chemicals spills and conducts damage assessment and restoration of these resources.

NOAA participates in joint training and workshops with interagency partners and other Arctic nations on activities such as the use of mechanical recovery, dispersants, and in situ burning following transboundary spill events. NOAA compiles baseline information on natural resources in the Arctic and promulgates standard techniques and guidelines for observing and measuring oil spills and assessing shorelines.

NOAA Office of Response and Restoration (ORR) also maintains the Arctic Environmental Response Management Application (ERMA®) to integrate and synthesize data into a single interactive map, provide quick geospatial visualizations, and improve communication and coordination among multiple responder agencies. As a common operational picture, ERMA® brings together all of the available information needed for an effective emergency response. In 2017, with funding assistance from the Bureau of Safety and Environmental Enforcement, NOAA improved its display for the Arctic by adding polar projection base maps. This provides a less distorted display of the region while maintaining accurate bearings to the coastline and provides a better tool for pan Arctic data sharing and perspectives.

Interagency preparedness exercises are essential for critical improvements in spill response procedures. In August 2018, NOAA participated in the Mutual Aid Deployment (MAD) exercise on Alaska's North Slope oil field. The 2018 exercise was hosted by Exxon Mobil and included over 200 industry and state and federal representatives. NOAA provided support with oil spill trajectory modeling, weather forecasts, resources at risk and sensitive areas information, facilitation of the Endangered Species Act Section 7 consultation, Shoreline Cleanup Assessment Techniques planning, ERMA®, in-situ burn planning, and data management planning. NOAA, with other members of the Alaska Regional Response Team's Food Safety Workgroup, also led the development of the "Ensuring Food Safety Following an Oil Spill in Alaska: Regulatory Authorities and Responsibilities" report that was released in December 2018.

International oil spill exercises are also important. In November 2018, NOAA ORR staff traveled with colleagues from the U.S. Coast Guard and the State of Alaska to Yuzhno-Sakhalinsk, Russia, to participate in a "Seminar on Understanding Maritime Pollution Threats and Response Systems in the Russian Federation-United States Trans-Boundary Area." The meetings concluded with an international tabletop exercise to test and practice the provisions of the existing "Joint Contingency Plan of the United States of America and the Russian Federation on Combating Pollution in the Bering and Chukchi Seas."

During the United States chairmanship of the Arctic Council for 2015 and 2016, NOAA chaired the Emergency Prevention, Preparedness, and Response (EPPR) Workgroup. Under this leadership, the U.S. delegation to the workgroup delivered several important projects including a Pan-Arctic Oil Spill Response Equipment Database, a Circumpolar Oil Spill Response Equipment Viability Analysis, an updated Guide on Oil Spill Response in Ice and Snow Conditions, and further advancement of exercise procedures for the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response. Currently, NOAA is a member of U.S. Delegation for EPPR and provides the current state of the art of response techniques, particularly on the use of dispersants in Arctic environments.

NOAA RESEARCH SUPPORTING THE ARCTIC MTS

NOAA continues to observe and model long-term changes occurring in sea ice thickness and extent which are important both for global climate modeling and understanding how access to the Arctic is changing with reduced seasonal ice cover. Deployed Seasonal Ice Mass Buoys provide near real-time data on ocean and air temperature through the sea ice that, combined with data from the atmosphere and ocean, contributes to the fundamental understanding of the role of the sea ice cover

in the global climate system. These observations enable seasonal to decadal predictions in sea ice cover.

INTERNATIONAL, INTERAGENCY AND LOCAL ENGAGEMENT

NOAA, in collaboration with numerous other agencies, has supported U.S. participation in the international Arctic Council since its establishment in 1996. The U.S. served as the second chair of the council from 1998 to 2000 and chaired the Council again from 2015 to 2017. Through the Council's Protection of the Arctic Marine Environment working group and other efforts, NOAA has supported coordination of efforts to promote safe Arctic navigation. Last year, the Council launched a public website to assist in the implementation of the Polar Code. To better address Arctic hydrographic and nautical charting challenges, NOAA has also participated in the Arctic Regional Hydrographic Commission since 2010.

NOAA serves as Vice Chair of the U.S. Arctic Observing Network Board after serving as Chair and has continued work towards a sustained and well-defined network of Arctic observations across NOAA, other Federal agencies, the State of Alaska and Alaska Native Tribes, academia, industry, and international partners, such as the Sustaining Arctic Observing Network. NOAA is a long-standing sponsor of the Arctic Report Card, an annual, peer-reviewed report developed by 85 scientists across 12 countries. The Arctic Report Card issued its 13th report in December 2018. The publication's annual update provides reliable data and observations to support local and regional decision makers in making informed decisions for Arctic communities, national security, industrial growth, environmental health, and food security.

On a local level, the increase in vessel traffic through the Bering Strait into the Chukchi and Beaufort Seas is of concern to Alaska Native coastal communities in the region. These communities rely on subsistence hunting of marine mammals, which are critical to their nutritional, cultural, mental and spiritual well-being. NOAA has been working with the Arctic Waterways Safety Committee (AWSC), as well as Alaska Native Organizations and regional bodies, to ensure the increase in research vessel traffic does not negatively impact the ability of the communities to hunt marine mammals. Since 2015, NOAA has requested community input for summer survey plans with the AWSC. During these briefings on planned work, NOAA also details its findings from its prior year surveys.

LOOKING TO THE FUTURE: ENHANCING NOAA'S CORE MISSIONS IN THE ARCTIC

While NOAA's core missions remain the same, advances in technology are providing opportunities to greatly enhance the accuracy, timeliness, and integration of our products and services, including those that inform and support marine navigation and transportation in the Arctic. To ensure that we consider the needs of and challenges facing our Arctic stakeholders, NOAA continues to look for innovative partnerships with the private sector and other stakeholders, including the ability of the private sector to incorporate NOAA data and services to develop new applications to enhance operations and efficiency.

CONCLUSION

NOAA plays a unique and important role in providing critical information infrastructure to support safe, reliable, and efficient marine transportation. Rapidly changing conditions and increased accessibility bring new urgency to NOAA's work to support increased activity in Arctic waters. Local, state, federal, and international partnerships are critical to achieving successful Arctic operations in this unique and challenging environment. NOAA is working to develop and apply technology and data in innovative ways to improve our navigation products and services. Thank you again for the opportunity to testify today. I appreciate the Subcommittee's time and attention and look forward to answering your questions.

Mr. MALONEY. Thank you, Admiral.

Colonel Borders?

Colonel BORDERS. Thank you, sir. Admiral Smith, thank you very much. We work with NOAA quite often in the Corps of Engineers, especially up in Alaska. In fact, I just received the concurrence to move through design with our Whittier study. So thank you.

Chairman Maloney and distinguished members of the subcommittee, I am Colonel Phil Borders. I am the commander of the

U.S. Army Corps of Engineers in the Alaska District. I actually live just outside of Anchorage, so I flew down here to this hot weather.

Thank you for the opportunity to appear before you today and discuss navigation needs in the Arctic, particularly the Port of Nome. Today I will provide you a quick overview of the Corps navigation program in Alaska, then focus in upon the preliminary conclusions of our soon-to-be published draft integrated feasibility report and environmental assessment for the Port of Nome Modification Study, highlighting some of the navigation needs in western Alaska and the Arctic.

As you know, the increased ocean water temperatures, reduction in pack ice, and the longer opening of the Northern Passage, Alaska and Alaskan ports are of vital interest to our Nation and our North American allies. Since 1902, when Congress requested the Corps to perform preliminary examinations of the Wrangell Channel in southeast Alaska, the Corps has played an important role in addressing navigation needs in the State.

In Alaska few communities are connected to Alaska's limited road system, resulting in ports and harbors playing an important role in statewide transportation and economy. The Corps of Engineers has constructed, overall, 62 harbors and channel projects over the last 117 years, with 57 of those 62 still in use today. Recently, construction projects in Alaska in Valdez and Port Lions, along with the 9 current navigation studies my district has, and the 2 authorized navigation projects that are ready for design, shows the demand of navigation improvements in Alaska remains strong today.

As part of the Corps' program in Alaska, the district has investigated the need for navigational improvement in the Arctic. In our 2013 report entitled "Alaska Deep Draft Arctic Port System Study," we noted more than 3,000 vessels used the great circle to transit annually, and there are over 400 Bering Strait transits annually. So the opening of the Arctic waters to maritime traffic is presenting new challenges with respect to maritime safety and environmental protection, as well as opportunities for greater efficiencies in shipping.

This ability of vessels to transit into and through the Arctic has increased in conjunction with the lengthening of time of open water, free ice, currently from about May to November.

A prime example of the navigation is Nome, Alaska. The Corps' navigation project at Nome was originally completed in 1923, and then expanded in 1954, and again modified in 2006. So we have been at this for a while. Located 737 miles north of Dutch Harbor along the Aleutian chain, Nome is the only major port facility in western and northern Alaska providing safe freight transfers for vessels in excess of 22 draft capable facilities.

Currently, multiple Government vessels, large cruise ships, research vessels, and large fuel tankers conduct lightering into Nome to access necessary facilities to bring both crew and cargo ashore. In total, vessels exceeding the draft depth entered the port spent over 1,200 hours in anchor offshore at Nome in 2017 alone, just to conduct those lightering operations.

Due to the lack of available deep draft along the western and northern coast, the U.S. Coast Guard, as stated earlier, is limited

to small vessels and helicopters. The nearest Coast Guard station to Nome is about 800 miles away south in Kodiak, as the admiral mentioned. However, because of the long sailing times through remote and often challenging waters, security and safety become our concern of paramount, both for the Coast Guard and for the Corps.

An increasing number of oil and gas transferred vessels are transiting the Atlantic, making spills a growing concern, mainly because of the limited facilities or ready available supplies, should a cleanup happen at sea.

In summary, though Nome is not the only community in Alaska in need of navigation permits, the situation in Nome is a good example. We are proud to work in collaboration with many other Federal agencies as we do routinely, and recommend Arctic implementation and needs of the Arctic.

Thank you, Mr. Chairman and subcommittee members. I am open to your questions, as always.

[Colonel Borders's prepared statement follows:]

Prepared Statement of Colonel Phillip J. Borders, Commander, Alaska District, U.S. Army Corps of Engineers

INTRODUCTION

Chairman Maloney, Ranking Member Gibbs and distinguished members of the subcommittee, I am Colonel Phillip J. Borders, Commander of U.S. Army Corps of Engineers (Corps) Alaska District. Thank you for the opportunity to appear before you today to discuss the role of the Corps in support of commercial navigation in the Arctic. The Corps works in collaboration with other federal agencies, and with state, local, and tribal entities on this issue.

I will provide you an overview of the involvement of the Corps in Alaska's port development, and an update on our soon to be published Draft Integrated Feasibility Report and Environmental Assessment for the Port of Nome Modification study.

THE CORPS OF ENGINEERS NAVIGATION PROGRAM IN ALASKA

Since 1902, when Congress authorized the Corps to perform preliminary examinations of Wrangell Channel in southeast Alaska, the Corps has played an important role in support of commercial navigation in the state. Due to few connections to Alaska's road system, many of the state's coastal communities rely on ports and airports for transportation. The Corps of Engineers has improved the channels at 62 ports in Alaska over the last 117 years. Fifty-seven of these ports are in use today. The Corps recently completed projects to deepen the ports of Valdez and Port Lions.

A 2013 Corps report, entitled "Alaska Deep Draft Arctic Port System Study", noted that "[m]ore than 3,000 vessels use the Great Circle route through Alaska's Unimak Pass each year and there are over 400 Bering Strait transits annually. The opening of Arctic waters to maritime traffic is presenting new challenges with respect to maritime safety and environmental protection as well as opportunities for greater efficiencies for shippers." This ability of vessels to transit into and through the Arctic has increased in conjunction with the lengthening of time of open water/ice free conditions, currently about May to November of each year.

PORT OF NOME MODIFICATION STUDY

Over the past 10 or so years, the Corps has been evaluating the costs and benefits of options for channel improvements at one or more ports in western Alaska. In the first phase of that effort, we explored 14 potential sites and concluded that a proposal involving two of these ports (Nome and Port Clarence) had the best potential for justification based on a further analysis. By February 2015, the Corps had dropped Port Clarence from consideration. It has focused since then on options for the Port of Nome.

The Corps first improved the Port of Nome in 1923. It modified that project in 1954, and again in 2006 to its present configuration. Located 737 miles north of

Dutch Harbor, Nome is the largest port in western and northern Alaska. Its main commercial docking area is in waters with a depth of –22ft MLLW.

Currently, multiple government vessels, large cruise ships and larger research vessels conduct business in Nome while anchored offshore in deeper water. This business includes the transfer of personnel and equipment to and from the ships. In addition, large fuel tankers anchored offshore of Nome lighter their load by off-loading it to smaller vessels for delivery to Nome and other small communities of the area.

Mr. Chairman and subcommittee members, this concludes my statement. Again, I appreciate the opportunity to testify today and look forward to answering any questions you may have.

Mr. MALONEY. Thank you, Colonel. We will now proceed to Members' questions, and I recognize myself for 5 minutes.

Colonel, can you help me understand the subject you were just talking about? What is the optimal depth for that port in Nome? I know we are fortunate enough to be joined by Admiral Allen, who is going to tell us it is—I think, according to your standards—deeper than 22 feet, deeper than the 35 feet they might get to with additional docking. Shouldn't it be 45 feet? Can you talk a little bit about that, sir?

Colonel BORDERS. Sir, in this project, it is a civil works project using the Remote and Subsistence Harbor Act of WDRA 2007. So we maintain the draft and the study—has been upon the vessels that use it and the Coast Guard vessels. So the study is looking forward to between 30 and 40 MLLW, mean lower low water, for the study that we have out there.

I understand the 45-foot depth, but that is for another organization. If they want, they have that capability there—for the *Arleigh Burke*-class, I believe, is what you are referring to sir.

Mr. MALONEY. And so if I could just press you on that a little bit, what does that answer mean that you just—could you put that into terms that a normal human could understand?

Colonel BORDERS. So the community of Nome, sir, on the shipping vessels that are up there, it is the assessment of the vessels that use that facility normally, and that is where we come up with between the 30 and the 40.

Mr. MALONEY. Right, but we have got a dynamic situation, don't we, Colonel? You would agree the whole point of what we are talking about today is the emerging reexamination of the Arctic, and developing a strategic plan, of keeping up with the great power competition. It is not going to be enough to just service the vessels who are using it now. Isn't that fair to say?

I mean, in other words, do we have any other deepwater ports anywhere nearby?

Colonel BORDERS. Sir, there is Port Clarence, which is——

Mr. MALONEY. That is it, right?

Colonel BORDERS [continuing]. Natural deepwater with no facilities——

Mr. MALONEY. You are not considering Port Clarence any more are you, right? So this is the only one we are considering, right, is Nome?

Colonel BORDERS. So it is the one that have, over the last three studies, has come to the conclusion that Nome is the best viable port with a benefit-cost ratio that also supports the community because we are using a civil works authority to do this.

Mr. MALONEY. And so, if we want to have a port, that is going to be it. And if we want to have a port we can actually use into the future with all the capabilities we want to develop—and we are going to spend a lot of taxpayer money on—it has got to be deeper than 22 feet, even 35 feet, doesn't it?

Colonel BORDERS. For national defense reasons, sir, I think that you are correct for—45 feet would be the optimal. But once again, this is—we are doing this under a civil works premise right now, and the authorities that the Corps has. So we do a lot of MILCON work, we are just currently not using that for this particular project.

Mr. MALONEY. I understand, thanks. And I appreciate your point. But I also think you appreciate the larger point, which we are paid to focus on, at least on this side of the dais.

Admiral Smith, can you tell me a little bit about what your challenges are in the Arctic, what your infrastructure needs are? Obviously, it is a vast region. The extraordinary work you do in other places simply hasn't been possible in that region. I understand that.

Can you put some context around that for us, and what we ought to be thinking about, what we ought to expect, what you would need to really bring it up to the same kind of standards we enjoy in other places?

Admiral SMITH. Yes, sir. Most of our work for hydrographic surveys in the Arctic for shipboard work has been staged out of Dutch Harbor using Nome as a sort of forward-operating base when it is accessible to us.

And, you know, as a result of that and the vast distances that we have talked about earlier, it is a very short operational season available to us for surveying. And so the two ships that we have and our contractors have to cram a whole season's worth of activities into that short window.

We have—recognizing this challenge, we are looking at ways of hitting that area as hard as we can with as many platforms as we can during that short season. So, to that end, we are looking at unmanned systems with—that are independent, with high-endurance, ship-based unmanned systems that can sort of be a force multiplier for our existing ships and future ships, and increased use of partnerships and crowdsourcing for the region.

All of those together are still not going to be enough, because it is such a huge challenge. But we are being very creative with all of the technology and resources available to us.

Mr. MALONEY. And we also heard Admiral Ray talk about how everything is harder in the Arctic. Could you say a word about how you track ice movement and ice flows, oil spills, potentially, and any additional challenges you have there?

Admiral SMITH. Yes, sir. Very briefly, it is an interagency effort with NOAA and the Navy and the Coast Guard for, you know, different parts of the program. There is a lot of satellite observations, aircraft observations, and that tracking has been consistent over time.

The oil spill response is particularly tricky, because we rely on modeling, which itself is then relying on observations and mapping, which is sparse in the Arctic. So we are investing in science for un-

derstanding the behavior of oil in that type of environment, as well as in the modeling necessary to support it.

Mr. MALONEY. Thank you, sir.

Mr. Gibbs?

Mr. GIBBS. Thank you, Mr. Chairman. I would just like to start out a little bit of a lighter note. I guess Captain Cook surveyed Alaska in 1778, and hopefully some of that survey data has been updated since then. You don't have to answer that.

I do want to talk a little about the charts and the survey and what actions can NOAA take to complete surveys and process the data from those surveys of navigationally significant areas of the Arctic charted more quickly.

And I want to tie this in a little bit with this other concept or a process called a Continuously Operating Reference System, or CORS. You know, the coastal mapping with the Army Corps NOAA does, they play together, interact. And I guess the two questions that come out of that really—does NOAA coordinate coastal mapping requirements and survey operations with the U.S. Army Corps of Engineers, the National Coastal Mapping Program?

And also, could you tell the committee how this important program relates not only to NOAA's mission, but geographic data more generally? Because I have kind of heard that sometimes our coasts change on the maps, can you explain this whole area of how we developed these charts, and how we can do it better and more efficiently?

Admiral SMITH. Yes, sir. Thank you for the question. I understand the first question to be about the process of taking from observation until it is useful to the public. I am pleased to report that we have made huge progress on that in the last decade or so. This has been a personal passion of mine. And that has resulted—the improvement has been a result of both processing improvements in hydrographic surveying, but also changes in the way that we update our charts and distribute them.

And, in fact, it is the charting changes that have probably led to the most notable improvement in this. So instead of waiting for a new edition of a paper chart to be printed, distributed to warehouses, and then sent out to customers, we are entirely digital now, and all charts are printed on demand. So when a new survey comes in, we can update it on the chart, and it can be available next Thursday.

So the holdover from being a print shop is now gone, and that has cut years off of the time it takes to update charts. The Continuously Operating Reference Systems are GPS-based reference systems that are very dense. In the continental U.S. they are largely partnerships. And so where there is any infrastructure—from university or other Federal agencies—we tend to have these. This is one area where, because there are thinner communities and less activity in general, we have less in Alaska.

But I am pleased to report that the National Geodetic Survey has a foundation CORS program that I know we will be hearing more about soon that will provide the underlying highest order positioning system to underlie the 2022 datum changes.

Coordinate with the Army Corps? Absolutely, both for the channel programs, channel dredging—that is where most of the data

comes from—but also for the coastal mapping program from the system run out of Mississippi and their other programs around the country.

We have a 100-percent interoperability. That is, we can use the data when necessary. We also do coordinate knowing what each other's plans are, so that we can meet each other's needs as we go forward. So we don't always use the data, because it is not always relevant, but we do have available full interoperability. And that really ties into the coastal change, as well, particularly with less ice in Alaska, there is more erosion of the coastline, and we are seeing more coastal change. And with larger scale charts, that sort of change is more relevant and easier to——

Mr. GIBBS. I appreciate it, I am glad to hear that you are working together on that.

Admiral SMITH. Yes, sir.

Mr. GIBBS. Colonel, we are told that the Chief's Report for the Port of Nome Modification Study—due fall 2019—is there any changes to that schedule? And is the Corps encompassing expected national security and other associate benefits in their evaluation of the Arctic deep draft port?

Colonel BORDERS. Sir, we don't anticipate any change. In fact, we anticipate achieve support in June of 2020 for the report. So we are on schedule for that.

I believe the second part of your question was——

Mr. GIBBS. About national security or other associated benefits.

Colonel BORDERS. We do—we have included national security in this report structure. Uniquely enough—so there is currently no metric in our process to address that, but we are addressing that as far as being in the report, so that, like the chairman spoke to earlier, it can be it can be looked at in the larger perspective outside of the authority that we are we are looking at this project.

Mr. GIBBS. I know you have got a challenge, because that is really the only possibility of having a deepwater port in that area, right?

Colonel BORDERS. That is my understanding, sir.

Mr. GIBBS. And the challenge——

Colonel BORDERS. It is the best chance, sir.

Mr. GIBBS. Yes, and the challenge is getting the draft deep enough.

All right. Thank you, Chairman. I yield back.

Mr. MALONEY. I thank the gentleman. Mr. Brown?

Mr. BROWN. Thank you, Mr. Chairman. Admiral Smith, in your testimony you talk about the need for strategic partnerships and increased capability to ensure a steady stream of data and accurate information for sea ice and weather forecasts. The National Ice Center, which is located in my district in Suitland, Maryland, is one of those strategic partnerships between NOAA, the Navy, and the Coast Guard.

Could you just talk a little bit about the ice center, and the value of that data, and what it means for operations in the Arctic?

Admiral SMITH. Yes, sir. Well, I will do my best, and if I don't meet your needs I can do—we can get followup information to you.

So the ice center provides operational forecasts and conditions that are suitable for marine navigation. It is one of a suite of serv-

ices that we provide to—that supports shipping services, marine navigation in general. It is, you know, heavily used, of course, for military, commercial, recreational, and other services.

And so I am not sure what the—I mean I think that is the——

Mr. BROWN. In my district, you say something nice about it, and then they all feel good that——

Admiral SMITH. Yes, sir.

Mr. BROWN [continuing]. They are being, you know, acknowledged for their good work. So thank you very much.

Admiral SMITH. And if I could also just say that that—the three-agency cooperation for an operational program like that is unusual, and really, really noteworthy. And we are really pleased to be part of that.

Mr. BROWN. Great. Well, thanks.

Colonel Borders, in your testimony—at least in your written testimony, you point out that the Corps of Engineers has improved channels at 62 ports in Alaska, and that 57 of those are still in use today. With the increasingly ice-free conditions in the Arctic, what are some of the things we can do better to increase our capacity in the Arctic and improve efficiency at our ports?

Colonel BORDERS. So a lot of it, sir, is getting in the studies. So down here in the lower 48—excuse the colloquialism—but a lot of the environmental studies, marine mammal studies, the endangered species studies, they are easy to gather, they are quickly gathered because the data is over and over years.

But when I had the mayor of Kotzebue in my office, and we did one of our civil works milestones, the agency decision milestone. So Mayor Smith—Eugene was in there, and he got a brief with me. And he said, literally, to get the information we can give to NOAA so they can make the right decision, we are going to have to put a fisherman or a fisher person on that dock to count the number of ringed seals that go by. The data just doesn't exist.

So some of it is collecting and learning more, I think, is the best answer, sir.

Mr. BROWN. So what do you need from Congress to help you with that?

Colonel BORDERS. Right now, sir, we just need the studies that we have to continue to be funded and supported. I would say that, outside of that—maybe I am speaking outside of my lane a little bit, but for NOAA and other agencies to have the ability to conduct some more broad-based studies in Alaska so that data is more openly, readily available, so when we get ready to build something we can build it.

Mr. BROWN. Great. Thank you, Mr. Chairman. I yield back.

Mr. MALONEY. Well, seeing no other Members who might have questions, I am going to thank the gentlemen for their testimony. We do have a third panel, so I am going to try to move ahead with this. Thank you both very much. Let's go to the third panel.

[Pause.]

Mr. MALONEY. Well, thank you all for being here. Without further delay I would like to move now to our final panel of witnesses.

We are joined today by Admiral Thad Allen, U.S. Coast Guard retired, coauthor of the Council on Foreign Relations report, "Arctic Imperatives: Reinforcing U.S. Strategy on America's Fourth Coast";

Ms. Heather A. Conley, senior vice president for Europe, Eurasia, and the Arctic for the Center for Strategic and International Studies; Dr. Abbie Tingstad, senior physical scientist for the RAND Corporation; and the Honorable Mead Treadwell, cochair of the Polar Institute for the Woodrow Wilson Center.

Thank you all for being here today. We look forward to your testimony.

Without objection, our witnesses' full statements will be included in the record.

As with the previous panels, since your written testimony has been made part of the record, the subcommittee requests that you limit your oral testimony to 5 minutes.

I am going to start with you, Admiral Allen. Thank you all for being patient and for allowing us to get through the other panels first.

In particular, Admiral Allen, I want to thank you very much for your four decades of service to the country. We respect very much your service to the Coast Guard, your work during Hurricanes Katrina and Rita. And of course, Deepwater Horizon. And I have read the report you coauthored for the Council on Foreign Relations, and it is a terrific piece of work. I know it has been out there for 2 years, but we are very thankful for your presence today. I wanted to give you an opportunity to highlight for us the importance of some of the issues you raised in that report.

Go ahead, sir.

TESTIMONY OF ADMIRAL THAD W. ALLEN, U.S. COAST GUARD (RET.); HEATHER A. CONLEY, SENIOR VICE PRESIDENT FOR EUROPE, EURASIA, AND THE ARCTIC, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES; ABBIE TINGSTAD, PH.D., SENIOR PHYSICAL SCIENTIST, THE RAND CORPORATION; AND HON. MEAD TREADWELL, COCHAIR, POLAR INSTITUTE, WOODROW WILSON CENTER

Admiral ALLEN. Thank you, sir. Mr. Chairman Maloney, Ranking Member Gibbs, other members of the committee—and I saw some old friends here that are no longer in the room, I will try and reach out and touch them at another time—I am pleased to be here with my distinguished colleagues, all of whom have a lot to add to the testimony today.

And I would like to comment on the Corps of Engineers and NOAA. Their testimony, as you know, was to the point, but incredible support provided to me during the hurricanes in the oil spill response, and my entire service and the Coast Guard.

For the record I am here today testifying in my personal capacity, not representing any entity. And I used to say when I was giving speeches that I am going to be frank and honest. Because I am retired, my pension is assured. I can only tell you today that I am retired.

[Laughter.]

Admiral ALLEN. In 2016, as you noted, I was honored to colead an independent task force sponsored by the Council on Foreign Relations that issued a report entitled "Arctic Imperatives: Reinforcing U.S. Strategy on America's Fourth Coast." That report developed recommendations for policymakers to consider in the tran-

sition process, as you noted, in 2016. I am going to summarize the key findings of that report, and the full report is available, and I have recommended to the staff it be appended to the report of the of the hearing, sir.

Mr. MALONEY. Without objection.

[The information follows:]

Report by Council on Foreign Relations, "Arctic Imperatives: Reinforcing U.S. Strategy on America's Fourth Coast," Submitted for the Record by Hon. Maloney

The report is retained in committee files and a PDF may be downloaded from the Council on Foreign Relations website at https://www.cfr.org/report/arctic-imperatives.

Admiral ALLEN. As stated in the report, the Arctic is a crossroads of international politics and a forewarning for the world. The United States, through Alaska, is a significant Arctic nation with strategic economic and scientific interests. As sea ice continues to melt, countries inside and outside the Arctic region have updated their strategic and commercial calculations to take advantage of the changing conditions stemming from the opening of the region.

The United States needs to increase its strategic commitment to the region or risk leaving its interests unprotected.

The task force organized its work into four interrelated areas: U.S. policy; U.S. national security; economic, energy and environmental issues; and, finally, Alaska and Alaska Natives. We consulted broadly, and support a comprehensive, integrated approach in assessing future options in the Arctic. That approach includes sustaining international partnerships—that was noted by Admiral Ray—of the Arctic Council, International Maritime Organization, and the Coast Guard Arctic Forum.

The task force identified six main goals U.S. policymakers should pursue to protect the United States growing economic and strategic interests in the Arctic.

First, ratify the U.N. Convention on the Law of the Sea. The Senate should help secure the United States legal rights to more than 386,000 square miles of subsea resources along its extended continental shelf by ratifying this treaty. Admiral Ray talked about rules-based operations in Alaska. This is the overarching global governance strategy for this globe and, in my view, the United States should be ashamed it hasn't ratified it yet.

I am retired.

[Laughter.]

Admiral ALLEN. Fund and maintain polar icebreakers. We recommended six; I won't get into that, because it has been detailed fairly significantly in the hearing to date.

Improve Arctic infrastructure.

Invest in telecommunications, energy, and other infrastructure in Alaska, and find locations for safe harbor ports and a deepwater port.

Three, strengthen cooperation with other Arctic nations. Continue diplomatic efforts with the Arctic Council and work with other Arctic states, including Russia, on confidence-building and cooperative security measures.

I would add continuing cooperation with Russia is vital, and the Coast Guard has done that through my entire career, and needs to continue to do that, regardless of the larger security environment we are operating in.

And finally, fund scientific research. Sustain budget support for scientific research beyond 2017 to understand the regional and global impact of accelerated change.

I am going to omit my other comments, because they have been covered by other folks. I would like to go to just maybe just one comment to close with, and it is in response to Admiral Ray's comments about peer competitors.

There is an old saying that I wish I could attribute to an author, but I can't, unfortunately. And the quote is, "You don't have sovereignty unless you can exert it." Our peer competitors understand that about the Arctic, and are demonstrating strategic intent with their current actions. In the United States we spend more time arguing about who understands the climate better.

Before I retired from the Coast Guard I was asked by a Member of Congress about my opinion on global warming. I responded there was water where there didn't used to be, and I was responsible for it. It is time to understand that we are all responsible for the Arctic and this planet. I would be happy to take your questions.

[Admiral Allen's prepared statement follows:]

Prepared Statement of Admiral Thad W. Allen, U.S. Coast Guard (Ret.)

Mr. Chairman Maloney, Ranking Member Gibbs, and members of the committee, I am pleased to have been invited to testify on this important topic and I thank you for the opportunity.

I am also pleased to be here with my distinguished colleagues. Admiral Charlie Ray is a superb leader. I have enjoyed long standing, valuable relationships with both NOAA and the Army Corps of Engineers. Their support to me and the Nation was critical in the responses to Hurricanes Katrina and Rita and to the Deepwater Horizon Oil Spill. Heather Conley is an old friend from CSIS and an expert in her field. Abbie Tingstad represents RAND where I served as a Senior Fellow and I welcome her. And finally, Mead Treadwell, who has made Arctic issues, governance, and infrastructure his life's passion.

For the record I am testifying in my personal capacity today and am not representing any other entity.

In 2016, I was honored to co-lead an independent Task Force sponsored by the Council on Foreign Relations (CFR) that issued a report entitled "Arctic Imperatives: Reinforcing U.S. Strategy on America's Fourth Coast." That report developed recommendations for policy makers to consider in the Presidential transition process.

As stated in the report, "The Arctic is a crossroads of international politics and a forewarning for the world. The United States, through Alaska, is a significant Arctic nation with strategic, economic, and scientific interests. As sea ice continues to melt, countries inside and outside the Arctic region have updated their strategic and commercial calculations to take advantage of the changing conditions stemming from the opening of the region. The United States needs to increase its strategic commitment to the region or risk leaving its interests unprotected."

The Task Force organized its work in four interrelated areas: U.S. Policy; U.S. National Security; Economic, Energy and Environmental Issues; and, finally, Alaska and Alaska natives. We consulted broadly and support a comprehensive, integrated approach in assessing future options in the Arctic. That approach includes sustaining international partnership through the Arctic Council, International Maritime Organization, and the Coast Guard Arctic Forum.

The Task Force identified six main goals that U.S. policymakers should pursue to protect the United States' growing economic and strategic interests in the Arctic:

- "*Ratify the UN Convention on the Law of the Sea*. The Senate should help secure the United States' legal rights to more than 386,000 square miles of subsea resources along its extended continental shelf by ratifying this treaty.
- *Fund and maintain polar ice-breaking ships*. Congress should approve funding for up to six icebreakers to improve operational capacity in the Arctic, so as to have at least three operational ships in the polar regions at any one time.
- *Improve Arctic infrastructure*. Invest in telecommunications, energy, and other infrastructure in Alaska and find locations for safe harbor ports and a deepwater port.
- *Strengthen cooperation with other Arctic nations*. Continue diplomatic efforts within the Arctic Council and work with other Arctic states, including Russia, on confidence-building and cooperative security measures.
- *Support sustainable development and Alaska Native communities*. "Maintain the [Arctic] Council's focus on sustainable development, environmental protection, and continued involvement of the Arctic's indigenous peoples."
- *Fund scientific research*. Sustain budget support for scientific research beyond 2017 to understand the regional and global impact of accelerated climate change."

In regard to today's hearing the report emphasizes that, "The United States needs to bolster its infrastructure and assets in the Arctic to safeguard its strategic interests, defend its national borders, protect the environment, and maintain its scientific and technological leadership."

More specifically, almost no marine infrastructure is in place within the U.S. maritime Arctic. In some areas infrastructure is provided by the oil and gas industry to support their facilities. However, this infrastructure supports industrial operations. Other needs are creating severe challenges for public authorities at the local, state, and national level. New commercial activity would be hampered by inadequate infrastructure. Deepwater ports exist in Norway, Iceland, and Russia, the largest of which is in Murmansk, Russia, but the North American Arctic has no major port to service transoceanic maritime transportation. The port at Nome, Alaska, is only twenty-two feet deep, but the city of Nome hopes to build out its docks to reach a draft of thirty-five feet deep without dredging. The Army Corps of Engineers defines a deepwater port as forty-five feet deep. The Task Force urged policymakers to reinforce U.S. strategic presence in the Arctic by making a sustained commitment to boosting technology and building the infrastructure for safe operations in the region.

In closing I would like to make a general comment on the U.S. position in the Arctic and appreciate Admiral Ray's comments on peer competitors.

There is an old saying that I wish I could attribute to an author—but can't. "You don't have sovereignty unless you can exert it." Our peer competitors understand that about the Arctic and are demonstrating strategic intent with their current actions. In the United States we spend more time arguing about who understands the climate better. Before I retired from the Coast Guard I was asked by a member of Congress about my opinion on global warming. I responded that there was water where there didn't used to be and I was responsible for it. It is time to understand that we are all responsible for the Arctic and this planet.

I recommend the CFR report be appended to the record of this hearing and I am happy to answer your questions.

Mr. MALONEY. Thank you very much, sir.

Ms. Conley?

Ms. CONLEY. Chairman Maloney, Ranking Member Gibbs, thank you so much for this kind invitation to testify before you this afternoon. And thank you for your thoughtful work for many years related to strengthening America's capabilities in the Arctic.

I actually really appreciate the title of this hearing, as there is a cost to doing nothing, and there is also a cost for taking action. I thought, since my written testimony is already placed in the record, that I would just provide a few moments of reflection on Secretary Pompeo's, I think, groundbreaking speech on Monday in Finland, and then to just offer some ideas for your consideration.

Although Secretary Pompeo's speech against the backdrop of the Arctic Council was perhaps a misplaced moment, because the Arctic Council does not deal with hard security, nor does it really deal

with economic issues, I think it is an important moment that a senior U.S. Government official has now stated that we are in a new age of strategic engagement in the Arctic. This is not new news to this committee, but I think it is new that it has been articulated.

But as I note in my written testimony, we fall again into a trap of our own making by describing what our competitors are doing, and that in some way substitutes for what we are not doing. So we can talk about Russia's 41 icebreakers, but we need 6. We can talk about the 16 deepwater ports that perhaps Russia may have, but we just need 1. We need to have more flexible, capable forces and assets that can operate in ice-covered waters and can fight in cold weather.

So my suggestion—and it came to me as I was listening to the testimony—is, quite frankly, we do need an operational plan, I would argue, along the lines—and I closely follow U.S. force posture in Europe and NATO—we need something akin to the European—it was first called the Reassurance Initiative, it went to the European Deterrence Initiative, and now it is the European Defense Initiative.

What happened? U.S. had withdrawn forces from Europe, and then the annexation of Crimea and the incursion into the Donbas occurred, and all of a sudden we had to get very focused and have a dedicated spending on air, land, and maritime component to make our forces more robust.

I would argue we need an Arctic sovereignty initiative. It needs to work both with the Coast Guard and with the Navy. It needs to be multiyear and dedicated. We have to take the urgency of great power competition in the Arctic and move forward with actual spending. What I have heard is lots of conversation about what we should do; we have to put the imperative of what we will do. And again, it is not about what our competitors are doing, it is about what the U.S. must do to protect its security interests in the Arctic.

Again, just two more or three more brief reflections on Secretary Pompeo's speech. He noted that respect and transparency are the price of admission in the Arctic. Well, I would probably rephrase that, and I would say that it is respect for international law and norms, which is the price for stability, security, environmental protection, and prosperity in the Arctic.

So we—right now everyone is respecting international law, but we don't have transparency. We have a lack of transparency of why Russia is constructing very sophisticated air bases with surface-to-air missiles, and developing new and exercising new Arctic-specific equipment. We don't have transparency on what China is doing in their observation centers or in their infrastructure development norms and Arctic code of conduct, and greater confidence-building measures are needed.

Secretary Pompeo also alerted us to the differences in the maritime legal interpretations of the Northwest Passage and the Northern Sea Route. This is important. But lumping Canada and Russia into the same bucket, I think, is incorrect. We have an ally and a NATO partner that we share protection of North America and NORAD. We have a difference of opinion. We manage that opinion. Russia's difference of opinion is a slightly different issue.

But again, we have to look at this in context. The reason that we don't have a major issue right now with that legal interpretation is because the traffic has been so minimal in the Northern Sea Route. In 2018 there were 27 full transits through the Northern Sea Route. We haven't really raised this issue, quite frankly, because it hasn't been used that much. And I suspect that the Northern Sea Route is not the primary interest for the Chinese. It is the transpolar, or central passage that is of importance to them. I don't believe they are going to pay those port fees in the future.

So I—just one closing comment that I have, and that is our work at the Arctic Council. The U.S. position on the Arctic Council and the declaration, unfortunately, had the unique result of having Russia and China sound more like environmental advocates, and working more harmoniously with our own allies than the U.S. We have to effectively use these vehicles, whether it is the International Maritime Organization or the Arctic Council, to shape the influence we want. When the U.S. walks away from these institutions, we cede influence and power to our competitors.

We have to stop kicking our own goals and get busy working on developing America's capabilities in the Arctic. Thank you.

[Ms. Conley's prepared statement follows:]

Prepared Statement of Heather A. Conley, Senior Vice President for Europe, Eurasia, and the Arctic, Center for Strategic and International Studies

Mr. Chairman, Ranking Member Gibbs, and distinguished members of the subcommittee, thank you for the kind invitation to speak to you once again and for holding this important hearing to discuss what we must do to ensure American sovereignty in the Arctic.

It has been my great privilege to testify before this subcommittee for the past four years on the Arctic. But it is my great frustration that I find myself repeating my previous testimonies, with the only exception that I offer updates on what our competitors, China and Russia, are doing to secure their strategic interests in the Arctic. Unfortunately, the only updates on U.S. policy that I can offer you today is what you already know very well, primarily due to the hard work of this subcommittee: first, the U.S. has finally set the wheels in motion to construct one heavy ice-breaker which we *hope* will be available for use in Antarctica by 2024. We *hope* that the Polar Star will continue to be operational while the new icebreaker is being built. We *hope* there will be additional heavy and medium ice-breakers built in the future that could be regularly utilized in the Arctic. But hope is not an effective operational plan. Second, various U.S. agencies and departments have produced several more Arctic studies and strategies which underscores that the United States has perfected our ability to describe an Arctic policy, but we cannot or will not implement one. Rest assured our competitors *are* implementing their policies.

A LOST DECADE

After spending over a decade researching U.S. strategic interests in the Arctic and the geopolitics of the region, I am encouraged that, over the past several months, there is a new and growing consciousness in Washington about the rise of great power competition in the Arctic and in particular, the role of China in the Arctic. This consciousness has also been heightened by the extraordinary and unprecedented pace of climate transformation we are witnessing in the Arctic. Our most predicative models are now off by decades.

Unfortunately, it has taken the U.S. a decade to realize what U.S. Coast Guard Rear Admiral Gene Brooks, then Commander of District-17, told us in 2008: "The Arctic is upon us, now." U.S. policy toward the Arctic never included a sense of urgency and anticipation to build the infrastructure and capabilities to protect America's fourth coast, or to prioritize our needs in the Arctic, or to make tough budget decisions. We have lost a decade. The U.S. cannot sufficiently safeguard U.S. territorial waters and our Exclusive Economic Zone, particularly given the up-tick in

LNG carriers and other foreign-flagged vessels traversing the narrow Bering Strait. I fear the U.S. Coast Guard has now become so accustomed to being inadequately resourced to execute its mission in the Arctic that it accepts its lack of readiness as a state of normalcy that cannot be challenged. The U.S. Coast Guard continues to rely on outdated capabilities and thinly resourced budgets which equates to a seasonal U.S. Coast Guard presence (July–October). Should an incident occur in the American Arctic, the only way that the U.S. can effectively manage is if it occurs during the summer season and near a pre-positioned U.S. maritime asset. Years of underinvestment and policy stagnation are coming home to roost.

In my testimony last year, I described in detail what China and Russia are doing economically and militarily in the Arctic and underscored my growing concerns that the U.S. was now at risk of losing its ability to protect and project its sovereignty and maintain full access to the Arctic. We cannot strategically sustain another lost American decade in the Arctic.

THE POWER OF AMERICAN PRESENCE

While I recognize this goes beyond the remit of this subcommittee, but as this is the only subcommittee that hosts regular Arctic hearings, this subcommittee is the best place to have a broader and more holistic conversation about U.S. policy toward the Arctic. It is essential that we broaden our concept of physical presence and its relationship to sovereignty in the Arctic. Sovereign presence can take the form of scientific ventures, sustainable infrastructure development, diplomacy, and an enduring security and maritime presence. All instruments of U.S. power must be deployed.

Growing U.S. Science and Diplomatic Presence in the Arctic. China has effectively used scientific research and its investments in Arctic indigenous communities to enhance its physical presence in the region. China opened its first Arctic scientific research station in 2004 on the island of Svalbard. Today, Chinese scientists have registered 80 projects on the island, including biological, social, and atmospheric studies.[1] In 2017, China conducted a circumpolar scientific research program in which their icebreaker, the *Xue Long*, traversed both the Northwest Passage and Northern Sea Route in the same season. In 2018, Beijing opened the China-Iceland Arctic Science Observatory (CIAO) in Northern Iceland. The facility has a wide mandate and focuses on climate change, satellite remote sensing, geosciences, oceanography, and fisheries among other issues.[2] Two weeks ago, at the fifth International Arctic Forum in St. Petersburg, China and Russia agreed to establish the Chinese-Russian Arctic Research Center to study issues such as ice conditions along the Northern Sea Route (NSR), a vital Arctic maritime transit route for both Russian and Chinese economic ambitions.[3]

While the U.S. has a substantial polar science budget, we should more actively pursue bilateral arrangements across the circumpolar Arctic to create additional American scientific observation and research centers.

Diplomatically, China has increased the frequency of visits by senior Chinese officials to capitals as well as a variety of international conferences. It has also increased its embassy personnel in Arctic Council member states, particularly in Iceland. This is critically important as Iceland assumed the chair of the Arctic Council yesterday (May 7th). It is encouraging news that the U.S. will reportedly have a foreign service officer spend about half of his or her time in Nuuk, Greenland. This is a step in the right direction, but it is not enough. The U.S. should consider increasing its diplomatic presence in Greenland as well as in Iceland, Northern Norway and in Finland by establishing what the State Department once termed American Presence Posts (APPs). These posts could include either diplomats or scientists who open a small office in strategic locations to ensure consistent American diplomatic presence.

Growing U.S. Infrastructure and Security Presence. It took over ten years to begin the procurement process for one U.S. heavy icebreaker which will largely be deployed to Antarctica. A similar timeline to construct critical infrastructure like a

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[1] Av Ole Magnus Rapp, "Kina raser mot Norge," *Klassekampen*, March 7, 2019. https://www.klassekampen.no/article/20190307/ARTICLE/190309978; "China at Loggerheads with Norway Over Access to Arctic Archipelago," *Sputnik*, March 12, 2019. https://sputniknews.com/europe/201903121073147498-norway-china-arctic-arhipelago-svalbard/.

[2] Melody Schreiber, "A new China-Iceland Arctic science observatory is already expanding its focus," *Arctic Today*, October 31, 2018. https://www.arctictoday.com/new-china-iceland-arctic-science-observatory-already-expanding-focus/.

[3] Pavel Devyatkin, "Russian and Chinese Scientists to Establish Arctic Research Center," *High North News*, April 15,2019. https://www.highnorthnews.com/en/russian-and-chinese-scientists-establish-arctic-research-center.

deep water port or improve satellite communications would leave the U.S. ill-prepared to address the growing economic and military presence of Russia and China in the Arctic. Although the Coast Guard's Arctic strategy always underscores the need for the U.S. to enhance its marine domain awareness and communication capabilities in the region, very little action is taken to increase these capabilities. U.S. military requirements exist for communications support for submarines, aircraft, other platforms, and forces operating in the high northern latitudes but these requirements do not take into account increased Coast Guard operations as a result of accelerated Arctic melting.[4] The U.S. should consider the expansion of current commercial satellite communication networks already in place, including Iridium Satellite, a commercial satellite communications service available in the Arctic that is used by the U.S. Air Force.[5] To further improve our operational capabilities, the Coast Guard should host additional forward operating location bases in Alaska as well as increase hangar space and aviation assets that are staffed beyond the summer season.

Beyond icebreakers, the U.S. lacks ice-strengthened surface vessels. Currently, U.S. Navy submarines are the only vessels capable of regularly monitoring the Central Arctic Ocean. NATO's Trident Juncture exercise last fall should have been a powerful wake-up call for the U.S. military. While the exercise did not occur when ice conditions were present, U.S. troops experienced harsh weather conditions not seen since the Cold War. It is encouraging that the Secretary of the Navy has announced additional exercises in Alaska this September but again, these exercises, while providing valuable experience, occur in the more benign summer months when sea ice in the Bering Sea is at a minimum. Working in less challenging conditions does not improve familiarity with cold-weather warfare and ice conditions which have atrophied over the years. Ironically, the planned U.S. exercise will likely occur at the same time the Russian military will be implementing its Tsentr-2019 exercise which will test some of Russian's most advanced and modern Arctic-designed weapon systems.

The U.S. must develop an operational plan that envisions a persistent security presence in the Arctic. A key pillar of this presence must include the enhanced protection of our missile defense architecture located in the Arctic. This will be critical as Russia's military footprint near Alaska and Greenland grows, and as China's growing economic and scientific infrastructure could support a strong PLA and PLAN presence. We must also carefully analyze the potential dual-use capabilities and implications of Chinese-built infrastructure for nearby U.S. troops and assets.

THE COST OF DOING NOTHING WILL ESCALATE

If the U.S. chooses not to enhance its physical presence in the Arctic or use multilateral instruments like the International Maritime Organization (IMO), the Arctic Council, and other entities to protect our interests and reinforce international legal norms, U.S. access to and influence in the Arctic region will diminish and our allies and partners in the region will increasingly accommodate Russia's and China's preferred policy outcomes. It is difficult to calculate the exact cost and national security implications of doing nothing, but we can already see the "cost" of policy stagnation over the last lost decade. The U.S. has fallen behind its competitors and policy options have been eroded.

There are several other near-term strategic costs of doing nothing that must be considered should the U.S. continue to choose not to increase its physical presence in or develop an operational plan for the Arctic.

Iceland's Arctic Council Chairmanship. As Iceland now assumes the chairmanship of the Arctic Council, we must be alert to the likely increase of influence by China on the Arctic Council. Economically, China has invested approximately $1.2 billion [https://www.cna.org/cna__files/pdf/COP-2017-U-015944-1Rev.pdf] in Iceland (between 2012 and 2017), representing 5.7 percent [https://www.cna.org/cna__files/pdf/COP-2017-U-015944-1Rev.pdf] of the country's GDP, after Iceland became the first European nation to sign a free trade agreement with China in 2008.[6] The U.S. must enhance its bilateral diplomatic engagement with Iceland throughout this two-year period just as it increases its security presence through the European Defense Initiative (EDI) with increased hangar space at Keflavik Air Force Base to conduct

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[4] Patrick L. Smith, Leslie A. Wickman, and Inki A. Min, "Broadband Satellite Communications for future U.S. Military and Coast Guard Operations in an Ice-Free Arctic," Aerospace Corporation, July 1, 2011.

[5] Ibid.

[6] Mark E. Rosen and Cara B. Thuringer, "Unconstrained Foreign Direct Investment: An Emerging Challenge to Arctic Security," *CNA Corporation*, November 2017. https://www.cna.org/cna__files/pdf/COP-2017-U-015944-1Rev.pdf.

anti-submarine operations in the North Atlantic. It should be noted that Russia assumes the Arctic Council chairmanship mantle after Iceland in 2021.

The Arctic Council itself is at an organizational crossroads. Political will among member states to affect change is low, which makes the intergovernmental forum ripe for both prolonged stagnation (leading to irrelevance) and potential influence by permanent observers such as China. The U.S. can choose to spend its time and diplomatic energy wordsmithing a ministerial declaration (to avoid the words "climate change") or it can meaningfully engage to shape the Arctic Council's future.

China's Economic Growth in Greenland. In the context of China's growing economic presence in the Arctic, Greenland has leapt to the forefront of U.S. concern. Chinese investments in Greenland center on energy and mineral resources, making Chinese state-owned enterprises' (SOEs) the top foreign investors [https://jamestown.org/program/china-greenland-mines-science-nods-independence/] in Greenland.[7] In 2018, the U.S. and Danish governments intervened at the last minute to prevent Beijing from being awarded a contract to develop three airports in Greenland, the site of deep-water ports and a critical location for the U.S. ballistic missile early warning system. While this intervention may have temporarily arrested China's efforts to invest in Greenland, such a "whack-a-mole" policy is not a comprehensive or strategic plan for the region. Working closely with the Danish authorities, we need a more robust plan of action for Greenland and a comprehensive analysis of a growing Chinese economic and scientific presence in Greenland and its implications for Thule AFB and the larger U.S. ballistic missile early warning system.

The Growth of Arctic LNG. The focal point of Arctic economic development for Russia and China is the Russian Yamal LNG-1 and Yamal LNG-2 projects on the Yamal Peninsula. This is a powerful example of the economic interaction between our two peer competitors. Chinese companies own 29.9 percent of the $27 billion project of Yamal LNG-1, an "anchor" investment that can translate into future "cluster" infrastructure investments such as port, rail, and telecommunications projects. Recently, two Chinese companies—China National Oil and Gas Exploration and Development Company (CNODC), a subsidiary of China National Petroleum Corporation, and China National Offshore Oil Corporation (CNOOC) signed agreements with Russia's Novatek to buy a combined 20 percent stake in the Yamal LNG-2 project.[8] Such an agreement, along with the Yamal LNG-1, will undoubtedly spur an increase in use by LNG carriers of the Bering Strait. As larger vessels become more frequent through the passage, U.S. Coast Guard resources will be increasingly strained, inhibiting their ability to protect America's coastline.

Russia's Extended Outer Continental Shelf Claims. The Russian government has presented extensive scientific data in 2001 and again in 2015 to claim significant portions of the continental shelf extending far into the Central Arctic Ocean. In 2016, the Danish government rejected the Russian government's approach to open bilateral negotiations on a mutually acceptable solution (Denmark has submitted scientific data for overlapping claims) to the extended outer continental shelf claims, preferring to wait for the conclusions of the Committee on the Limits of the Continental Shelf (CLSC). Canada has also submitted a claim that overlaps with Russia's. Thus far, this issue has been handled appropriately within the UN Convention on the Law of the Sea (UNCLOS). However, should Russia choose to take a more unilateral approach to its claims, this could destabilize the region. As the claimants await a ruling that is likely to take several more years, Russia has reinforced its conventional military presence on the Kola Peninsula as well as its military footprint across the Russian Arctic to include radars, air bases, and coastal defense systems on remote islands like Wrangel Island [https://www.tearline.mil/public__page/russias-resurgent-military-posture-in-the-arctic-a-case-study-of-wrangel-island/], Kotelny Island [https://www.tearline.mil/public__page/the-ice-curtain-protecting-the-arctic-motherland/], and Severnaya Zemlya.

Sovereignty and Svalbard. The 1920 Treaty of Spitsbergen or Svalbard grants Norway sovereignty over Svalbard but allows signatories of the treaty to access and participate in the economic development and scientific understanding of Svalbard. Norway regulates these activities without discrimination. The Treaty also prohibits Norway from establishing a naval base or any military fortification or use Svalbard

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[7] Ibid.

[8] Katya Golubkova and Maria Kiselyova, "Russia's Novatek to sell 20 percent in Arctic LNG 2 to China," *Reuters*, April 25, 2019. https://www.reuters.com/article/us-russia-gas-novatek-cnodc/russias-novatek-to-sell-20-percent-in-arctic-lng-2-to-china-idUSKCN1S11WY.

for warlike purposes.[9] This is the legal basis upon which China has established its 2004 scientific station and Russia has invested in coal mines. There have been tensions between Russia and Norway over fisheries management as well as mine ownership concerns, but such disputes have been resolved due to mutual interest in preserving the cooperative nature of the Arctic region. Some experts, however, have expressed concern that Russia's new Arctic command on the Kola Peninsula, which emphasizes the planning and training of amphibious operations supported by missile strikes on shore, could leave military options available to it in an effort to alter the archipelago's neutral status.[10] President Putin recently cautioned in a speech on April 9th in St. Petersburg, "I wouldn't like tosee the Arctic turning into something like Crimea . . . "

After a decade of stagnation, the U.S. finds itself lagging behind its peer competitors. A lack of policy priorities, commitment of multi-year financial resources, and political will has shifted the U.S. from being a reluctant Arctic power to an inadequate Arctic power. The U.S. must reassert its presence in all its manifestations to protect American sovereignty, ensure U.S. access to the region, and shape and influence its future development. If not, we will continue to occupy ourselves by describing what others are doing in the Arctic every time a Congressional hearing is held. The strategic costs to the U.S. for this path will be great.

Mr. MALONEY. Thank you, Ms. Conley.

Dr. Tingstad, am I saying your name correctly, Doctor?

Ms. TINGSTAD. You are, sir.

Mr. MALONEY. Tingstad.

Ms. TINGSTAD. Thank you.

Mr. MALONEY. Go ahead, ma'am.

Ms. TINGSTAD. Chairman Maloney, Ranking Member Gibbs, thank you very much for the opportunity to appear before you this afternoon.

The three main points I would like to leave the committee with today are: one of the greatest concerns that has emerged in my research are incidents that might imperil safety, bring military or other assets together in escalatory ways, or release toxins into the environment in the Arctic; the second point is that, although there are many factors that will impact future outcomes in the Arctic, cooperation at all levels, including issues to do with geopolitics and governance, will be among the most influential; and third, mitigating capability gaps to enable safety, security, and stewardship activities will help enable U.S. governance in the Arctic, but will require investing in organizations and people, as well as in multiple types of assets and infrastructure.

There is no silver technology or other bullet. The solution, whatever the specifics, will be multifaceted. I will return to each of these points briefly in the remainder of my time.

First, the importance of discrete events. One of the primary findings from the research I referred to in my written testimony was the concern of stakeholders writ large about safety, risk of escalation stemming from marginal insulated incidents, and the containment and mitigation of environmental hazards.

In addition to the immediate concern about loss of life and property, among other things, these types of events have the potential in the future to cause a chain reaction leading to general issues of

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[9] Heather A. Conley, et al. *History Lessons for the Arctic*, Center for Strategic and International Studies, December 2016, 15. https://csis-prod.s3.amazonaws.com/s3fs-public/publication/161219__Conley__HistoryLessonsForArctic__Web.pdf

[10] Pavel K. Baev, "Russian Strategic Guidelines and Threat Assessments for the Arctic," *George C. Marshall European Center for Security Studies*, Security Insights No. 26, ISSN 1867-4119, April 2019. https://www.marshallcenter.org/MCPUBLICWEB/mcdocs/security__insights__26__-__baev__march__2019__-__final__-__letter__size.pdf.

rising tensions, perhaps between stakeholders, as well as the creation or perception of a security and governance void in the Arctic region. This will naturally impact indigenous and other local communities, it will impact the role of the U.S. Coast Guard, and it could lead to increased involvement or even assertiveness from individual Arctic stakeholders, to include Russia and China.

Let me pause for a minute on Russia and China. One of the other aspects of our work has been looking at the durability of Arctic cooperation. Naturally, Russian assertiveness in the Arctic and the emergence of China as a long-term player in the region has raised questions about the durability of this cooperation for getting ahead of governance and other issues, something I touched upon momentarily. The United States and others are right to be wary of Russian and Chinese activity in the Arctic, but must be mindful of some important points.

First of all, Russia and China do not have identical histories, stakes, or interests in the region. Russia's confidence in the efficacy of the protective ice barrier for its long strategically and economic economically important northern rim, is understandably waning. In contrast, China does not hold any territory in the Arctic. It is, of course, one of 13 Arctic Council permanent observer states, and as such has participated by the council's rules and in the spirit of cooperation thus far. That said, the economic and military resources at China's disposal make it a very powerful stakeholder, and there is no doubt that China seeks investment and influence in the region. Whether China's near Arctic state concept will catch on with others, creating the potential for a negotiating bloc, also remains on the horizon.

Returning to cooperation and governance as two important factors among many in influencing the vulnerability of the Arctic to safety and security incidents, these decisions that Arctic stakeholders make about these as a group and individually will shape activity in the Arctic and affect the resources required and available to govern that activity. This is very important for demands on the maritime transportation system, and the transportation system writ large, I would argue, in the Arctic, and on the U.S. Coast Guard in terms of what the Service does, when, where, how often, and at what intensity.

I will conclude by talking about the third point I raised, which is about U.S. Coast Guard capability gaps in the Arctic. And what we found in our research was that there are three main types of gaps: communications in navigation; maritime and other domain awareness; as well as response capabilities.

Some specific recommendations that came out of our study included installing additional communications infrastructure. Admiral Ray talked a little bit about that earlier. Also, investing in remotely controlled air, sea, and amphibious craft for providing persistent wide-area surveillance; updating data gathering and database construction processes to enhance the role of automation; developing operating concepts, plans, and investment strategies that recognize the need for both agile first-response assets, as well as infrastructure and logistics to sustain longer term operations and to conduct heavy lifting; increasing the number of forward-operating locations and resources, including local and mobile elements,

as well as continuing improving long-term relationships with Native communities, and pre-positioning key response items in those partner communities.

I conclude by reiterating once again that any mitigating strategy will involve a multifaceted approach. Part of good governance is being equipped to prevent and mitigate problems by making the right investments in organizations and people, as well as in multiple assets and infrastructure. Thank you.

[Ms. Tingstad's prepared statement follows:]

Prepared Statement of Abbie Tingstad, Ph.D.,[1] Senior Physical Scientist, The RAND Corporation[2]

Chairman Maloney, Ranking Member Gibbs, and other distinguished members of the committee, thank you for the opportunity to appear before you this afternoon. Ongoing and emerging transformations in the Arctic are raising many important questions, and we do not yet have all the answers. How will or should international and domestic governance evolve? What is next for indigenous communities? How will China's role evolve? What is the United States' path?

I am going to focus on anticipating and pre-emptively addressing some key Arctic vulnerabilities. The three main points I would like to leave the committee with today are:

1. One of the greatest concerns that has emerged in my research are incidents that might imperil safety, bring military (or other) assets together in escalatory ways, or release toxins into the environment.
2. Regional cooperation and governance will influence demands on the maritime (and broader) transportation system and the U.S. Coast Guard through their role in generating, preventing, and mitigating problems.
3. Mitigating capability gaps to enable safety, security, and stewardship activities will require investing in organizations and people, as well as in multiple types of assets and infrastructure.

I elaborate in detail on these points in what follows.

THE ARCTIC IS VULNERABLE TO INCIDENTS ENDANGERING SAFETY, SECURITY, AND ENVIRONMENTAL INTEGRITY

There are many uncertainties about the Arctic. However, we do know something about the primary drivers of change and how these could shape and disturb the Arctic's complex environment. In our research, my colleagues and I have used scenarios to explore the types of changes that might result in regional safety, security, and environmental vulnerabilities.

Several fundamental drivers of change influence potential paths of change in the Arctic. These factors include economics, technology, climate and physical environment, the regulatory environment, and social issues.

Not all drivers play the same role in Arctic change. One way to think about these drivers is that they raise or lower the "cost of doing business" by promoting, restricting, or controlling access. Principal among these drivers is climate, which has enhanced maritime access, but has negatively affected winter road seasons and transportation infrastructure. Other forces shaping access include technological advances in drilling, automation, network and connectivity; legal conventions, other laws, and regulations; military postures and operations; and widely observed operational and cultural norms.

Other change drivers shape activities in the Arctic. Some examples are indigenous community autonomy, anticipated or existing hydrocarbon and fishery resources, and perceptions of the Arctic within domestic political discourse. These types of forces also both discourage and motivate activities in the Arctic. For example, an increased emphasis on the health of the Arctic environment could motivate ecologi-

[1] The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of the RAND Corporation or any of the sponsors of its research.

[2] The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

cal monitoring and some types of tourism, while discouraging further resource extraction and large-scale shipping.

These drivers of change can be combined to form scenarios that illustrate potentially dangerous Arctic situations. My colleagues and I used these scenarios during two research activities that took place in 2017:

- a series of Coast Guard-focused scenarios deliberated on during two workshops with servicemembers and other partners [3]
- an Arctic cooperation tabletop exercise conducted with a multinational Arctic stakeholder group in Oslo, Norway.[4]

Our Coast Guard Arctic scenarios featured alternative assumptions about development of activity in the Arctic. We then combined these assumptions with plausible events or longer-term problems that would necessitate some kind of Coast Guard participation. The scenarios often included cooperation with partners in various capacities. Although the workshops were designed somewhat differently, participants at each event were invited to develop concepts of operation for each scenario, identify capabilities to use to achieve some level of incident resolution, and assess the most limiting gaps.

The Coast Guard scenarios covered a variety of situations. For example, participants began one workshop by considering the following events that might occur in the present-day Arctic:

- a ship collision in the Bering Strait
- a passenger plane crash somewhere north of the Alaska-Yukon Territory boundary
- activists in kayaks protesting new offshore oil drilling programs
- a small coastal community threatened by a storm surge and severe weather.[5]

The participants then considered events that might occur in the 2030s. Within the context of a future world in which measured economic growth draws people and primarily legal economic activity north, Coast Guard workshop participants discussed

- the implications of a new, deepwater port
- an offshore oil rig explosion
- a protest for environmental reasons against hydrocarbon extraction.[6]

Within the context of a future world in which disorder is increasing, regulations loosen, people are migrating north, and international cooperation is weakened, Coast Guard workshop participants discussed

- a suspected cyber attack that takes out power in three U.S. Arctic villages
- foreign vessels increasingly fishing illegally in the U.S. Exclusive Economic Zone
- a suspected terrorist attack on a cruise ship
- illicit trafficking of people and goods.[7]

The objective of the Oslo exercise was to test the limits of Arctic stakeholder cooperation by unfolding a series of events—in which no particular nation stood out as the ultimate aggressor—over the course of the 2020s. These events could potentially raise tensions among two or more Arctic nations, as well as among other stakeholders, including indigenous communities and the hydrocarbon industry. Following a set of starting conditions, participants considered the issue of overlapping claims for continental shelf extensions, opportunities and risks associated with further development of waterways through the Northwest Passage and the Northern Sea Route, and responses to two potentially escalatory incidents: the blocking of one vessel by another and a near collision between ships.[8]8 Participants were asked to consider plausible stakeholder responses and posit under what conditions Arctic cooperation might unravel at each step of the exercise.

One of the primary findings from both the Coast Guard scenario analysis and the Oslo international tabletop exercise was that stakeholders at all levels were concerned about safety, risk of escalation stemming from marginal incidents (particu-

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[3] Abbie Tingstad, Scott Savitz, Kristin Van Abel, Dulani Woods, Katherine Anania, Michelle D. Ziegler, Aaron C. Davenport, and Katherine Costello, Identifying Potential Gaps in U.S. Coast Guard Arctic Capabilities, Santa Monica, Calif.: RAND Corporation, RR-2310-DHS, 2018. As of April 29, 2019: https://www.rand.org/pubs/research__reports/RR2310.html

[4] Stephanie Pezard, Abbie Tingstad, and Alexandra Hall, *The Future of Arctic Cooperation in a Changing Strategic Environment: Insights from a Scenario-Based Exercise Organised by RAND and Hosted by NUPI*, Santa Monica, Calif.: RAND Corporation, PE-268-RC, 2018. As of April 29, 2019: https://www.rand.org/pubs/perspectives/PE268.html

[5] Tingstad et al., 2018.

[6] Tingstad et al., 2018.

[7] Tingstad et al., 2018.

[8] These were intentionally focused on the maritime domain because international incidents of significance are somewhat more plausible in this domain during the timeframe of the early to mid-2020s.

larly those involving military or law enforcement), and containment and mitigation of environmental hazards. The following situations were of particular concern:[9]

- Countries choose recurring safety issues or unplanned military encounters to emphasize larger longer-term or extra-regional security issues. Participants were concerned that such incidents might have unintended consequences among domestic audiences.
- Maritime access and activity increase faster than anticipated and countries cannot manage the situation with existing fixed and mobile infrastructure, leading to loss of life and environmental degradation. Increasing disorder leads to real or perceived voids in governance, regulation, and security. Countries with particularly vested economicinterests forcefully attempt to contain and control mounting turmoil.

During the course of the Coast Guard workshops, many discussions focused on concern about the ability to perform search and rescue, law enforcement, or pollution response. During the Norway exercise, participants were concerned about the outcome of the United Nations' Commission on the Limits of the Continental Shelf examination of competing claims for continental shelf extensions, the possibility of deep ocean hydrocarbon extraction, and shifting alliances—as well as NATO's presence in the Arctic.

COOPERATION AND GOVERNANCE MAKE A DIFFERENCE

Many factors influence the vulnerability of the Arctic to safety and security incidents. Cooperation and governance stand out for several reasons.[10] First, they shape activity in the Arctic and affect the resources required and available to govern that activity. Second, there is an important co-dependency between them: Cooperation between different stakeholders internationally and domestically enables or constrains governance as well as resources to support it;[11] similarly, governance issues both motivate and test the boundaries of cooperation. Third, both cooperation and governance have tremendous ramifications both at home and abroad and are strongly influenced by domestic policies (and often by domestic perceptions). Finally, there are some strong examples in recent Arctic history of employing cooperation and governance tools to make decisions ahead of potential crises.

Throughout modern Arctic history, cooperative decisionmaking on governance has built a foundation for reducing vulnerability to incidents, events, or patterns of concern.[12] For example, the Agreement on the Conservation of Polar Bears was put into effect in 1973 at a time of heightened Cold War tensions.[13] Some more recent examples of cooperation include the 2018 agreement to prevent unregulated high seas fisheries in the Central Arctic Ocean;[14] the U.S.-Russian proposal, approved by the International Maritime Organization, to define six two-way routes in the Bering Strait to enable safer shipping;[15] and the 2017 Agreement on Enhancing International Arctic Scientific Cooperation.[16] Arctic cooperation on the international scale (such as the 2011 Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic) has been broadly facilitated through the Arctic Council since the council's formation in 1996, alhough these activities have notably (and per-

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[9] These observations are naturally driven by the events of the scenarios presented. However, researchers and participants participating in both analyses were strongly encouraged to question assumptions and lead discussions down other paths to ensure that thinking was not constrained to the particular futures at hand.

[10] *Cooperation* includes long-term and short-term activities that facilitate shared decisionmaking and/or resources. *Governance* involves constructing, implementing, and enforcing laws, regulations, practices, and general guidance.

[11] Such as for policy enforcement and to support and mitigate the consequences of economic development.

[12] Stephanie Pezard, Abbie Tingstad, Kristin Van Abel, and Scott Stephenson, *Maintaining Arctic Cooperation with Russia: Planning for Regional Change in the Far North*, Santa Monica, Calif.: RAND Corporation, RR-1731-RC, 2017. As of April 29, 2019: https://www.rand.org/pubs/research__reports/RR1731.html

[13] "Agreement on the Conservation of Polar Bears," Oslo, November 15, 1973. As of April 18, 2019: http://pbsg.npolar.no/en/agreements/agreement1973.html

[14] See Jane George, "A New International Deal Protects the Central Arctic Ocean's Fish Stocks," *Arctic Today*, October 3, 2018. As of April 18, 2019: https://www.arctictoday.com/new-international-deal-protects-central-arctic-oceans-fish-stocks

[15] "IMO Approves US-Russian Proposal on Bering Strait Shipping Routes," *World Maritime News*, May 23, 2018. As of April 18, 2019: https://worldmaritimenews.com/archives/253399/imo-approves-us-russian-proposal-on-bering-strait-shipping-routes

[16] "US Signs Agreement on Enhancing International Arctic Scientific Cooperation," *National Science Foundation News Release*, May 12, 2017. As of April 18, 2019: https://www.nsf.gov/news/news__summ.jsp?cntn__id=241923

haps for good reason) excluded military security topics.[17] The Arctic Coast Guard Forum brings together the relevant coast services from all eight Arctic states.[18] The International Code for Ships Operating in Polar Waters (Polar Code) is a landmark step, facilitated by the International Maritime Organization, toward risk reduction in maritime polar environments.

In addition, partnerships with indigenous organizations and communities at the international and subnational level, as well as relationships with commercial, academic, and nonprofit entities, cannot be overlooked. These types of partnerships can be particularly important for law enforcement, incident prevention, and incident mitigation.

Recently, Russian assertiveness in the Arctic and the emergence of China as a long-term player in the region has raised questions for some Arctic nations about the power of cooperation and partnerships for addressing governance issues. Russia has been increasing its military capabilities in the Artic, forming a northern command, establishing two Arctic brigades, developing infrastructure, and deploying and upgrading military assets.[19] The Russian government and economic sector is also investing in fixed and mobile infrastructure for civilian or commercial use, and some of this infrastructure appears to be dual-use. For example, this year, the Russian Ministry of Natural Resources and Environment released a plan for further developing mineral resources in the Arctic and the logistics for bringing them to market via the Northern Sea Route.[20]

China has been promoting the idea of a "Polar Silk Road" in recent years. This builds on China's decades-long interest in polar science and its more recent participation as an observer in Arctic governance issues through the Arctic Council. In its 2018 Arctic policy, China reaffirmed its position that the Arctic matters to states without recognized territory in the region. China's Arctic policy states unambiguously that its goals with respect to the Arctic are

> to understand, protect, develop and participate in the governance of the Arctic, so as to safeguard the common interests of all countries and the international community in the Arctic, and promote sustainable development of the Arctic.[21]

China's investment in the Yamal Liquid Natural Gas project with Russia was substantial. Other investments have been more modest, and some have not come to fruition (such as the purchase of an unoccupied naval base in Greenland and the development of a now-cancelled resort in Svalbard).

The United States and others are right to be wary of Russian and Chinese activity in the Arctic, but must be mindful of some important points. Russia and China do not have identical histories, stakes, or interests in the Arctic. Like the United States, Russia has territory in the region. Russia's confidence in the efficacy of the protective ice barrier for its long, strategically and economically important northern rim is understandably waning. Its recently increased regional assertiveness should be interpreted against the backdrop of other factors, such as broader Russian military reforms and Russia's continued cooperative behavior on applied matters, such as Bering Strait navigation and scientific advances. Thus far, Russia's policies on Northern Sea Route administration have had limited impact on the freedom of others to navigate in the region (in part because of the route's overall limited navigability). Russia continues to have many economic incentives to participate in cooperative governance frameworks and discussions on Arctic issues.

In contrast, China does not hold any territory in the Arctic. It is one of 13 Arctic Council Permanent Observer States; China has participated by the council's rules and in the spirit of cooperation. A number of Arctic nations have put up roadblocks to Chinese investment, largely because of domestic pressure. That said, the economic and military resources at China's disposal make it a very powerful observer,

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[17] Arctic Council, "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic," May 12, 2011. As of April 18, 2019: https://oaarchive.arctic-council.org/handle/11374/531

[18] A North Atlantic Coast Guard Forum and a Pacific Coast Guard Forum similarly seek to build cooperation.

[19] Andrew Osborn, "Putin's Russia in Biggest Arctic Military Push Since Soviet Fall," *Reuters*, January 30, 2017. As of April 22, 2019: https://www.reuters.com/article/us-russia-arctic-insight/putins-russia-in-biggest-arctic-military-push-since-soviet-fall-idUSKBN15E0W0

[20] "Russia Releases Comprehensive Plan for Arctic Logistics," *Maritime Executive*, March 19, 2019. As of April 22, 2019: https://www.maritime-executive.com/article/russia-releases-comprehensive-plan-for-arctic-logistics

[21] People's Republic of China, State Council,"China's Arctic Policy," white paper, January 26, 2018. As of April 22, 2019: http://english.gov.cn/archive/white__paper/2018/01/26/content__281476026660336.htm

and there is no doubt that China seeks investment and influence in the region. This cannot necessarily be assumed to be restrained or benign.

When it comes to the shifting geopolitics of the Arctic, Russia or China do not operate in a vacuum. Alliances, interests, and actions shift over time, and these shifts have implications for governance and cooperation. For example, some of Russia's recent activities have brought other Arctic states closer together (such as Finland and Sweden signing a trilateral agreement with the United States). The question of whether China's "Near-Arctic State" concept will catch on with others, creating the potential for a negotiating bloc, remains on the horizon.[22]

United States decisionmakers will need to contemplate the potential impacts shifting geopolitics will have on governance and the associated needs for infrastructure and other capabilities in the Arctic. As discussed, governance has an important influence on shaping demand for Arctic access and the transport systems of the future. Real or apparent gaps in governance and such materiel capabilities as infrastructure could create the perception of a security void. This might invite more presence and influence from stakeholders with vested regional interests.

IT WILL TAKE MORE THAN ONE INVESTMENT TO SHORE UP ARCTIC CAPABILITIES AND CAPACITY

What are the key capability gaps for U.S. Arctic operations? One issue that concerns me greatly is the characterization—in the media at least—of the United States' Arctic operating challenges as an "icebreaker gap."[23] I do think that the U.S. is dangerously limited in its individual ability to break ice. This numbers game—in particular, comparisons to the overwhelming size of the Russian icebreaker fleet—also has real significance from a great power competition perspective. Another reason for the icebreaker focus is the long lead time to plan and build these unique ships.

However, while this generalization of Arctic challenges might be convenient, it distractsfrom the broader problem of systemic capability shortfalls. In our examination of broad priorities for closing Coast Guard capability gaps, we found that no single type of capability worked for every scenario or acted as a "silver bullet" solution for mitigating shortfalls. For this study, we defined *capability* broadly, as a means to accomplish a mission, function, or objective.[24] Our scope included such individual materiel assets as icebreakers and helicopters; fixed infrastructure like ports and airfields; and organizations, agreements for cooperation, and people (including training).

First, we looked at the existing capabilities that the Coast Guard, federal interagency partners, local communities, and commercial providers could use to add value in different scenarios. In addition to existing icebreakers, some of the most valuable assets included MH–60 Jayhawk helicopters, HC–130 aircraft, various airports and airfields, ports, National Security Cutters, drones, medical evacuation capabilities, satellite and other communications networks, rescue coordination centers, Coast Guard sector specialist personnel, and data (maritime traffic, weather, ice, and other conditions important for on-scene response). These examples help highlight the diversity of capabilities that are needed for Arctic operations. No one asset can do it all alone.

Second, we examined shortfalls in the existing capabilities within the study scenarios. We found that the shortfalls varied as much or more as the existing capabilities. In general, these gaps—defined as capabilities not readily available or planned to be available to the Coast Guard—fell into the broad categories of communications, awareness, and response.

Communications are critical for Coast Guard (and a variety of other) missions. Problems in the Arctic include patchy and unreliable voice communications and extremely limited or nonexistent bandwidth.

An important aspect of awareness is understanding and assessing situations. In the Arctic, "operating blind" is a term that is used to describe the limited level of awareness: Threats and hazards are often poorly understood, and the capacity and capability are lacking to regularly monitor those that are identified. There is particular concern about sensing previously unidentified threats and hazards that do

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[22] Pezard, Tingstad, and Hall, 2018.

[23] Charlie Gao, "The 'Icebreaker Gap': How Russia is Planning to Build More Icebreakers to Project Power in the Arctic," *National Interest*, August 19, 2018. As of March 19, 2019: https://nationalinterest.org/blog/buzz/icebreaker-gap-how-russia-planning-build-more-icebreakers-project-power-arctic-29102

[24] Department of Homeland Security, *Department of Homeland Security Manual for the Operation of the Joint Requirements Integration and Management System*, Washington, D.C., DHS Instruction Manual 107-01-001-01, April 4, 2016, p. 3.

not or cannot actively emit signals, such as "dark" vessels and fast-moving ice. The ability to fuse information from individual data streams into a unified picture of activity and conditions is also challenging.

Finally, the potential for response to a threat or hazard in the Arctic is extremely limited and strongly depends on the proximity to the incident location of scarce material assets, people, and supporting infrastructure. Naturally, reducing the incidence of threats and hazards is an important first step. However, if prevention fails, ensuring that the right people and assets are available and can be deployed rapidly to the right place is necessary. Responders must consider harsh operating conditions and the few resources available for coordination. Furthermore, access to appropriate follow-up materiel and procedures, including medical care and hazardous material clean-up, is not guaranteed. Ensuring sufficient sustainment of operations is the next challenge.

This study was not intended to provide recommendations on specific ways to mitigate gaps. However, the diversity of ways in which workshop participants elected to shore up capability and capacity in the context of different scenarios alludes to a rich set of possibilities. No one type of mobile asset, fixed infrastructure, organization, collaboration, or other entity appeared to satisfy every potential gap. Rather, a combination of existing capabilities (in many cases with increased capacity) and diversification of capabilities to support communications, awareness, and response appears to be necessary in order to tackle current and future vulnerabilities in the Arctic. Some specific types of mitigation options considered include:

- installing additional communications infrastructure and leveraging the growing number of commercial communications satellites in polar orbits
- exercising communications tactics, techniques, and procedures to train servicemembers in overcoming decisionmaking challenging with attenuated communications channels
- investing in remotely controlled air, sea, and amphibious craft for providing persistent wide-area surveillance, especially if these assets are networked together and to sensors on other assets to provide a common operating picture
- updating data-gathering and database construction processes to enhance the role of automation to improve data quality, make data accessible, and fuse information into a common operating picture
- developing operating concepts, plans, and investment strategies that recognize the need for both agile, first response assets as well as infrastructure and logistics to sustain longer-term operations and (literally) conduct heavy lifting
- investigating remotely controlled airlift and oil-spill response capability
- adding small-boat landing capability to icebreakers
- increasing the number of forward operating locations and resources, including local and mobile elements
- prepositioning key response items in partner communities
- enforcing new industry self-help regulations
- improving long-term relationships with native communities (including through additional Coast Guard cultural training).

There are also some broader governance-related issues to contemplate when it comes to getting out in front of problems, such as those related to incidents that put safety, security, and environmental integrity at risk. First, continuing to participate in discussions and decisionmaking is very important. Historically, Arctic cooperation and governance has benefited from stakeholders operating under the same frameworks. The United States has the opportunity to continue work in the Arctic Council and Arctic Coast Guard Forum. Finding ways to keep discussion channels open for important military security communications is also vital. Reconsidering the ratification of the United Nations Convention on the Law of the Sea also is an option.

Second, enabling stewardship and security (including law enforcement) through the provisioning and maintenance of appropriate infrastructure and capabilities, as well as organizations and people to support Arctic operations, is important. First and foremost, this provides opportunities for incident prevention and mitigation. It also demonstrates the presence of the United States as a capable and reliable partner, both internationally and in a domestic context. Importantly, as demonstrated by Russia, certain types of infrastructure can send a mixed message, so we should consider the messaging associated with our investments. Ultimately, it will take more than one investment and the efforts of federal, state, and local agencies and organizations to get out in front of the issues that keep those responsible for safety, security, and stewardship in the Arctic awake at night.

Throughout history, the Arctic has been largely inaccessible place to outside cultures. However, because of climate and improvements in technology, we can no longer view the Arctic as "falling off the top of the map." The Arctic is changing

rapidly in many respects. By making the right investments in organizations and people, as well as in multiple types of assets and infrastructure, we can get in front of tomorrow's Arctic problems, some of which are already upon us today.

Mr. MALONEY. Thank you, Dr. Tingstad.

Governor Treadwell, thank you for joining us. You may proceed.

Mr. TREADWELL. Thank you. Thank you, Chairman Maloney, Ranking Member Gibbs. Thank you for the opportunity to be here today.

I believe I first testified before this committee during the consideration of OPA 90, when I was a local government official. I was working to help make sure we had the infrastructure after a major oil spill. In the early 2000s, as a Commissioner on the Arctic Research Commission, was the first of several times I have been before this committee to say we needed icebreakers. Working with Admiral Allen, when he was Commandant, to try to help make that happen, it is good to see it happening today. And thank you for your continuing attention on this issue.

As your wrap-up batter today, let me just talk about the issue of how do you actually get the infrastructure we need in the Arctic. And I have got three basic ideas that I wanted to share with you. I want to make sure that it is understood that these are my ideas or the opinions that I express are my own, not the Wilson Center. I do cochair the polar program at the Wilson Center, and we are holding a major symposium with the National Ice Center and the U.S. Arctic Research Commission in July, to which you are all invited.

But the first thing I would like to say is that we are—you are constantly being asked to appropriate funds for Arctic infrastructure, whether it is icebreakers or—that might be justified by security or economic development. The problem that I see is that our security plans, our civil plans, our commercial plans all identify the need for the same thing: ports, charting, communications. But we still have stovepipes that don't really work together to figure out how to pay it.

Now we do have CMTS, which is a cross-government effort, to look at the Marine Transportation System. But it doesn't include the State government, which can bring significant resources to the table as well. And I want to appreciate the work that CMTS has done in the Arctic, but I just want to say we need to get away from this, and a couple of examples.

When you heard the Coast Guard say today that we have floating bases with these new icebreakers, that is tremendous. But it is leaving the civil authorities who need to finance ports to kind of act on their own. And we really should be working together to get the security issues covered, as well as the civil and commercial issues covered.

When you heard the question on telecommunications, the same issue—I chair an advisory board for Iridium. We have got 66 new satellites operating, a 360-by-360 process that works and serves the military, and this is something where the commercial needs and the security needs can be answered together.

The second point I want to make is that when it comes to finding revenue, especially to pay for icebreakers—when the admiral and I were serving together it cost something between $60 and $80 mil-

lion a year to run our icebreaker program. Now the Russians are charging half a million dollars to go across the Arctic Ocean per ship. So to make up $80 million is 160 ships. That is one ship a day during the open navigation season. All right?

Senator Murkowski and Senator Sullivan have proposed a bill which the Wilson Center has worked on—I worked on developing it as chair of the Arctic Circle Mission Council on Arctic Shipping and Ports—which says let's create an Arctic Seaway Development Corporation very similar to the St. Lawrence Seaway Corporation which exists in Congressman Gibbs's district. The St. Lawrence Seaway approach has two nations working together. We could have several nations working together in the Arctic to put together a seamless system to get people across the Arctic Ocean. And that concept is well described in S. 1177.

But Mr. Chairman, I guess I would put it this way: When we come ask you for money for icebreakers and talk about inbound Arctic shipping, it is not really American taxpayers' jobs to pay the bill so China can sell goods to France. It is our job to set up a system so that tariffs and revenue can come in to help pay for those icebreakers, and that is the concept in that legislation.

Mr. Chairman, finally, the third thing I would like to say in terms of paying for Arctic infrastructure is it is a lot easier to pay for something when there is more economic activity.

Now there was a large push during the Bush and then Obama administrations to make OCS drilling work offshore. There was expectations that it was going to help pay for the major ports in the Arctic. It didn't happen, for whatever reasons, and we can discuss those.

But I would predict that the next big wave of economic activity the Russians have already shown us how to do. They are bringing 16½ million tons of LNG from Yamal through the Bering Strait—2,600 miles through the ice to get there—while we have got big fields at Prudhoe Bay, and the Canadians have a big field at the Mackenzie Delta, that are lying fallow. Now, this is not something that requires congressional appropriation, but it does require congressional and diplomatic attention.

And with that opportunity I predict that sometime by the end of the next decade you are going to see maybe as much as 50 million tons a year of LNG moving out of Russia, maybe as much as 30 to 40 million tons of LNG a year moving out of Alaska and the Canadian Mackenzie Delta. And I believe that relatively benign economic activity, which has a lower carbon impact than some of the fuels being used in Asia today, is going to help bring the economic activity necessary to pay for the infrastructure. So I would just urge you to pay attention.

Mr. Chairman, thank you very much for your time.

[Mr. Treadwell's prepared statement follows:]

Prepared Statement of Hon. Mead Treadwell, Cochair, Polar Institute, Woodrow Wilson Center

Chairman DeFazio, Ranking Member Graves, Congressman Young, and distinguished members of the subcommittee, thank you for the opportunity to be here today. My name is Mead Treadwell, and I live in Anchorage, Alaska. I am the Co-

chair of the Woodrow Wilson Center's Polar Institute,[1] Chair of the Iceland-based NGO Arctic Circle's Mission Council on Arctic Shipping and Ports,[2] and Chair of the Polar Advisory Board at Iridium Communications, Inc. I am also the former Lieutenant Governor of Alaska (2010–2014) and Commissioner and Chair of the U.S. Arctic Research Commission (2001–2010) under President Bush and President Obama. While I am here through my affiliation with the Wilson Center, the following thoughts and opinions are my own.

Thank you also for the title of this hearing. The United States cannot afford to "do nothing" about the general lack of marine infrastructure in the Arctic.Inaction undercuts efforts to develop a safe, secure and reliable Arctic marine transportation system. Your hearing is well-timed. Just this week, the eight-nation Arctic Council Ministerial occurred in Finland. There, Secretary of State Pompeo challenged Russia and China to help maintain the Arctic as a peaceful, lawful region as they expand their infrastructure and presence.[3] In doing so, he underscored the need for a stronger U.S. presence.

The U.S. infrastructure gaps you will hear about today are little different from those outlined in the Arctic Marine Shipping Assessment that was adopted by the Arctic Council in 2009. Those shortages range from a shortage of icebreakers, an absence of Arctic deep water ports and ports of refuge, an absence of bunkering and refueling capabilities, an absence of salvage capability, and difficulties in communications, charting, ice monitoring and situational awareness.

There are three ways we can more speedily fill the gaps we discuss again today.

1. First, we can appropriate capital funds for infrastructure, justified by security or economic development. Security plans, civil plans, commercial plans all identify similar needs. We need to have these plans mesh together better. All sides appear to be "going it alone," where Polar Security Cutters are described as "mobile bases" for the Navy and Coast Guard, and civil and commercial authorities are left to justify and finance northern ports, communications, and icebreaking services on their own. If we work better together, we can get more done, faster.
2. Second, we can create a business, an Arctic Seaway Development Corporation, modeled on the St. Lawrence Seaway, where we bring nations together to offer a reliable, voluntary, tariff-based service that will attract and justify infrastructure investment. That's the purpose of S. 1177, "The Shipping and Environmental Arctic Leadership Act,"[4] developed by an extensive process at the Arctic Circle and the Wilson Center, with consultations with Arctic states and observing nations from across the globe. Sometimes dubbed "Uber for Icebreakers," the business plan requires just a small percentage of the traffic served by Suez, diverted to the Arctic, to pay for the icebreakers we need.

   Mr. Chairman, if the Arctic were an isthmus, rather than an ocean, and it had been a glacier that retreated rather than sea ice, we would be building a canal right now, and looking at tariffs to help pay the bill—just as Suez and Panama do. Russia has developed a tariff based system that the Secretary of State this week criticized because it is compulsory in an ocean that we believe the rule of law requires be open for freedom of navigation. The proposal we have is a voluntary "best practice" that insurers and ship owners, encouraged IMO rules, should sign up for. It wins business on establishing reliability on an ocean which has failed to attract regular service because reliable infrastructure is not in place.
3. Third, we can sell more resources and induce more private capital to invest in the American Arctic. Russia is cleaning our clock in serving global LNG markets from Yamal, and the vast gas resources we've found at Prudhoe Bay and Point Thomson and the Canadians have found in the Mackenzie Delta are still lying fallow. Pipelines planned to bring gas south in both Alaska and Canada have been so expensive as to not be able to compete with new gas supplies in North America. If we look at shipping LNG directly, we have just 600 miles

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[1] Alongside the National/Naval Ice Center and the US Arctic Research Commission, the Wilson Center will co-host the 8th Symposium on the Impacts of an Ice-Diminished Arctic on Naval and Maritime Operations (IDA-8) on July 17–18, 2019, in Washington, D.C.

[2] For more information about the Arctic Circle's Mission Council on Shipping and Ports, including the Council's Draft Final Report and Recommendations, please visit: https://arcticcircleseawayreport.wordpress.com.

[3] For a transcript of Secretary Pompeo's remarks in Finland, please visit: https://www.state.gov/secretary/remarks/2019/05/291512.htm.

[4] For the text of S. 1177, "The Shipping and Environmental Arctic Leadership (SEAL) Act," please visit: https://www.murkowski.senate.gov/imo/media/doc/SEAL%20Act.pdf. For the one-pager produced by Senator Murkwoski's office, please visit: https://www.murkowski.senate.gov/imo/media/doc/SEAL%20Act%20One-Pager.docx

to get through the ice zone, while the Russians must traverse 2600 miles of ice to make it to the Bering Strait. Economic activity in the North will help pay for infrastructure in the North.

Let me give some examples of ways we are making progress on all three approaches:

- Many of us here pushed the last three administrations to include funding for new icebreakers to meet critical U.S. needs. At last, a contract was issued this past month for the U.S. to start construction on a new heavy Polar Security Cutter, and for preliminary work to be done on two more PSCs—half of the the six vessel goal announced by the President in his 2017 address to the Coast Guard Academy.
- We have also made progress in developing a system of ports in the US Arctic, including a deepwater port capable of servicing large ships like the new Polar Security Cutters. In 2015, Congress established a Port Clarence Council with the State of Alaska and Bering Straits Native Corporation to develop a strategy for developing Port Clarence, America's only deep water port in the Arctic. At least eight other western and Northern Alaska communities, including Nome and Adak, Utqiagvik and Prudhoe Bay, have aspirations and plans to support increased Arctic shipping.
- In 2018, the International Maritime Organization (IMO) approved a joint-proposal between the U.S. and Russia to establish a two-way shipping lane through the Bering Strait. I'm proud of the work we did first at the State of Alaska, and later at the Wilson Center, to encourage negotiations between the U.S. Coast Guard and the Russian government to get this started.
- Iridium's new polar-orbiting network of satellites is providing enhanced communications, marine and aviation tracking capability pole-to-pole, and is available to support the Global Maritime Distress Safety System (GMDSS). Other ice and ship-monitoring space-based radar systems are coming along, too.

For 152 years, the United States has been an Arctic nation. But it has never faced the imperatives it does today now that its third coast, the Arctic, has become accessible. Our challenge in the Arctic is to unlock its value while maintaining our values. We want the benefits of shorter shipping routes and untapped natural resources. We want to maintain our values—respect for traditional ways of life, food security, and the natural environment; the inviolability of our maritime boundaries; and the right of any vessel to freedom of navigation and passage. We can do both.

Mr. Chairman, let me conclude with some specific recommendations.

1. Let's keep up the funding for icebreakers we have authorized and follow through on the system of ports needed in Alaska. To meet our goals of safety, security, and reliability in the Arctic, the military, civil, and commercial sectors need to work together. Whether it is a defense authorization bill, a Coast Guard authorization bill, or a general transportation authorization bill, I urge the Congress to move away from the "stovepipe" approach as you push our agencies to make appropriate plans for the Arctic.
2. The best way to fulfill our infrastructure gaps in the Arctic is to generate new revenues. I urge this committee to sponsor companion legislation and hold hearings on S. 1177, "The Shipping and Environmental Arctic Leadership Act," which would do just that.
3. The largest driver of shipping in the Arctic Ocean today is LNG exports from Sabetta on the Yamal Peninsula in Russia. Why can't the United States and Canada, which have ample gas reserves on the Arctic coast, also export their gas and other natural resources to Asian, North American, or European markets? I believe we can, and am—in my private business—encouraging this to happen. Making it happen won't require Congressional funding, but it will require Congressional and diplomatic support.

PASS S. 1177, "THE SEAL ACT"

Based on the premise that American taxpayers—like those of other Arctic coastal states—should not have to bear the full cost of developing an international seaway so that Asian producers can sell goods more efficiently to European consumers, S. 1177, "The Shipping and Environmental Arctic Leadership (SEAL) Act," would create a congressionally chartered seaway development corporation—similar to the Saint Lawrence Seaway—with the power to collect voluntary shipping fees in exchange for providing access to icebreakers, ports, and port-side facilities. Its singular task would be to establish a working relationship with the other Arctic coastal states to develop an integrated marine transportation system capable of offering seamless, reliable service to ships using the Arctic Ocean. Fees collected by the corporation would be used to lease spare icebreakers ("Uber for Icebreakers") and fund

marine infrastructure and other projects needed to ensure safe, secure, and reliable shipping in the Arctic Ocean.

Passing S. 1177, introduced by Senator Murkowski and Senator Sullivan in April, would send a clear message that the United States remains committed to maintaining its role as a key player in polar governance and cooperation. It would also encourage the military, civil, and commercial sectors to work together to strengthen the US presence. Revenues received would help finance, build, and operate key marine transportation infrastructure such as Polar Security Cutters, deep draft ports, places of refuge, port-side facilities, and additional equipment or systems.

ENCOURAGE LNG AND OTHER EXPORTS FROM THE AMERICAN ARCTIC

Today, the single greatest driver of vessel activity in the Arctic Ocean is Russia's ongoing development of multiple Liquified Natural Gas (LNG) export facilities with direct access to the Northern Sea Route (NSR). In 2013, Yamal LNG—a joint-venture including Novatek, the Russian government, and other entities—began construction of an LNG plant at Sabetta on the Yamal Peninsula. Four years and $27 billion later, the *Christophe de Margerie*—a revolutionary first-in-its-class icebreaking LNG carrier—completed a winter traverse of the NSR, stopping at Sabetta to take onboard the first LNG shipment from the plant that it successfully delivered to a buyer in South Korea. In February of this year, the company announced that it had offloaded more than 130 cargoes and shipped more than 10 million tons since start-up began in December 2017. By my own estimate, total LNG production from the Arctic could amount to as much as 80 million tons per year in the next 15 years if tidewater capacities in Russia, Alaska, and Canada come to market—making Arctic states the world's dominant suppliers of LNG.

With Russia's success in bringing such large and growing amounts of Arctic LNG to markets in Europe and Asia, it seems increasingly plausible—if not imminently doable—that we in Arctic America do the same from Prudhoe Bay, Point Thompson, and—in Canada—from the MacKenzie River Delta. Alaska also has sizable deposits of precious metals and rare earth minerals (REMs) that could be exported via ship in the future. Right now, these projects would need no additional funding from Congress. But they will require Congressional and diplomatic support in the years ahead.

Mr. Chairman, thank you for the opportunity to be here today. I am happy to answer any questions you may have. I would also be very pleased to provide additional information to committee members and staff at any time.

Mr. MALONEY. I thank the gentleman. Before we proceed to Members' questions—yes, I would ask unanimous consent that Mr. Graves of Louisiana be allowed to join the panel for the purposes of participating in today's hearing.

Without objection.

I now proceed to Members' questions and recognize myself for 5 minutes.

Admiral Allen and Ms. Conley, I am interested in following up on your comments about asserting sovereignty in the Arctic. I take your point, Admiral, about, you know, you have sovereignty where you can assert it. What does that look like in the Arctic? And help us understand the gap between—I take it you don't think we can now. What does it look like?

And the same question to you, Ms. Conley, or to any of the members of the panel.

Admiral ALLEN. It kind of depends on where you sit. I have had a lot of conversation with my counterparts, especially the Chief of Naval Operations, when I was the Commandant. From a U.S. security standpoint and Navy missions, subsurface capability and capacity meets their mission set from where they sit.

But as Admiral Ray was discussing, if you have an event in the Arctic and you don't have a platform there to operate from, command and control communications beyond what the current infrastructure is up there, you are not going to get it there in time to

be meaningful or impactful. Therefore, in my view, in terms of non-submarine missions not related to DoD, right now I would say there is a lack of sovereignty in Alaska. And we need to be truthful about it.

Mr. MALONEY. And would the—same question to you, Ms. Conley, but please be specific, as well, I have read the recommendations from the report. Do those cover it? Are there other things that sovereignty looks like? Please give us your thoughts.

Ms. CONLEY. Chairman, thank you so much. I mean what we are talking about is a whole-of-government approach. And what has been sort of unfair is that we have placed this burden on the Coast Guard because they are the leading force that provides that law enforcement, sovereign presence in the Arctic. But they are one important element of a wider array.

We need a stronger diplomatic presence in all of the Arctic countries. We can put Russia aside for a moment because of the current challenges. This is exactly what Congressman Gallagher was saying about our presence in Greenland. We need a bigger science presence. Right now China is opening up scientific observatory centers. We are a science power in the Arctic. We need to increase our sovereign presence.

But on this security nexus we need to think about increasing the forward-operating locations, not simply Kodiak, but additional—we need—what is concerning me about Admiral Ray's testimony is that so many of the assets he was talking about, I don't believe are really going to be destined for the Arctic. They are available, but they won't be there on a persistent presence, beyond just this season.

Right now we practice in the summer season. We have to have a persistent permanent presence. This will take the Navy, quite frankly. The Navy's strategy, to me, was quite disappointing. It did not talk about ice-strengthened surface vessels. We got banged around in Trident Juncture in good weather. We need a surface fleet capable of a persistent presence. We need the helicopters. We need the communications. It is a plan, and we have to exercise that plan. So it is a whole-of-government strategy.

Mr. MALONEY. I appreciate that. Would you say a word on—and again, to any of the panel—but on the deepwater port issue? Help me understand the challenges and needs, and related to what we just talked about.

Ms. CONLEY. If I can just offer, we have to get out of the mode of studying, and doing. We study things in lieu of action.

Mr. MALONEY. Like, where are you going with this, Ms. Conley?

Ms. CONLEY. We have to—and this is joining with the private sector, but we have to make the decision to do it. And I don't know how Congress can move that forward, but we are going to be 10 more years studying the matter, and we have to start doing it. And that is where this whole-of-government Arctic sovereignty initiative, where there is incentive by the Government to then help the private sector join in that cooperation. Then I will be quiet, I am sorry.

Mr. MALONEY. No, you are here to testify. So go ahead and testify.

Yes, sir.

Admiral ALLEN. Well, I see Mr. Graves is in the room, so maybe I will comment on how the Army Corps of Engineer scopes projects.

[Laughter.]

Admiral ALLEN. Maybe I am practicing law without a license, or out of my lane here, but their authorization language and their appropriation language stovepipes projects. I think what the colonel was trying to say, given the authorization they had, the report is going to detail what they can do.

And getting back to Heather's comments, we need to be thinking about what is a whole-of-government response and what we are going to need up there in the future. And the 22 feet at Nome and what they can actually do, whether it is extending the pier or dredging, is not going to get us to a point where we will have the flexibility to bring the draft vessels we need in to give us extended presence up there.

Mr. MALONEY. Go ahead, sir.

Mr. TREADWELL. Thank you, Mr. Chairman. If you take a look at the Bering Strait, the Russians have got a beautiful port at Provideniya, just across the Bering Strait. We can't rely on that. We have a natural deepwater port at Port Clarence, and we have a port at Nome that is already doing work. Port Clarence needs a road, Nome needs dredging. Together you are talking about a system of ports which is about a $300 million problem. And if we can find $300 million we will do it.

Now, one of the reasons why I talk about a system to generate revenue is if you go to Cold Bay, Alaska, a wide-body jet probably lands there once a year. But we keep it plowed all year. We keep it ready, because it is the one port of refuge for an aircraft going across the Pacific. We need to understand that if we can create a revenue source from this new Arctic traffic, we are going to be able have the money to come and pay for some of this infrastructure.

Mr. MALONEY. Thank you, sir.

Mr. Gibbs?

Mr. GIBBS. Thank you. I am very intrigued by the comments here.

Admiral, you have been around a long time. You have seen the capabilities, what has happened from 10 years ago and what is happening. How satisfied or dissatisfied are you with regard to the growing Arctic capabilities versus the increased maritime activity in the Arctic and—in which the—over the Coast Guard's responsibilities? So can you just elaborate what you have seen? Are we making progress or not? How are we doing?

Admiral ALLEN. Well, I hate to cover the same ground that Heather raised, but what happens is we have separated functional capability and mission by the authorizations and appropriations the individual agencies get, and neither of those, individually, by agency, are enough to address the comprehensive integrated approach you need in the Arctic.

That is the reason this notion of a comprehensive campaign plan, or a larger view of the area up there, is probably going to be necessary. Because nobody can afford to have their budgets earmarked. Certainly, the Coast Guard is not going to want their budget earmarked to improve the Port of Nome. So everybody is

going to be trying to optimize what they can within their jurisdiction and the capabilities required to execute their mission.

The issue is if you add all those up they don't come up with a comprehensive integrated plan, and I think—and I would agree with Heather Conley, I think we are in alignment on this—that is what is called for.

Mr. GIBBS. I guess to follow that a little bit, we had a lot of discussion about Nome. I kind of got the impression that is the only option, but then I hear about the challenges of getting the port deep enough. Are—is there other areas we should be looking at, even though there might not be a population? Is there other things, kind of looking outside the box, that maybe Nome is not the place to have it?

Mr. TREADWELL. Mr. Gibbs, through the chair, there is a natural deepwater port of refuge at Port Clarence, which is a fairly short road connection from Nome. If a road could go in that area where the Coast Guard had loran stations, where there is some power capability left behind, where it may be used to support a graphite mine is available. The proponents of that port and Nome are working together and look at this really as a system of ports. Because, you know, the people are in Nome, which—it may be better to work with both.

But that deepwater port has been used since the 1840s by ships going in when they couldn't come into Nome, and there is an exposure. So there is a reason to work together with those ports.

Mr. GIBBS. OK, and go ahead, Admiral. Oh, go ahead.

Mr. TREADWELL. And just one other thing. The admiral addressed the issue of the Corps of Engineers authorities. I did a lot of work on the Port Clarence-Nome issue over the last 4 or 5 years, and the Corps—because there is no port now collecting revenue, they can expand a port but they can't really—the law doesn't contemplate frontier ports. It really needs to. They can't really look at the security issues that they need to look at, and that is a challenge for both Nome and Port Clarence.

Mr. GIBBS. Now this other port, you say it is a deepwater port, naturally?

Mr. TREADWELL. Yes, sir.

Mr. GIBBS. That is interesting. Admiral, did you——

Admiral ALLEN. I would just add that you can build a deepwater port, but it may be more expensive to build a road to it. So you have to look at the entire system of surface rail, what is going on with permafrost, how do you actually construct an artery to get to the port. That is—this all has to be integrated.

Mr. GIBBS. Now some of the questions or testimony you talked about in the Bering Strait, you know, especially China—I think Ms. Conley talked about they want to do the transpolar route, which would shorten it, but you got to get through a lot more ice.

How do we collect revenues? Did I hear somebody mention something about tariffs or a possibility—who was that?

Yes?

Mr. TREADWELL. The Senate has a bill pending, Senate bill 1177, which is called the SEAL Act, introduced by Senator Murkowski, Senator Sullivan, and Senator King from Maine. The bill essentially creates a Seaway Development Corporation, which is modeled

on the legislation that created the St. Lawrence Seaway in your district. It sets up a system to go out and work with other nations to use the icebreaker capabilities across the Arctic—really, across the world—to offer a reliable service in the Arctic and to charge a tariff for it.

Now, if you read the Secretary's speech in Finland the other day, he criticizes Russia for demanding a $500,000 or so tariff for use of the Northern Sea Route. That tariff is paid by people because the route does save the money and it saves them more than $500,000. The concept here is set it up voluntary, the insurance industry has set up a best practices forum at the Arctic Council, and set this up as a best practice, and see if you could collect some money.

And I would just put it this way. The Suez Canal uses about—serves about 18,000 ships a year; 5 percent of that is 900 ships; 900 ships paying $500,000 is $450 million a year, and that can cover the operational needs of a lot of icebreakers.

And so the concept is to do what the United States did with St. Lawrence. We don't charge a tariff. The Canadians do, but we work together to have a seamless system. It is similar to the concept of Comsat, where we created the international satellite system, and to bring the world together to offer a seamless service.

Mr. GIBBS. Just a quick one, Mr. Chairman—to do that, would you have to have a treaty or agreement with Russia for the Bering Strait?

Mr. TREADWELL. Well, I was one, Congressman, who worked to try to get this system the Coast Guard announced, where we have the traffic system with Russia in the Bering Strait, and I believe it is important that we cooperate with Russia. But one of the things this does is it develops a revenue source that helps us pay for the additional infrastructure we need.

And you know, the Russians right now have the de facto monopoly on ship services in the Arctic. Their plans have been done by international consulting companies for something like a billion-dollar-a-year ship services market supporting ships going across the Arctic. And the U.S. is sitting on its hands. And that is why this legislation has been introduced.

Mr. GIBBS. Thank you, Mr. Chairman.

Mr. MALONEY. I thank the gentleman. Mrs. Miller?

Mrs. MILLER. Thank you, Mr. Chairman.

Ms. Conley, in West Virginia our economy relies very heavily on international exports of our natural resources and manufacturing products. How does the lack of the American presence in the Arctic have negative consequences on our trade interests?

Ms. CONLEY. Congresswoman, there are certainly economic opportunities that the Arctic presents in both shipping of and exporting goods, as well as what we call destinational shipping, which is countries that are going to the Arctic to get mineral and energy resources and taking them back to market. So I would argue for the citizens of West Virginia increasing safe and secure trade and transshipment is a—potentially, a very positive development for U.S. economic growth.

We are challenged by two things—and this gets back to the lack of ratification for the Law of the Sea Treaty. We cannot in the Arc-

tic potentially mine the seabed because we are not signatories, and have not ratified it. And we cannot extend our Outer Continental Shelf because we aren't ratifying. These are—we are losing opportunities for economic investment in the Arctic region, which would benefit all American citizens. And we are not able to protect and ensure the safe and secure transit of those goods, either energy or exported goods, if we do not have the appropriate infrastructure to safely do it.

Mrs. MILLER. Well, that sort of answers my next question on what Congress could do to help alleviate the issue.

Ms. CONLEY. So what is so important is that we understand the Arctic as a national imperative. I think many times, if we think about the Arctic, we may think about simply Alaska's needs for infrastructure. But this is a whole-of-nation effort. If we want to grow the American economy and jobs, we need to think of the Arctic as something enhancing our prosperity.

But we also have to do it in a secure and stable way that protects America's exclusive economic zone, our Territorial waters, and our coastline. So it is sovereignty. It is enhancing American prosperity. But we can only do that with a much more emboldened presence in the Arctic. Our competitors understand the strategic value of the Arctic; we have forgotten it.

Mrs. MILLER. Thank you.

Mr. Treadwell, a deepwater port in the Arctic is imperative, as you have mentioned, for American trade to compete in the region. What progress has been made to develop this port infrastructure? Have we done things to identify? And are we helping to facilitate doing such a thing?

Mr. TREADWELL. Well, the answer is we haven't done enough. And I will put it this way. There is a Port Clarence Council, which has been established to try to develop an economic plan for Port Clarence. It was established by Congress, and it set it up between the State of Alaska and the Bering Straits Native Corporation. And the Coast Guard and the Corps of Engineers have been cooperating with that council as they have done their work.

The city of Nome has been working with the Corps of Engineers on applicability there for appropriations under the upcoming Water Act. The Congress has asked the military to look at the military needs for a port. And, you know, I will just say with some experience around here, that when you when you ask an agency to say what it needs, if it actually says what it needs then they are told to pay for it. So you are not exactly seeing everything that I hoped we would see with some of this legislation.

But the fact is I believe there is enough on the record right now for Congress to find that it would be absurd for us to go into a brandnew ocean, newly accessible to the world, and not have a deepwater port of refuge, and not have a port which could have us play a role in assisting shipping and transshipping. And frankly, as we do that, not doing it with a way to have a tariff or some sort of revenue source to help pay for it.

Mrs. MILLER. Thank you. Mr. Chairman, I yield back my time.

Mr. MALONEY. I thank the gentlelady.

Mr. Graves?

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Chairman.

Thank you all very much for being here to testify today. You are all familiar with the fact that in recent weeks we have finally awarded a contract for the first heavy icebreaker, the Polar Security Cutter, in decades. And we have awarded a contract for one. I think we were all of the understanding that that boat is likely going to be south.

You compare our capabilities and assets to those of other Arctic nations, and even, to some degree, as you noted, non-Arctic nations. We are getting blown away. Not even close to the capabilities those nations have, compared to the United States. Yet you have all noted the strategic importance of the Arctic to the United States.

I am just curious. What is your opinion as to why the United States is so far behind other Arctic nations in regard to our capabilities and preparation for changing conditions in the Arctic, and even just capabilities in the Arctic?

Ms. CONLEY. Well, it is a great question. I think we have forgotten how strategic the Arctic is. During the Second World War and the Cold War it was so strategic because it reduced the distances between the North Pacific and the North Atlantic. It was vital to protect the United States from Alaska. And then, at the end of the Cold War, we forgot that strategic imperative.

Mr. GRAVES OF LOUISIANA. OK, so we forgot. And let's say that is the excuse, that we just forgot. But then, when you see what some of these other countries are doing—and let's be candid, these aren't necessarily nations that are close allies of ours—why would that not raise our concerns, or at least curiosity?

Ms. CONLEY. Because it didn't fit into our focus on the Middle East and the Indo-Pacific. As Admiral Allen said, I mean, this is about budgets. And anything that takes focus away from what we are driving towards is a distraction to budgets. And I think this is what our military services have really been wrestling with. They are articulating why the Arctic is important now, but no one is redirecting resources to that.

So either they are not getting the signal from the top that we have to restructure our priorities, and we are going to have to make some hard choices. What they are saying is this is an issue, but we don't have either the—we are stretched on capabilities and readiness, or we don't have those resources. And our allies, though—excuse me—our adversaries, our peer competitors, understand the strategic importance and are using this time and space to build their capabilities.

Admiral ALLEN. Yes, I am not going to sugarcoat this. For 20 years high-level decisions about strategic presence in the Arctic and ice breaking have been relegated to mid-level bureaucrats in OMB. Let me repeat for the record, the Office of Management and Budget.

Mr. TREADWELL. Mr. Chairman, as somebody who was an official who often tangled with those OMB officials and was told I shouldn't say what needed to be said around here, I concur with the admiral.

I am going to just give you an analogy. Anchorage, Alaska, is the fifth largest air cargo port in the world. I used to fly on KAL 007. And we tried to stay, obviously, as far away from Russian airspace,

because when it didn't happen people were killed. A Member of Congress was killed. At the end of the Cold War a group of us worked very closely to try to establish the global aviation system.

And if today you get on an airplane in Detroit and go to Shanghai, you are dropping pennies from heaven into the Russian Treasury. They collect over $500 million a year to pay for a global air traffic system. We collect it, it is used to support Essential Air Service. And we set up a revenue model, whether it was with taxes or fees, to help cover that global seamless system.

Now I have had Commandants—not the ones that I am sitting next to—say, "Well, I am not sure I want to charge for icebreaker services for the Coast Guard, because if somebody needs it and they are going to have to pay for it, they may not call me when they are needed, and lives could be lost." And I understand that. On the other hand, I will say this, that if you are going to use the Arctic Ocean and save 20 days' travel with a ship that might be carrying 15,000 containers, you can probably afford to drop $500,000 on a voyage, and it only takes a few hundred of those ships, one or two a day, to actually pay for the infrastructure we need.

And so we need to think a little bit more creatively, and—as we put together this proposal we met with parliamentary authorities, we met with civil authorities, we have met with shippers in Japan, Korea, China, Singapore, across Europe. Not everybody is aligned, but we did find this: All of them said, "We see the opportunity in the Arctic, but we are not going to use it until somebody has established reliability."

And we put—the admiral and I worked together on Arctic policy, the actual Arctic policy, the statement signed by President Bush in 2009, implemented by Obama, where we said we want an Arctic Ocean which is safe, secure, and reliable. And we have really dropped thinking about reliability now.

So I can't tell you—I mean the Arctic is always out of sight, out of mind for people until they get—you know, until it is—until the weather report says you are getting cold air. But I will say this. It is—10,000 people today will cross the Arctic Ocean on aircraft, and we have got a way to pay for what we need for safety. We have to think about how to do that for shipping.

Mr. GRAVES OF LOUISIANA. Thank you.

Mr. MALONEY. I thank the gentleman. We now proceed to the second round of questions.

I do understand Mr. Larsen to be en route. It wasn't my intention to go to a second round, but as a courtesy to Mr. Larsen we are going to prolong the torture a little bit longer, ladies and gentlemen.

[Laughter.]

Mr. MALONEY. But I do very much appreciate the subject you are raising.

Dr. Tingstad, would you like to get in on any of this? You have three very aggressive fellow witnesses today. I feel like you might have something to add to this conversation.

Ms. TINGSTAD. I have actually been humbled and honored to sit back and watch the wonderful conversation happening here.

But yes, and I would like to reflect momentarily on hard choices. You know, I thought that was a very astute question about, you know, what has happened, why are we not thinking of the Arctic more strategically, or why haven't we. And the U.S. has a lot of focus areas around the world, a lot of focus areas, domestically, as well. And there have been choices made to not invest in the Arctic, not focus on the Arctic. There was a lot of sea ice. And now that the rubber is meeting the road, it is time to start refocusing on the Arctic.

I would like to bring to you, you know, all of our attention, as we have continued to do over the course of, I am sure, many of these types of testimonies and hearings, that the U.S. Coast Guard has an impressive array of statutory missions. And that is a Service that is already stretched very thin, doing missions all around the world. And to think of what might happen with some of these discrete incidents—it is the Coast Guard that I was talking about earlier—those discrete incidents and helping the U.S. enforce governance and sovereignty in the Arctic, it is the Coast Guard that is going to be the stuckee for that in many cases—with partners, naturally, international and domestic partners.

But I just wanted to continue to raise that for the committee, that it is an important issue. There are hard choices to be made, but I am not—I don't want to speak from a position of authority on this, but I am not sure the Coast Guard is in a position to make any more hard choices about its resources if it needs to stretch them into a more active Arctic. So I wanted to leave the committee with that.

Mr. MALONEY. Thank you.

Mr. Gibbs?

Mr. GIBBS. I want to—just a thought—just a question. How far behind are we, compared to what Russia and China are doing, and the possibility of catching up if—you know, how fast do we need to act to catch up?

When we talk about all the infrastructure, the communications, and the—all the icebreakers and everything, you know, how critical is this? I mean what do we got to do right away—I guess I am just challenging your minds here a little bit because I was delaying for Rick Larsen, but go ahead.

Ms. CONLEY. My own estimate, we have lost a decade. And this gets back to when President Bush signed the National Security Presidential Directive in 2009, Admiral Allen's last act in the Oval Office. We stopped. We didn't pursue—Russia started including the Arctic in its military doctrine in 2007, 2008. China built its first Arctic research station on Svalbard in 2004. So we have just lost a decade.

It can't take this long to build an icebreaker, it can't take this long to decide on a deepwater port. We are now—you know, the more time we lose we will not be able to recover it. And I fear we are going to lose access because we will not be able to——

Mr. GIBBS. Yes, but we are going to lose the commercial aspect of it, but I would also argue there is a national security aspect, correct?

I yield back, thanks.

Mr. MALONEY. I thank the gentleman. Mr. Larsen?

Mr. LARSEN. Thank you, Mr. Chairman. You are all very kind to let me come back here and ask a few questions.

And I want to first just say hello to Admiral Allen again, as well as to Mr. Treadwell. These two gentlemen have been here since—testifying on the Arctic since 2001, at least since I have been here. So thanks for having another hearing on the Arctic.

So a couple of questions. First with Ms. Conley—and I know some of this has been asked, or some of this subject matter has been asked.

But could you, through—you have testimony—answer the question. What are China's motivations regarding the increased Arctic presence?

Ms. CONLEY. So, quite frankly, there is a strong desire for economic presence. First and foremost, energy resources, which is why they are now investing very strongly in the Yamal LNG project. And I think this will expand. So, energy.

Secondly—and I don't think we should discount that it is the protein—fisheries are continuing to be very attractive for China's alternative sources.

And then finally, shipping. This is an alternative to the Straits of Malacca, should those, for conflictual purposes, not be available to them. They see the opportunity of reducing transshipment by 30 percent, which is why the transpolar route is very important.

Right now the Arctic is primarily energy. That will be the back-and-forth to Yamal. But every year, COSCO, the shipping company, tests a containership. The Northern Sea Route is too shallow for deep container traffic. That is what makes the transpolar route—and if you looked at the map, which is why Iceland is so vital to China's projection in the Arctic, because again they will need to use the Bering Strait. But you could see where potential port infrastructure in Iceland would then be a dispersant to both North America, as well as northern Europe, potentially.

So the Chinese—their vision is to 2040, 2050. They are thinking that far ahead. They are seeing what is possible. They are looking for those opportunities. It may not work, but to have that length of projection of what you want, and to shape it to have access to fisheries, shipping, energy—at this point I don't foresee a military role, it is predominantly economic. But there will be dual-use capabilities.

We have to remember that the U.S. missile defense architecture is in the Arctic, and Thule Air Force Base in Greenland, of course, and Fort Greely in Alaska, that could also be potentially compromised. So we have to think more long term on that.

Mr. LARSEN. And that gets to the next question. What should our motivations be in the Arctic? What should U.S. motivations be?

Ms. CONLEY. This is about protecting the United States. It is about ensuring that we protect our territory, our airspace, our maritime capabilities, first and foremost.

And then, secondly, we want to shape this region to make sure it is stable and prosperous, to make sure rules and norms are followed, that we have access to the high seas.

And in order in order to do that, we have to increase our physical presence across the region, both terrestrial and maritime.

[Slide]

Mr. LARSEN. Yes. So there is a map up. And if you look to the side you can see it. If you put on my glasses you can see it.

[Laughter.]

Mr. LARSEN. You can barely see it without them. But it doesn't do a lot of justice to the issues here. And, Admiral Allen, maybe you could talk a little to that, but—since you have been chewing on this problem for a while.

Off of the coast of the United States, it is just fairly open water. But if you go to Canada, I mean, it gives an impression of the land masses in northern Canada. But there is many more islands, and the same with Russia. It is not as unpopulated by islands and land as it comes across in the map. The point is that almost every country's Arctic is a different Arctic. And it is impacted by different weather, as well.

So, in your time thinking about this, what challenges do each of those Arctics provide to those countries, compared to the challenges that we have with our Arctic? I am sorry I don't have a lot of time left. I won't keep the committee here long.

Admiral ALLEN. Thank you, sir. Excellent question. First of all, let me associate myself with Ms. Conley's remarks. I support them completely. Let me just add a couple of things onto it.

Each one of those routes is different because of the status of the waterways related to whether or not they're in international waters, internal waters, in Territorial sea, or, in the case of the Bering Straits, under the Law of the Sea Treaty that would be classified as a transit strait. A transit strait is a strait that connects two international bodies of water, and transit through there cannot be an inhibited.

And when we talk about fees and tariffs, that is all possible, but there was a landmark case in the Torres Strait north of Australia, where they attempted to establish a pilotage charge. And there may be some conflicts moving ahead that have to be discussed, but it is not clear. There is a difference in the Canadian view of the Northwest Passage route versus our view. There are still claims on our boundary of the Beaufort Sea between the U.S. and Canada. And one of the reasons that the Russians can establish charges there is because internal waters—and they can make that mandatory, because it is not a transit strait.

Mr. LARSEN. Right.

Admiral ALLEN. Was that helpful?

Mr. LARSEN. That is helpful. That is one of the differences.

Did—Ms. Tingstad, do you have a——

Ms. TINGSTAD. If I may, I had a followup.

Mr. LARSEN. Yes, sure, I guess.

Mr. Chairman, is that all right?

Mr. MALONEY. Without objection.

[Laughter.]

Mr. LARSEN. All right. Thank you for the extra time.

Ms. TINGSTAD. Thank you.

Mr. MALONEY. That is the final question. Well, thank you all very much——

Mr. LARSEN. I am sorry, so just to follow up quickly——

Mr. MALONEY. The gentleman's time has expired.

Mr. LARSEN. It is up to you.

Mr. MALONEY. But without objection—go ahead, no. I thought you were going to submit it for the record, I am sorry. Did I misunderstand you?

Ms. TINGSTAD. No, I——

Mr. MALONEY. Oh, forgive me.

Ms. TINGSTAD. I just have a——

Mr. MALONEY. I am—no, I apologize. Go ahead.

Ms. TINGSTAD. No, not at all, no.

I wanted to add that, in terms of the differences in the in the Arctic, we should look forward to the changes that are occurring that are occurring differentially across the region. So those routes that we see here—I mean, those are lines for convenience, approximately where they would be, of course, but then there is also going to be a differential in how quickly those waters will be open, and for how long during the year.

So, you know, we are looking at—actually, some studies have shown that that middle route across the center is actually going to be more frequently open for longer durations than the route that goes across the Northwest Passage—some long lying ice that is projected to stay out there for some time. Thank you.

Mr. MALONEY. Thank you, Dr. Tingstad, and forgive my clumsiness. I misunderstood your initial response.

I want to thank our panel. Seeing no further questions from the Members, I ask unanimous consent that the record of today's hearing remain open until such time as our witnesses have provided answers to any questions that may be submitted to them in writing. And I have asked further unanimous consent that the record remain open for 15 days for any additional comments and information submitted by Members or witnesses to be included in the record of today's hearing.

Without objection, so ordered.

If no other Members have anything to add, with sincere thanks to all of you for your expertise, your service, your contribution today, your travel from far away, we very much appreciate your participation.

And the subcommittee stands adjourned.

[Whereupon, at 4:30 p.m., the subcommittee was adjourned.]

APPENDIX

QUESTIONS FROM HON. SEAN PATRICK MALONEY FOR ADMIRAL CHARLES W. RAY, VICE COMMANDANT, U.S. COAST GUARD

Question 1. What intelligence assets does the Coast Guard need for Arctic MDA?

ANSWER. As a member of the National Intelligence Community, the Coast Guard both contributes to and benefits from the capabilities of Intelligence Community partners. The Coast Guard must continue to improve information and intelligence collection in the Arctic, including support for the development and dissemination of collection requirements for Arctic marine conditions, climate, maritime safety, and security threats.

Unlike Coast Guard Cutter *Polar Star*—our existing heavy polar icebreaker—the new Polar Security Cutters will include intelligence collection capability similar to that of our National Security Cutter fleet. Our National Security Cutters operate seasonally in the Arctic now, but the new Polar Security Cutters will provide more access in the polar regions, together with advanced maritime domain awareness capabilities.

Question 2a. What are existing Coast Guard shoreside assets?

ANSWER. Please see attachment.

List of Coast Guard Real Property Assets within the Arctic

Assets pulled from SAM Q2 FY19

Legal Interest	Use of Asset	Type of Asset	AssetName	Latitude	Longitude	City	State	County
Government Owned	Active	ADAK ISLAND - ATON	GANNET ROCKS LIGHT 4 (LLNR 27525)	51.866926	-176.608991	Adak	AK	ALEUTIANS WEST
Government Owned	Active	ADAK ISLAND - ATON	SWEEPER COVE RANGE FRONT LIGHT (LLNR 27542)	51.852526	-176.654169	Adak	AK	ALEUTIANS WEST
Government Owned	Active	ADAK ISLAND - ATON	SWEEPER COVE RANGE REAR LIGHT (LLNR 27543)	51.851336	-176.66047	Adak	AK	ALEUTIANS WEST
Government Owned	Active	ADAK ISLAND - ATON	SWEEPER COVE ENTRANCE LIGHT 5 (LLNR 27530)	51.857588	-176.591944	Adak	AK	ALEUTIANS WEST
Government Owned	Active	ADAK ISLAND - ATON	SWEEPER COVE JETTY LIGHT 6 (LLNR 27535)	51.85984	-176.629649	Adak	AK	ALEUTIANS WEST
Government Owned	Active	ADAK ISLAND - ATON	SWEEPER COVE LIGHT 7 (LLNR 27540)	51.854233	-176.629158	Adak	AK	ALEUTIANS WEST
Government Owned	Inactive	LORAN, ATTU	LORSTA ATTU - LAND	52.833003	173.179379	Adak	AK	ALEUTIANS WEST
Government Owned	Inactive	LORAN, ATTU	NORTH/SOUTH RUNWAY	52.826469	173.156033	Adak	AK	ALEUTIANS WEST
Government Owned	Inactive	LORAN, ATTU	EAST/WEST RUNWAY	52.826469	173.156033	Adak	AK	ALEUTIANS WEST
Government Owned	Inactive	LORAN, ATTU	AIRCRAFT PARKING APRON	52.837617	173.17955	Adak	AK	ALEUTIANS WEST
Government Owned	Inactive	LORAN, ATTU	RUNWAY BRIDGE PEACEFUL RIVER	52.831343	173.174615	Adak	AK	ALEUTIANS WEST
Government Owned	Inactive	LORAN, ATTU	AIRCRAFT TAXI WAYS (ABANDONED)	52.82818	173.167877	Adak	AK	ALEUTIANS WEST
Government Owned	Inactive	LORAN, ATTU	ROADS	52.836814	173.186803	Adak	AK	ALEUTIANS WEST
Leased	Active	SHEMYA ISLAND, COMMS	SHEMYA ISLAND, COMMS - LAND	52.725775	174.122346	Adak	AK	ALEUTIANS WEST
Government Owned	Active	AKUTAN HARBOR - ATON	AKUTAN HARBOR SECTOR LIGHT (LLNR 27430)	54.131817	-165.785167	Akutan	AK	ALEUTIANS EAST
Government Owned	Active	AKUTAN HARBOR - ATON	AKUTAN POINT LIGHT 2 (LLNR 27440)	54.144945	-165.728096	Akutan	AK	ALEUTIANS EAST
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	NORHT HEAD LIGHT (LLNR 1240)	54.221074	-165.979748	Akutan	AK	ALEUTIANS EAST
Leased	Active	KUSKOKWIM RIVER - ATON	KWIGUK PASS ENTRANCE LIGHT (LLNR 27865) - LAND	62.801957	-164.867783	Alakanuk	AK	KUSILVAK
Leased	Active	MASS, BARROW	MASS - LAND	71.280606	-156.788694	Barrow	AK	NORTH SLOPE
Leased	Active	MASS, BARROW	ANTENNA SPACE, NWS BLDG	71.280841	-156.788916	Barrow	AK	NORTH SLOPE
Government Owned	Active	ALASKA PENINSULA - ATON	CHIGNIK BOAT HARBOR ENTRANCE DAY BEACON 2 (LLNR 27062)	56.304928	-158.3812	Chignik	AK	LAKE AND PENINSULA
Government Owned	Active	NORTON SOUND - ATON	POINT ROMANOF LIGHT - LAND	63.199885	-162.633367	Dillingham	AK	DILLINGHAM
Government Owned	Active	NUSHAGAK BAY - ATON	EKUK RANGE FRONT LIGHT (LLNR 27810)	58.798954	-158.554372	Dillingham	AK	DILLINGHAM
Government Owned	Active	NUSHAGAK BAY - ATON	EKUK RANGE REAR LIGHT (LLNR 27815)	58.802136	-158.556523	Dillingham	AK	DILLINGHAM
Leased	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	BILLINGS HEAD LIGHT - LAND	54.296687	-165.5244	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	CG MSD UNALASKA	MSD UNALASKA OFFICE	53.889683	-166.54351	Dutch Harbor	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	ILIULIUK HARBOR SOUTH CHANNEL DAYBEACON 10 (LLNR 27485)	53.876285	-166.547855	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #512 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #402 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #502 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #503 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #509 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #511 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #501 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Leased	Active	STRAWBERRY HILL, LLC - DUTCH HARBOR - LEASED HOUSING	2387 AIRPORT BEACH ROAD #508 - HSG	53.890063	-166.543669	Dutch Harbor	AK	ALEUTIANS WEST
Government Owned	Active	UNALASKA ISLAND - ATON	ULAKTA HEAD LIGHT (LLNR 27450)	53.924191	-166.508813	Dutch Harbor	AK	ALEUTIANS WEST
Government Owned	Active	UNALASKA ISLAND - ATON	SPITHEAD LIGHT (LLNR 27460)	53.897374	-166.515491	Dutch Harbor	AK	ALEUTIANS WEST
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	SCOTCH CAP LIGHT - LAND	54.395176	-164.745268	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	SCOTCH CAP LIGHT (LLNR 1220)	54.394827	-164.744282	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	CAPE SARICHEF LIGHT (LLNR 1230)	54.598337	-164.927789	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	SCOTCH CAP LIGHT - LAND WEST	54.416714	-164.833512	False Pass	AK	ALEUTIANS EAST
Leased	Active	BECHEVIN BAY - ATON	IKATAN BAY LIGHT - LAND	54.764241	-163.366107	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	BECHEVIN BAY - ATON	IKATAN BAY LIGHT (LLNR 27420)	54.764241	-163.366107	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	BECHEVIN BAY - ATON	IKATAN POINT LIGHT (LLNR 27425)	54.776042	-163.186693	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	BECHEVIN BAY - ATON	FALSE PASS BREAKWATER LIGHT 1 (LLNR 27401.5)	54.864422	-163.408096	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	BECHEVIN BAY - ATON	ISANOTSKI STRAIT LIGHT 3 (LLNR 27410)	54.824967	-163.37545	False Pass	AK	ALEUTIANS EAST
Government Owned	Inactive	CAPE SARICHEF LIGHT - ATON	CAPE SARICHEF LIGHTHOUSE	54.598369	-164.927667	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	CAPE SARICHEF LIGHT - ATON	CAPE SARICHEF LIGHT - LAND	54.589297	-164.927563	False Pass	AK	ALEUTIANS EAST
Government Owned	Active	PORT MOLLER - ATON	HARBOR SPIT DAYBEACON (LLNR 27580)	55.91312	-160.579653	Homer	AK	KENAI PENINSULA
Government Owned	Active	AKUTAN HARBOR - ATON	AKUN STRAIT LIGHT (LLNR 27435)	54.131885	-165.659641	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	AKUTAN HARBOR - ATON	AKUTAN SMALL BOAT HARBOR LIGHT 1 (LLNR 27427)	54.13009	-165.622567	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	AKUTAN HARBOR - ATON	AKUTAN SMALL BOAT HARBOR LIGHT 2 (LLNR 27428)	54.130655	-165.622057	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	UGAMAK ISLAND LIGHT (LLNR 1225)	54.229135	-164.600432	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	CAPE ETOLIN LIGHT (LLNR 1287)	60.430123	-166.160527	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	BLACK RIVER ENTRANCE LIGHT (LLNR 1290)	62.365443	-165.347328	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	BILLINGS HEAD LIGHT (LLNR 1235)	54.296687	-165.5244	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	CAPE RODNEY LIGHT (LLNR 1345)	54.64294	-166.396423	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	SEALION ROCKS LIGHT (LLNR 1245)	55.464478	-163.203078	Kodiak	AK	KODIAK ISLAND

List of Coast Guard Real Property Assets within the Arctic

Assets pulled from SAM Q2 FY19

Legal Interest	Use of Asset	Type of Asset	AssetName	Latitude	Longitude	City	State	County
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	CAPE SENIAVIN LIGHT (LLNR 1250)	56.399072	-160.146265	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	CAPE GREIG LIGHT (LLNR 1260)	57.741677	-157.696418	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	CAPE MOHICAN LIGHT (LLNR 1285)	60.21136	-167.457812	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BECHEVIN BAY - ATON	ISANOTSKI STRAIT LIGHT 2 (LLNR 27415)	54.815334	-163.362714	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BECHEVIN BAY - ATON	CAPE KRENITZEN LIGHT 7 (LLNR 27285)	55.063128	-163.421798	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BECHEVIN BAY - ATON	CHUNAK POINT DAYBEACON 2 (LLNR 27300)	55.03325	-163.454663	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BECHEVIN BAY - ATON	ROCKY POINT LIGHT 6 (LLNR 27325)	54.971046	-163.442595	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BECHEVIN BAY - ATON	ST. CATHERINE COVE DAYBEACON 4 (LLNR 27345)	54.996392	-163.48924	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BECHEVIN BAY - ATON	FALSE PASS BREAKWATER LIGHT 2 (LLNR 27401)	54.865273	-163.408224	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BECHEVIN BAY - ATON	ISANOTSKI STRAIT LIGHT 5 (LLNR 27405)	54.856443	-163.391642	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BERING SEA (EASTERN PART) - ATON	GRANTLEY HARBOR LIGHT (LLNR 27980)	65.27679	-166.347665	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BERING SEA (EASTERN PART) - ATON	GRANTLEY HARBOR DAYBEACON 2 (LLNR 27982)	65.273085	-166.362582	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BRISTOL BAY - ATON	NELSON LAGOON LIGHT (LLNR 27555)	56.010832	-161.093328	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	BRISTOL BAY - ATON	WALRUS ISLAND LIGHT (LLNR 27560)	56.021568	-160.811067	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	CAPE PRINCE OF WALES TO POINT BARROW - ATON	CAPE PRINCE OF WALES LIGHT (LLNR 1355)	65.633627	-168.119192	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	CAPE PRINCE OF WALES TO POINT BARROW - ATON	SHISHMAREF LIGHT (LLNR 1360)	66.255843	-166.040177	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	CAPE PRINCE OF WALES TO POINT BARROW - ATON	NORTHWEST CORNER LIGHT (LLNR 1365)	66.580553	-164.406723	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	CAPE PRINCE OF WALES TO POINT BARROW - ATON	POINT HOPE LIGHT (LLNR 28000.4)	68.331967	-166.525159	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	GOLOVNIN BAY - ATON	ROCKY POINT LIGHT (LLNR 27955)	64.396037	-163.149892	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KOTZEBUE SOUND - ATON	RILEY CHANNEL ENTRANCE LIGHT (LLNR 28000)	66.783357	-161.855085	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KOTZEBUE SOUND - ATON	CAPE ESPENBERG LIGHT (LLNR 27985)	66.557485	-163.60804	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KOTZEBUE SOUND - ATON	CAPE DECEIT LIGHT (LLNR 27995)	66.099035	-162.750468	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	KAKUKTAHUK PASS ENTRANCE LIGHT (LLNR 27874)	63.14926	-163.587142	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	YUKON RIVER NORTH ENTRANCE LIGHT (LLNR 27875)	63.040757	-163.379533	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	SHELDON POINT LIGHT (LLNR 27859.5)	62.539256	-165.020293	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	MEKORYUK BREAKWATER DAYBEACON 2 (LLNR 27859)	60.387532	-166.183943	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	YUKON RIVER SOUTH ENTRANCE LIGHT (LLNR 27860)	62.589365	-164.961663	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	KWIGUK PASS ENTRANCE LIGHT (LLNR 27865)	62.6018	-164.867913	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	YUKON RIVER MIDDLE ENTRANCE LIGHT (LLNR 27870)	63.073672	-164.633788	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	KUSKOKWIM RIVER - ATON	OKWEGA PASS LIGHT OP (LLNR 27872)	63.040947	-163.65577	Kodiak	AK	KODIAK ISLAND
Leased	Active	NORTON SOUND - ATON	EGG ISLAND LIGHT - LAND	63.611037	-161.743075	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	NORTON SOUND - ATON	POINT ROMANOF LIGHT (LLNR 27895)	63.199885	-162.833367	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	NORTON SOUND - ATON	CAPE STEPHENS LIGHT (LLNR 27900)	63.540883	-162.313627	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	NORTON SOUND - ATON	WHALE ISLAND LIGHT (27905)	63.490913	-161.997348	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	NORTON SOUND - ATON	EGG ISLAND LIGHT (LLNR 27910)	63.611037	-161.743075	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	NORTON SOUND - ATON	UNALAKLEET RIVER SOUTH SPIT LIGHT (LLNR 27920)	63.867569	-160.787679	Kodiak	AK	KODIAK ISLAND
Government Owned	Active	NORTON SOUND - ATON	SHAKTOOLIK RIVER ENTRANCE LIGHT (LLNR 27925)	64.378655	-161.236032	Kodiak	AK	KODIAK ISLAND
Leased	Active	KUSKOKWIM RIVER - ATON	YUKON RIVER NORTH ENTRANCE LIGHT - LAND	63.040833	-163.379444	Kotlik	AK	KUGILVAK
Leased	Active	KOTZEBUE NATIONAL GUARD FACILITY	KOTZEBUE NATIONAL GUARD FACILITY - LAND	66.882503	-162.607564	Kotzebue	AK	NORTHWEST ARCTIC
Leased	Active	KOTZEBUE NATIONAL GUARD FACILITY	KOTZEBUE HANGAR	66.882331	-162.607618	Kotzebue	AK	NORTHWEST ARCTIC
Leased	Active	KOTZEBUE SOUND - ATON	RILEY CHANNEL ENTRANCE LIGHT - LAND	66.783357	-161.855085	Kotzebue	AK	NORTHWEST ARCTIC
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	SLEDGE ISLAND LIGHT (LLNR 1340)	64.496336	-166.198947	Nome	AK	NOME
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	SLEDGE ISLAND LIGHT - LAND	64.496336	-166.198947	Nome	AK	NOME
Leased	Active	GOLOVNIN BAY - ATON	CAROLYN ISLAND LIGHT - LAND	64.451081	-162.875078	Nome	AK	NOME
Leased	Active	HF, NOME	NOME HF COMMUNICATION SITE - LAND	64.4851	-165.253006	Nome	AK	NOME
Leased	Active	NOME HARBOR - ATON	NOME HARBOR RANGE FRONT LIGHT - LAND	64.503922	-165.423025	Nome	AK	NOME
Government Owned	Active	NOME HARBOR - ATON	NOME HARBOR RANGE FRONT LIGHT (LLNR 27972)	64.503922	-165.423025	Nome	AK	NOME
Government Owned	Active	NOME HARBOR - ATON	NOME HARBOR RANGE REAR LIGHT (LLNR 27973)	64.505114	-165.421431	Nome	AK	NOME
Leased	Active	NOME HARBOR - ATON	NOME HARBOR ENTRANCE LIGHT 1 - LAND	64.492663	-165.439618	Nome	AK	NOME
Leased	Active	NOME HARBOR - ATON	NOME HARBOR ENTRANCE LIGHT 2 - BREAKWATER	64.492778	-165.435833	Nome	AK	NOME
Government Owned	Active	NOME HARBOR - ATON	NOME HARBOR ENTRANCE LIGHT 2 (LLNR 27962)	64.492888	-165.435812	Nome	AK	NOME
Government Owned	Active	NOME HARBOR - ATON	NOME HARBOR ENTRANCE LIGHT 1 (LLNR 27963)	64.492663	-165.439618	Nome	AK	NOME
Leased	Active	CAPE PRINCE OF WALES TO POINT BARROW - ATON	POINT HOPE LIGHT - LAND	68.331967	-166.525159	Point Hope	AK	NORTH SLOPE
Government Owned	Active	PORT MOLLER - ATON	PORT MOLLER LIGHT 5 (LLNR 27575)	55.977959	-160.563079	Port Heiden	AK	LAKE AND PENINSULA
Leased	Active	PRIBILOF ISLANDS - ATON	ST. GEORGE HARBOR RANGE REAR LIGHT - LAND	56.570055	-169.664539	Saint George Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. GEORGE HARBOR RANGE FRONT LIGHT (LLNR 27625)	56.569361	-169.66975	Saint George Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. GEORGE HARBOR RANGE REAR LIGHT (LLNR 27626)	56.570055	-169.664539	Saint George Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. GEORGE HARBOR ENTRANCE LIGHT 1 (LLNR 27627)	56.56971	-169.67284	Saint George Island	AK	ALEUTIANS WEST

List of Coast Guard Real Property Assets within the Arctic

Assets pulled from SAM Q2 FY19

Legal Interest	Use of Asset	Type of Asset	AssetName	Latitude	Longitude	City	State	County
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. GEORGE HARBOR DAYBEACON 2 (LLNR 27828)	56.567975	-169.668365	Saint George Island	AK	ALEUTIANS WEST
Government Owned	Active	NORTON SOUND - ATON	WHALE ISLAND LIGHT - LAND	63.490913	-161.997348	Saint Michael	AK	NOME
Government Owned	Active	LORAN, ST PAUL ISLAND	LORSTA ST PAUL - LAND	57.150721	-170.248647	Saint Paul Island	AK	ALEUTIANS WEST
Government Owned	Active	LORAN-C PCMS, ST PAUL	PCMS SITE COMMS HUT	57.153444	-170.251722	Saint Paul Island	AK	ALEUTIANS WEST
Leased	Active	LORAN-C PCMS, ST PAUL	LORAN - LAND	57.154463	-170.221354	Saint Paul Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. PAUL HARBOR LIGHT 6 (LLNR 27832)	57.125369	-170.279601	Saint Paul Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. PAUL HARBOR DAYBEACON A (LLNR 27833)	57.126287	-170.280053	Saint Paul Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. PAUL HARBOR DAYBEACON B (LLNR 27834)	57.125973	-170.278584	Saint Paul Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. PAUL HARBOR JETTY LIGHT 4 (LLNR 27830)	57.128073	-170.288126	Saint Paul Island	AK	ALEUTIANS WEST
Government Owned	Active	PRIBILOF ISLANDS - ATON	ST. PAUL HARBOR JETTY LIGHT 3 (LLNR 27831)	57.12806	-170.28506	Saint Paul Island	AK	ALEUTIANS WEST
Leased	Active	R21, ST PAUL ISLAND	R21 NDS TOWER (70' SST)	57.167333	-170.204444	Saint Paul Island	AK	ALEUTIANS WEST
Leased	Active	R21, ST PAUL ISLAND	SHELTER SPACE	57.167333	-170.204444	Saint Paul Island	AK	ALEUTIANS WEST
Leased	Active	ST PAUL AIRFIELD	AIRCRAFT FUELING STATION - LAND	57.158112	-170.230308	Saint Paul Island	AK	ALEUTIANS WEST
Leased	Active	ST PAUL AIRFIELD	HANGAR 3	57.157869	-170.22971	Saint Paul Island	AK	ALEUTIANS WEST
Leased	Active	KOTZEBUE SOUND - ATON	CAPE ESPENBERG LIGHT - LAND	66.567486	-163.60804	Shishmaref	AK	NOME
Leased	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	GRANTLEY HARBOR DAYBEACON 2 - LAND	65.27679	-166.347665	Teller	AK	NOME
Leased	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	GRANTLY HARBOR LIGHT - LAND	65.27679	-166.347665	Teller	AK	NOME
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	POINT SPENCER LIGHT (LLNR 27975)	65.2772	-166.848957	Teller	AK	NOME
Government Owned	Inactive	LORAN, PORT CLARENCE	LORAN - LAND	65.241426	-166.86838	Teller	AK	NOME
Government Owned	Inactive	LORAN, PORT CLARENCE	RUNWAY	65.247315	-166.85804	Teller	AK	NOME
Government Owned	Inactive	LORAN, PORT CLARENCE	AIRCRAFT PARKING APRON	65.247278	-166.856943	Teller	AK	NOME
Government Owned	Active	ALASKA PENINSULA AND ALEUTIAN ISLANDS - ATON	UGAMAK ISLAND LIGHT - LAND	54.229135	-164.800432	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	CAPTAINS BAY - ATON	BAILEY LEDGE LIGHT (LLNR 27505)	53.869925	-166.5595	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	ILIULIUK HARBOR SOUTH CHANNEL DAYBEACON 11 (LLNR 27490)	53.875405	-166.546963	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	ILIULIUK HARBOR SOUTH CHANNEL DAYBEACON 12 (LLNR 27495)	53.875852	-166.548871	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	ILIULIUK HARBOR SOUTH CHANNEL DAYBEACON 13 (LLNR 27500)	53.875537	-166.549787	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	CARL E MOSES HARBOR LIGHT 1 (LLNR 27500.5)	53.867164	-166.553603	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	CARL E MOSES HARBOR LIGHT A (LLNR 27500.1)	53.869883	-166.550325	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	CARL E MOSES HARBOR LIGHT B (LLNR 27500.2)	53.869445	-166.550868	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	CARL E MOSES HARBOR LIGHT C (LLNR 27500.3)	53.86864	-166.552252	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	ILIULIUK HARBOR - ATON	CARL E MOSES HARBOR LIGHT D (LLNR 27500.4)	53.867619	-166.553683	Unalaska	AK	ALEUTIANS WEST
Leased	Active	INTERNATIONAL PORT OF DUTCH HARBOR(LEASED)	PIER	53.903645	-166.525712	Unalaska	AK	ALEUTIANS WEST
Government Owned	Active	UNALASKA ISLAND - ATON	ARCH ROCK LIGHT 3A (LLNR 27503) 2016	53.876648	-166.567011	Unalaska	AK	ALEUTIANS WEST
Leased	Active	CAPE PRINCE OF WALES TO POINT BARROW - ATON	CAPE PRINCE OF WALES LIGHT - LAND	65.633527	-168.119192	Wales	AK	NOME
Leased	Active	GOLOVNIN BAY - ATON	GOLOVNIN BAY LIGHT 4 - LAND	64.521111	-162.916944	White Mountain	AK	NOME

Question 2b. Are they sufficient?

ANSWER. The Coast Guard has made a significant investment and commitment to maintaining a robust presence in Alaska, as we continue to field new assets with modern capabilities and invest in adequate shoreside facilities to enable our front line operations.

With approximately 10% of the Coast Guard's real property inventory located in Alaska and the vast distances between units in the region, sufficient funding to invest in new facility construction and maintaining our existing plant is critical. With the support of Congress, the Coast Guard received funding and is in the planning stages to build out waterfront and maintenance facilities to support delivery of six new Fast Response Cutters and two Offshore Patrol Cutters to Alaska.

The Coast Guard was also funded to construct the first phase of housing to accommodate additional personnel and their families associated with new assets (i.e., OPC, FRC, HC-130J) being delivered to Kodiak. We are in the early stages of design work on those housing units now. Over the last few years, the Coast Guard also constructed a new hangar to support forward deployed helicopters in Cold Bay and new facilities to enable our transition from HC-130H aircraft to HC-130J aircraft in Kodiak.

As reflected on the unfunded priorities list (UPL), one of the Coast Guard's priorities in Alaska remains an additional phase of new family housing in Kodiak.

Question 2c. How do these bases interact with local community infrastructure?

ANSWER. The Coast Guard's primary operational interaction with local communities in the Alaskan Arctic is through Operation ARCTIC SHIELD, a year-round planning and operational endeavor which provides mobile and scalable presence in the Arctic. Last year's operations yielded many successes. We executed nearly 20 search and rescue cases, resulting in over 35 lives saved or assisted, and educated over 3800 local children on boating safety.

Through extensive engagements with other federal, state, local, and tribal agencies, we performed mass rescue, oil spill, and ice rescue exercises; conducted search and rescue training; positioned assets during cruise ship transits; and performed safety and compliance examinations.

These capacity-building collaborations would not be possible without leveraging the existing infrastructure in local Alaska communities as a force multiplier. For example, as part of that temporary footprint, this year we will again use "Forward Operating Location Kotzebue," an Army National Guard hangar we've leased, as a staging base for rotary-wing assets to support our full suite of missions in the Arctic. Utilizing existing facilities whenever possible removes the need to construct, maintain, and staff permanent infrastructure in arduous and often remote areas.

QUESTIONS FROM HON. RICK LARSEN FOR ADMIRAL CHARLES W. RAY, VICE COMMANDANT, U.S. COAST GUARD

Question 1. When the new icebreaker is delivered, how will you balance missions in the Arctic and Antarctic? Why is it so vital to have three heavy and three medium icebreakers?

ANSWER. The High Latitude Mission Analysis Report determined that a minimum of six polar icebreakers, at least three of which need to be heavy icebreakers, are needed to provide year round assured access to the Arctic, and seasonal access to the Antarctic. Cutter capacity demand is driven by the seasonality of employment taking into account platform types, deployment lengths, and required post-deployment ship maintenance and replenishment time requirements. Missions for Polar Security Cutters (PSCs) will be determined by the operational need across the range of Coast Guard authorities and responsibilities, as well as the interagency needs of our federal government partners. Annual support of OPERATION DEEP FREEZE is planned to continue. Medium and heavy icebreakers will be used in the Arctic year round to provide presence and promote maritime safety, security, and stewardship.

Question 2. What resources does the Coast Guard have to respond to an oil spill in the Arctic? Do you need additional resources?

ANSWER. The Coast Guard serves as the Federal On-Scene Coordinator for oil spill response in the coastal zone of the United States. The Oil Pollution Act of 1990 requires owners or operators (plan holders) of certain oil-handling facilities and applicable tank vessels and non-tank vessels to prepare and submit response plans to the Coast Guard. Commercially available response resources in the Arctic are critical and provide the primary response capability. Under Vessel and Facility Response Plan regulatory requirements, owners/operators must ensure personnel with adequate resources can respond to oil spills in the coastal waters of Alaska.

The USCG conducts oil spill planning efforts through the National and Regional Response Teams (NRT and RRT) and Area Committees. Sector Juneau, Sector Anchorage, and Marine Safety Unit Valdez provide incident management personnel and expertise to mitigate and respond to oil spills. The Seventeenth Coast Guard District and its subordinate units maintain contingency plans that align with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR § 300) to strengthen response efforts within the state.

While industry is the primary provider of oil spill response equipment, the Coast Guard's National Strike Force and other Deployable Specialized Forces are available to provide oil spill response expertise and have access to pre-positioned oil response equipment staged around the state of Alaska. This pre-positioned equipment includes 51 caches of pollution response equipment across eighteen local coastal communities to mitigate potential impacts to shorelines in the event of a spill.

Question 3. Besides icebreaking, can you provide specific examples of other capability gaps in the region like weather forecasting, communications, aids to navigation, and ice forecasting? How do these gaps make operating in the Arctic different from operating in other U.S. territorial waters?

ANSWER. In 2018, the Coast Guard sponsored research by the Homeland Security Operational Analysis Center/RAND Corporation into potential gaps in U.S. Arctic capabilities. This study gave an independent and objective analysis of the Coast Guard's current and future state to effectively conduct statutory missions in the Arctic. The study identified three potential gaps as well as a fourth gap that deals with how the Service addresses gaps.

The first gap involves limitations in voice and data communications due to sparse infrastructure, vast distances, weather conditions, fewer satellites in the polar orbits, and atmospheric conditions in the high latitudes. The Coast Guard continues to work with the Department of Homeland Security in a whole-of-government effort to improve communications.

The second gap noted by RAND is a lack of consistent awareness regarding threats and hazards, such as poorly chartered waters and the potential for fast-moving ice and low visibility. The Coast Guard continues to address lessons learned from Operation Arctic Shield to better identify threats and hazards in the region. Operation Arctic Shield also includes operational surges during peak activity periods and provides a mobile, scalable presence to reduce risk.

The third gap noted in the study relates to challenges in incident response ability, due in part to the limited number of assets and ability to sustain operations once on scene. Some of the same communications limiting factors also impact these capacity issues. To optimize our response resources, the Coast Guard will continue Operation Arctic Shield to conduct mobile and scalable operations. We will also continue to collaborate with other federal, tribal, state, and local partners to improve maritime operations. The Coast Guard is also committed to supporting international forums such as the Arctic Coast Guard Forum to leverage the expertise and capabilities other Arctic nations can bring to bear during a response.

Lastly, the RAND study noted an inability to effectively articulate Coast Guard needs and risks in the Arctic. In April 2019, the Coast Guard released an updated Arctic Strategic Outlook, which articulates the Service's long-term Arctic vision and describes the accelerating national security, economic, and environmental risks and opportunities in the region. The Strategic Outlook reaffirms the Coast Guard's commitment to American leadership in the region through partnership, unity of effort, and continuous innovation.

Question 4. How will you "strengthen partnerships" when our Arctic partners are clear-eyed about climate change, but the U.S. is not?

ANSWER. In accordance with the Coast Guard's 2019 Arctic Strategic Outlook, the Service partners with the other Arctic nations as well as other partners and allies with aligned Arctic interests and values to promote a conflict-free region where international law and respect for sovereignty are upheld.

As part of our ongoing efforts to strengthen regional partnerships, the Coast Guard currently conducts extensive engagements with a broad portfolio of Arctic partners and stakeholders. These include: Operation Arctic Shield; regular interagency, intergovernmental, and international meetings; and routine international engagements such as through the Arctic Coast Guard Forum (ACGF) and non-governmental Arctic forums.

The Coast Guard continues to assert leadership in the region by strengthening partnerships across the Arctic community of international, federal, tribal, state, and local agencies and stakeholders. The Coast Guard plays a leadership role in multilateral organizations focused on Arctic governance, such as the International Maritime Organization (IMO), as well as the operationally-focused ACGF. The Service

also cooperates with Arctic allies and partners through combined operations and exercises to safeguard and secure the Arctic domain.

Question 5. How does the Coast Guard plan to incorporate resiliency into plans for future ports and shoreside infrastructure in the Arctic? How will resilient infrastructure design impact the United States' presence in the region?

ANSWER. As Coast Guard facilities and assets are planned for recapitalization, resiliency for natural disasters is factored into facility plans and designs. Additionally, Coast Guard shore infrastructure is constructed in accordance with international and local building codes when there are more stringent codes due to localized vulnerabilities such as natural disasters. The Coast Guard also incorporates operational readiness requirements (backup communications, logistic chains, etc.) into facilities through the planning, design, and construction processes.

Question 6. How is the Coast Guard collaborating with indigenous groups in the U.S. Arctic to balance their sovereignty and subsistence hunting needs with the growing presence of large vessels?

ANSWER. Alaska Natives have unique knowledge of the Arctic region that is of critical importance to those who work and operate there. The Coast Guard works closely with Alaska Native communities to better understand and serve the region. To facilitate this collaboration, Coast Guard liaisons meet regularly with Alaska Native communities, both locally and at Coast Guard Headquarters in Washington, DC.

Each year during Operation Arctic Shield, the Coast Guard conducts training, education, and outreach to local communities. During Arctic Shield 2019, the Coast Guard participated in boating safety events throughout the Arctic region and hosted numerous community service events and tours of Coast Guard assets to increase awareness and information exchanges. The Coast Guard also provided ice rescue training and fishing vessel safety training prior to the Kotzebue salmon season. Additionally, the Coast Guard forward deployed two MH-60 aircraft to Kotzebue to provide expanded search and rescue coverage, maritime domain awareness, and living marine resources operations.

The Coast Guard also played a large role in forming the Arctic Waterway Safety Committee, one of approximately 300 harbor safety committees nationwide. These committees provide a forum to discuss local marine interests and act collectively to develop best practices for a safe, efficient, and predictable operating environment for all stakeholders. The Arctic Waterway Safety Committee charter includes voting members from all five subsistence co-management groups (i.e., Bowhead Whale, Walrus, Polar Bear, Ice Seal, and Beluga Whale). Active Coast Guard participation during these meetings fosters communication and understanding of areas of possible conflict with subsistence activities.

Additionally, the Bering Strait Port Access Route Study, and resultant International Maritime Organization actions to establish voluntary two-way routes through the Straits, addressed, in part, sensitive coastal waters and the subsistence activities of local residents when identifying the safest transit routes for large vessels through the area. When completing this study, the Coast Guard conducted significant community engagement and received extensive input from local residents and their representative groups to identify their concerns and experience/knowledge in this area. The resulting guidelines will improve navigational safety while protecting breeding areas and nurseries vital to Arctic marine mammals and the traditional way of life for Alaska Natives, including subsistence hunting grounds.

QUESTION FROM HON. ALAN S. LOWENTHAL FOR ADMIRAL CHARLES W. RAY, VICE COMMANDANT, U.S. COAST GUARD

Question 1. What efforts are the Coast Guard making to assess current and predicted vessel traffic in the region and—if warranted—recommend measures to improve maritime safety and environmental protection for Arctic species?

ANSWER. The Coast Guard assesses Arctic vessel activity and trends through a variety of means. At the tactical level, the Coast Guard uses all source fusion intelligence, tracks, and databases to monitor vessel activity in the Arctic areas of interest. The Coast Guard derives this information from sources such as satellite and terrestrial Automatic Identification System data, exchanges with Canadian counterparts, open-source research, and other classified means.

Additionally, the Coast Guard assesses vessel traffic trends through area committee engagements. The Coast Guard played a key role in establishing, and is very active in, the Arctic Waterway Safety Committee, one of more than 300 harbor safety committees nationwide. The purpose of these committees is to bring together stakeholders and local marine interests within a single forum to discuss vessel traf-

fic projections and implications from multiple perspectives. The Arctic Waterway Safety Committee also includes voting members from all five subsistence co-management groups (i.e., Bowhead Whale, Walrus, Polar Bear, Ice Seal, and Beluga Whale), which fosters communication and understanding of potential conflicts regarding subsistence activities.

The Coast Guard also conducts Port Access Route Studies to assess and enhance navigational and environmental safety and—in the case of the Arctic region in particular—to reconcile the right of navigation with other waterway uses such as subsistence hunting and fishing. For example, the Coast Guard recently completed the Bering Strait Port Access Route Study. During this study, the Coast Guard engaged extensively with international, federal, tribal, state, and local leaders to better understand vessel traffic trends and other factors that may impact navigational safety. As a result of this study, the Coast Guard proposed six two-way routes and six precautionary areas in the Bering Sea and Bering Strait. Approved by the International Maritime Organization (IMO) and implemented in December 2018, these measures reduce the likelihood of maritime casualties such as collisions, oil discharges, and hazardous material releases which may threaten the marine environment, including many endangered species and remote indigenous communities that rely on traditional subsistence activities.

QUESTIONS FROM HON. SEAN PATRICK MALONEY FOR REAR ADMIRAL SHEPARD M. SMITH, DIRECTOR, OFFICE OF COAST SURVEY, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Question 1. What resources does NOAA have to model and predict ice movement, or the movement of oil spills in Arctic waters? Are these models sufficient for commercial use?

ANSWER. The National Weather Services' Alaska Sea Ice Program (ASIP) produces ice analysis and other decision support services for customers and partners operating in the Bering Sea and Arctic Ocean. NOAA also operates the National Ice Center (NIC) in partnership with the U.S. Navy and the U.S. Coast Guard. The NIC provides global to tactical scale ice and snow products, ice forecasting, and other environmental intelligence services for the United States government. It coordinates closely with the Canadian government on ice-related activities.

NOAA's Office of Response and Restoration provides oil spill modeling during coastal oil spills in support of the Federal On-Scene Coordinator, usually the U.S. Coast Guard. NOAA uses the General NOAA Operational Modeling Environment (GNOME) to predict oil movement and weathering in a wide range of situations including those with sea ice. GNOME incorporates the latest operational current models, ice models, wind models, and real time observations. NOAA then predicts oil behavior with GNOME. The GNOME tool and source code are freely available to the public and commercial sectors.

NOAA enhances its ability to predict the movement of oil in ice by working with partners to ensure that as more predictive models become operational, they can be drawn into GNOME. Recently, NOAA has worked with the DOI Bureau of Safety and Environmental Enforcement, the National Fish and Wildlife Foundation, and the Department of Homeland Security Arctic Domain Awareness Center (ADAC). GNOME can now ingest the Navy's Global Operational Forecast System operational model, including ice variables.

NOAA's oil and ice modeling capabilities have improved greatly over the past six years in order to be ready for anticipated increases in vessel traffic and the related risks to people and the environment. However, the services we provide rely heavily on the advancement of the entire observing and modeling community, including efforts and investments of other agencies such as the NASA, the National Science Foundation, and the Departments of Energy and Interior, and on the physical and chemical observations needed to validate the models. Some areas remain problematic. For example, observation of oil location and extent from satellite imagery is nearly impossible under a large area of continuous ice and even difficult in just ice infested water.

Question 2. What unique conditions exist in the Arctic that complicate oil recovery? Do we have the resources to address those issues?

ANSWER. The unique conditions that complicate oil recovery can be summed up by a 2014 National Academies of Science consensus report on the current state of science and engineering regarding oil spill response and Arctic marine environments: "*Arctic oil spill response is challenging because of extreme weather and environmental conditions; the lack of existing or sustained communications, logistical, and information infrastructure; significant geographic distances; and vulnerability of Arctic species, ecosystems, and cultures. A fundamental understanding of the dy-*

namic Arctic region . . . is needed to help guide oil spill response and recovery efforts. Information on physical processes—including ocean circulation, ice cover, marine weather, and coastal processes—is important to frame the environmental context for the Arctic ecosystem and can help responders predict where oil will spread and how weathering might change its properties." (National Research Council 2014. Responding to Oil Spills in the U.S. Arctic Marine Environment.)

NOAA works closely with other Federal agencies with statutory responsibilities, along with state and local partners, to leverage resources and capabilities in the event of oil spills. For instance, the Oil Pollution Act of 1990 requires owners or operators of certain oil-handling facilities and applicable tank vessels and non-tank vessels to prepare and submit oil and hazardous materials spill response plans to the Coast Guard.

QUESTIONS FROM HON. RICK LARSEN FOR REAR ADMIRAL SHEPARD M. SMITH, DIRECTOR, OFFICE OF COAST SURVEY, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Question 1. How will UAS improve NOAA's surveying and charting capabilities and what are the challenges of using UAS in the Arctic? Are you coordinating with the FAA?

ANSWER. NOAA's Office of Coast Survey is currently developing small Unmanned Aircraft System (UAS) capabilities to augment our shoreline mapping efforts, where the speed and remote operation of UAS can increase the safety of acquiring data while providing a more comprehensive data product than what is currently collected from small boats. With UAS, we have the ability to create a shoreline terrain model, which is of particular interest in the Arctic for analysis of erosion and storm surge. In addition, NOAA's National Geodetic Survey is currently testing small UAS systems to facilitate the transition from research to operations.

Large UAS systems (with medium altitude and long endurance) can also be very effective in remote areas such as Alaska and the Arctic, which would improve the efficiency of shoreline and photogrammetry surveys. They could also support lidar sensors for shallow water bathymetric mapping in coastal regions. However, many of these systems are not currently capable of ship based operation, precluding use in remote areas. This effort is coordinated with the FAA through NOAA's Office of Oceanic and Atmospheric Research UAS Program Office, and platform certification is performed in association with NOAA's Aircraft Operations Center under the Office of Marine and Aviation Operations (OMAO). OMAO provides trained UAS pilots and operational expertise to investigate new technologies and applications for UAS, and this year, OMAO is expanding those efforts with its new Unmanned Systems Operations Program. The new program provides centralized coordination, support and guidance for unmanned marine and aircraft systems across NOAA, evaluates emerging Unmanned Systems technologies, and determines where opportunities exist to cost-effectively carry out NOAA mission-critical activities. The Unmanned Systems Operations Program's work will inform future acquisitions of UAS. Among the options, OMAO is investigating hybrid quadrotor unmanned aircraft that can be launched from ships and have longer endurance to meet a variety of NOAA missions, which has already been tested onboard NOAA ships.

Question 2. Why is NOAA's work important to help indigenous and commercial mariners cooperatively operate in the Arctic?

ANSWER. NOAA's work is important in assisting Native Alaskan communities because most rely on subsistence fishing and hunting of marine mammals, and changes in ice and vessel traffic are creating a direct impact to their way of life. As the Arctic ice continues to retreat, increased fishing and shipping will create a greater likelihood of conflict between commercial mariners and Native Alaskans. NOAA's service can provide data to inform decisions and reduce the potential for conflict.

Question 3. What steps are you taking to address coastal and inland flooding in the Arctic? Is federal funding sufficient for these efforts? If not, what do you need?

ANSWER. NOAA is working to improve its observation networks and forecasting capabilities to better predict coastal and inland flooding, and to improve decision support services to those in vulnerable remote Alaskan communities. One key factor in forecasting coastal flooding is accurately predicting sea ice, which has a dampening effect on waves.

The National Ice Center (NIC), a partnership among NOAA, the U.S. Navy, and U.S. Coast Guard, provides sea ice assessments for the Arctic. The NIC uses data from NOAA JPSS and Geostationary Operational Environmental Satellites-West (GOES-West), Department of Defense (DoD) weather satellites, European and Japa-

nese satellites, and purchased data from the commercial sector to support its mission. These data are provided directly to users in Alaska to support environmental monitoring and weather forecasts by the NWS. Data from these satellites will improve the timing and accuracy of weather and hazard forecasts out to seven days, including better predictions for fog, ice formations, coastal and inland flooding, and ice breaking in the Arctic.

Moreover, NOAA is focusing on the science fundamentals to improve coupled water, ice, atmosphere models. Areas where further research and understanding are needed are the stable Arctic boundary layer, interactions between the oceans, ice, and atmosphere in the marginal ice zone, riverine impacts to ice, and troposphere-stratosphere interactions. These activities will improve NOAA's ability to forecast the weather, Arctic sea ice, and coastal and inland flooding.

NOAA believes the level of funding committed to improving these capabilities is currently sufficient.

QUESTIONS FROM HON. ALAN S. LOWENTHAL FOR REAR ADMIRAL SHEPARD M. SMITH, DIRECTOR, OFFICE OF COAST SURVEY, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Question 1. What resources does NOAA have to model and predict ice movement, or the movement of oil spills in Arctic waters? Are these models sufficient for commercial use?

ANSWER. See response to Maloney 1.

QUESTIONS FROM HON. SEAN PATRICK MALONEY FOR COLONEL PHILLIP J. BORDERS, COMMANDER, ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS

Question 1. What infrastructure is needed to support vessels operating in the Bering, Chukchi, and Beaufort seas?

ANSWER. Response was not received at the time of publication.

Question 2. What is the Army Corps experience working in the Arctic, and are engineers sufficiently trained to design adaptive infrastructure for a more dynamic Arctic environment?

ANSWER. Response was not received at the time of publication.

QUESTIONS FROM HON. RICK LARSEN FOR COLONEL PHILLIP J. BORDERS, COMMANDER, ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS

Question 1. What steps are you taking to address coastal and inland flooding in the Arctic? Is federal funding sufficient for these efforts? If not, what do you need?

ANSWER. Response was not received at the time of publication.

QUESTIONS FROM HON. SEAN PATRICK MALONEY FOR ADMIRAL THAD W. ALLEN, U.S. COAST GUARD (RET.)

Question 1. Has the Administration's refusal to acknowledge climate change hindered our efforts in the Arctic?

ANSWER. There is no singular view on climate change in the federal government so I would hesitate to use the term "Administration." There are many subject matter experts throughout government that understand the science associated with climate change and are concerned, as we all should. There are also a number of high-ranking officials, many with no scientific or academic credentials that question global warming or climate change. Our inability to address long standing issues in the Arctic span administrations and political parties. Even when consensus is achieved in the Executive or Legislative Branches, creating and implementing policy or passing legislation has not been accomplished. As a result, the Arctic and the rest of the globe are paying the price for inaction. Finally, until recently there was institutionalized resistance in OBM to create and fund programs of record to address ice breaking needs, infrastructure improvements, and navigational improvements. We all collectively own the problem of climate change. But, because agency's authorities and jurisdictions are comingled as are authorization and appropriations responsibilities in the Congress, there is no single point of accountability. The situation is further complicated by state, local, and tribal interests which must be considered. While it is tempting to ascribe the current Administration's "refusal to acknowledge climate change" as the problem, short sided and myopic views that are political driven are neither the cause or the cure for needed change in the Arctic, they are just the latest reason by a number of "Administrations" to do nothing. The current administration chose not to continue the Arctic Executive Steering Committee created in the previous administration and the Secretary of State spoke about shrinking sea

ice as "new opportunities for trade" at an Arctic Council Ministerial. Disturbing? Yes—but so was 8 years of failing to fund icebreakers and defunding modernized LORAN in Alaska by the prior administration. It is time to stop admiring the problem and do something.

Question 2. What role could port and maritime transportation infrastructure play in facilitating international cooperation and regional economic development?

ANSWER. An Arctic deep-water port would provide logistics for shipping and a forward operating base to respond to incidents, stage patrols, refuel ships and aircraft, and improve navigation and communications. These capabilities and infrastructure would reduce the risks to maritime commerce and facilitate trade and other uses of an Arctic with greater access.

QUESTION FROM HON. ALAN S. LOWENTHAL FOR ADMIRAL THAD W. ALLEN, U.S. COAST GUARD (RET.)

Question 1. What types of oversight might reduce the likelihood of an oil spill in this region?

ANSWER. First, let me be clear, there is no risk-free way to extract carbon fossil fuel from the earth. The level of oversight should be commensurate with the risk acceptance of the public and that varies by region. Assuming increased oil production will occur in the Arctic in the future, I would emphasize the basic points I made to the Congress and Presidential Commission following the Deepwater Horizon oil spill where I was the National Incident Commander.

1. There needs to be independent, third party inspection of drilling systems similar to inspections required for aircraft and vessels. Attempts to create such a system have been curtailed by the current administration. Industry standards created the systems in use on the Deepwater Horizon and they failed. This is beyond the Committee's jurisdiction and lies in oversight of the Department of Interior and the Bureau of Safety and Environmental Enforcement (BSEE).
2. Standby response equipment and well containment equipment must be available and deployable within a reasonable timeframe. Again, these standards will be driven by risk acceptance.
3. There are no forward operating bases or infrastructure to support a large-scale spill response in the Arctic. Until that infrastructure is in place deployable platforms like icebreakers must be available to establish presence, command and control, logistics, and air support.

QUESTIONS FROM HON. ANTHONY G. BROWN FOR ADMIRAL THAD W. ALLEN, U.S. COAST GUARD (RET.)

Question 1. What infrastructure investments can we make now to lower the "cost of doing business" in the Arctic in the long-run?

ANSWER. Investments should be focused on basic, enabling infrastructure that benefits multiple users and reflects broad stakeholder engagement, investments that create an enabling or multiplier effect for follow on investment. Included are ports, connecting highways and/or rail, communications, navigation systems, emergency response capability, weather observing, environmental sensing, and workforce development. This will require a balance of the art of the possible and what is needed in the long term. For example, deepening the Port of Nome is possible but may not achieve the long-term depth needed for larger vessels to operate further north than current ports at Dutch Harbor and Kodiak. That said, a deep-waster port with no interior access via roads has limited capability. Communications, navigation and emergency services serve all communities and commercial activities.

Question 2. What is a reasonable timetable to initiate broad infrastructure investments that will enable a ready Federal presence?

ANSWER. The comprehensive, long term investment plan needed for the Arctic is an exercise in applied civics and governing that involves all stakeholders and, above all, a consensus. I do not believe the elements needed to create and execute that plan exist today. Successful efforts in the past (Apollo Space Program, South Pole Station and associated Antarctic infrastructure at Palmer Station and McMurdo Sound, intercontinental railroad, transatlantic telegraph) had three components: diverse stakeholders, consensus, and predictable funding. They also had a single, empowered entity to execute the plan. The Navy originally explored the Antarctic and built the South Pole Station in the 1950s. That program was ultimately transferred to the National Science Foundation where it has been stabilized and now operates under an effective long-term plan. Such a program could be a public-private venture or a regional authority (Port of NY/NJ). Thought could also be given to international agreements with regional partners. At any rate, I would recommend immediate

focus be given to the governing structure that could create and implement the desired plan.

QUESTIONS FROM HON. SEAN PATRICK MALONEY FOR HEATHER A. CONLEY, SENIOR VICE PRESIDENT FOR EUROPE, EURASIA, AND THE ARCTIC, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Question 1. Has the Administration's refusal to acknowledge climate change hindered our efforts in the Arctic?

ANSWER. Yes and no. Yes, it has harmed the U.S. in that, rather than lead the policy direction and course of the Arctic Council, last month we unnecessarily wasted political capital on preventing ministerial statements, making Russia and China look like environmental stewards, and further isolating the U.S. diplomatically. Thankfully, bipartisan support in Congress has allowed the United States to continue to fund its science activities in the polar regions but again, these activities are not directed to enhance and strengthen U.S. policies and decisions in the Arctic.

No, whether you believe in climate change or not, this does not prevent the administration from taking decisions related to the safety, protection, and defense of U.S. territorial waters, its Exclusive Economic Zone, and its territory by ensuring the U.S. has the necessary icebreakers, maritime domain awareness assets, and deep-water ports to successfully manage the emergence of an increasingly ice-free Arctic Ocean.

Question 2. What role could port and maritime transportation infrastructure play in facilitating international cooperation and regional economic development?

ANSWER. As noted above, it will play a significant role. The Bering Strait will experience an uptick in maritime traffic, particularly bulk and LNG carriers. Without proper infrastructure, the risk of casualties or and environmental catastrophe grows, which could devastate U.S. waters and coastline and harm Alaska's economic potential. With enhanced infrastructure, Alaska can play an important role in the future of Arctic maritime transportation, particularly as vessels will increasingly use the Bering Straits to access either the Northern Sea Route (NSR) or the Transpolar route to connect markets in Northern Europe and Asia. This infrastructure will also help reduce IUU fishing activity in the Bering Sea and northern Pacific Ocean. A 2017 CSIS report titled, "Maritime Futures: The Arctic and the Bering Strait Region," [https://csis-prod.s3.amazonaws.com/s3fs-public/publication/171027_Conley_MaritimeFutures_Web.pdf?mHPGy0uKqRMcek0zw6av5jI332MeELk5] further discusses the need for updated maritime infrastructure in greater detail.

QUESTIONS FROM HON. RICK LARSEN FOR HEATHER A. CONLEY, SENIOR VICE PRESIDENT FOR EUROPE, EURASIA, AND THE ARCTIC, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Question 1. Shifting the focus away from economic opportunity in a more accessible Arctic, can you speak to the global economic losses associated with climate change, from sea level rise, drought, instability, and natural disasters?

ANSWER. It is difficult to calculate the global economic losses due to climate change. We only can attempt to calculate the costs of relocating cities and towns from America's coasts due to sea level rise from the massive calving of the Greenland Ice Sheet. Wildfires in the Arctic will increase smoke and particulate pollution in mid-latitude climates as the Arctic tundra dries, coupled with increased lightning strikes due to storm severity. There are also significant reconstruction costs for roads, railroad, pipelines, runways, and buildings constructed on rapidly melting permafrost in the Arctic. Permafrost thaw increases methane and C02 release into the atmosphere. Mid-latitude climates appear to be deeply impacted by the upward and downward lobes of a weakening jet stream which typically makes Alaska warmer in the winter and the continental U.S. colder, increasing home fuel costs. In the summer, this phenomenon reverses, causing more severe heat waves or cooling patterns depending on location. Finally, there are potential significant losses in ocean food sources due to ocean acidification and the increase in microplastics.

Question 2. Are China's motivations for increasing Arctic presence strategic, economic, or both?

ANSWER. Both. Strategically, Beijing wants to ensure that it has full access to Arctic resources (natural, mineral and protein resources) and cannot be denied access by the five Arctic coastal states. It wisely uses a variety of international organizations, like the Arctic Council, to shape the organization's agenda and influence its future course of development. As it works multilaterally, it enhances its economic weight bilaterally with Arctic states by investing in Arctic economies, funding key

infrastructure (rail, ports, undersea cables), investing in scientific centers across the Arctic, and giving generously to indigenous populations. As a new region to develop and expand its Belt and Road Initiative (the so-called "Polar Silk Road"), China views the Arctic as a future maritime transit route to European markets and alternative to the Straits of Malacca. It is particularly interested in rare earth minerals in Greenland and energy resources from the Yamal peninsula.

QUESTION FROM HON. ALAN S. LOWENTHAL FOR HEATHER A. CONLEY, SENIOR VICE PRESIDENT FOR EUROPE, EURASIA, AND THE ARCTIC, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Question 1. What types of oversight might reduce the likelihood of an oil spill in this region?

ANSWER. To reduce the likelihood of an oil spill in the Arctic, it is essential that international energy companies employ the highest safety and regulatory standards possible when operating in the Arctic *and* that there is sufficient infrastructure and capabilities that can be deployed immediately alongside highly trained personnel in response to a spill. The U.S. Coast Guard does not have sufficient infrastructure and capabilities to meet this requirement. The Coast Guard should increase the number of its forward operating locations in Alaska as well as increase hangar space and aviation assets. Unfortunately, the U.S. Coast Guard currently relies on outdated capabilities and thinly resourced budget which equated to a seasonal presence (July-October). Congress should do more the make sure resources are properly allocated and priorities identified to improve overall U.S. presence and reduce the likelihood of incidents in the region.

QUESTIONS FROM HON. ANTHONY G. BROWN FOR HEATHER A. CONLEY, SENIOR VICE PRESIDENT FOR EUROPE, EURASIA, AND THE ARCTIC, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Question 1. What infrastructure investments can we make now to lower the "cost of doing business" in the Arctic in the long-run?

ANSWER. We must invest now in Arctic infrastructure to lower future costs and protect the American Arctic. This begins by enhancing U.S. icebreaking capabilities, increasing satellite coverage to support improved domain awareness, developing a deep-water port in the American Arctic, and increasing the number of Coast Guard forward operating locations in the Arctic that can be staffed year-round rather than only during the summer months. Congress should also insist that the U.S. Navy has ice-strengthened surface vessels in its fleet, increase the number of live search and rescue exercises in the American Arctic, and encourage public-private partnerships to help develop needed infrastructure. The 2017 CSIS report titled, "Maritime Futures: The Arctic and the Bering Strait Region," [https://csis-prod.s3.amazonaws.com/s3fs-public/publication/171027__Conley__MaritimeFutures__Web.pdf?mHPGy0uKqRMcek0zw6av5jI332MeELk5] further discusses these investments in greater detail.

Question 2. What is a reasonable timetable to initiate broad infrastructure investments that will enable a ready Federal presence?

ANSWER. This should have occurred a decade ago. The United States is late to need to defend its sovereignty in the Arctic. Other nations have pursued their ambitious agendas. Congress should articulate a multi-year budget to enhance U.S. capabilities in the Arctic beginning with modern and multi-use icebreaking capabilities, enhanced satellite communications, and a deep-water port. This "bare minimum" investment should allow the U.S. to protect its most essential interests in the Arctic.

QUESTIONS FROM HON. SEAN PATRICK MALONEY FOR ABBIE TINGSTAD, PH.D.,[1] SENIOR PHYSICAL SCIENTIST, THE RAND CORPORATION [2]

Following the hearing on May 8, 2019, the congressional committee sought additional information and requested answers to the questions in this document. The answers were submitted for the record. An important caveat to the answers presented herein is that these do not address some of the major relevant policy and fiscal ques-

[1] The opinions and conclusions expressed in this addendum are the author's alone and should not be interpreted as representing those of the RAND Corporation or any of the sponsors of its research.

[2] The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

tions surrounding U.S. Arctic strategy that remain unanswered. The research that I discussed during the subcommittee hearing and that informs the answers to the questions posed below primarily addresses operational issues and the capabilities needed to address them. Therefore, the responses here do not constitute policy recommendations. I have followed the policy context in cases where the questions posed presume one.

Question 1. Has the Administration's refusal to acknowledge climate change hindered our efforts in the Arctic?

ANSWER. My research has not explicitly examined the current administration's positions on the Arctic. What I can say is that awareness of the Arctic and appreciation for the significance of climate change impacts (on sea ice especially but also, for example, on permafrost melt) among planners and operators concerned with the region appears to have endured (e.g., in the U.S. Coast Guard's and U.S. Navy's Arctic strategy documents), based on my continued engagement with this community. According to the analysis that my colleagues and I conducted on Arctic cooperation mechanisms, the Secretary of State's discussion of security issues at the May 2019 Arctic Council Ministerial Meeting in Rovaniemi, Finland, and the lack of a joint declaration at the conclusion of this event appear to be departures from the historical pattern of engagement at this venue.

Question 2. What role could port and maritime transportation infrastructure play in facilitating international cooperation and regional economic development?

ANSWER. Because of the confluence of change drivers, such as climate and economic opportunity, in the Arctic surface maritime environment, nation-states and other stakeholders (e.g., commercial companies, indigenous populations) may increasingly interact there. Port and maritime transportation infrastructure is needed to contribute to the region's economic growth, as well as to enable regional search and rescue, environmental response, and law enforcement activities. Without these support functions, Arctic economic growth will be limited, or the region will face high risks of experiencing safety, environmental hazards, or other significant incidents that could undermine prosperity. Port and maritime infrastructure will help operationalize international agreements (e.g., for search and rescue) and further enable opportunities for international economic partnering. Before making major infrastructure investment decisions, stakeholders should consider the possible political implications (e.g., Arctic populations' negative reactions to recent Chinese efforts to invest in their territories), as well as potential negative consequences to local communities.

QUESTIONS FROM HON. ALAN S. LOWENTHAL FOR ABBIE TINGSTAD, PH.D., SENIOR PHYSICAL SCIENTIST, THE RAND CORPORATION

Question 1. What types of oversight might reduce the likelihood of an oil spill in this region?

ANSWER. Oil spills are not an explicit focus of my research. Generally speaking, however, stakeholders express concern about appropriately shaping regulations and enabling the enforcement of those regulations through organizing, training, and equipping the right people, particularly those with oversight responsibilities (e.g., personnel at the U.S. Coast Guard, the Department of the Interior, and the Environmental Protection Agency). International cooperation on oil spill prevention and mitigation through the auspices of the Arctic Council, construction of the Polar Code, and other means have been promising. In our research on potential U.S. Coast Guard Arctic gaps, we assessed that the following steps, among others, would better enable oil spill prevention and response:

- Review requirements for industry "self-help" or organic response mechanisms.
- Pre-position response supplies in local communities.
- Develop additional mechanisms to leverage autonomy.

An additional area of concern is the lack of information about the potential for large spills in the region, the current capability and capacity among partners to remedy any spills, and the variety and severity of environmental impacts that large spills could have. Much remains to be learned about Arctic ecosystems and the environment.

Question 2. What impacts will an increase in maritime traffic have on communities that subside on ocean mammals like bowhead whales?

ANSWER. This is an important question for Arctic community resilience. My research has not looked at this issue. However, the immediate and higher-order impacts of maritime infrastructure development and traffic on ecosystems is undoubtedly a key consideration for future planning and an important area for continued

discussion and research with international and other partners, given the high level of physical connectivity in the Arctic.

QUESTIONS FROM HON. ANTHONY G. BROWN FOR ABBIE TINGSTAD, PH.D., SENIOR PHYSICAL SCIENTIST, THE RAND CORPORATION

Question 1. What infrastructure investments can we make now to lower the "cost of doing business" in the Arctic in the long-run?

ANSWER. From the perspective of enhancing Arctic safety, security, and stewardship, key investments must be made in redundant Arctic communications (voice, data), domain awareness (via space, air, ground, maritime surface, maritime subsurface, and cyber), and response capability (including immediate on-scene capability, as well as longer-term sustainment of operations). The types of capabilities that might be useful to a future U.S. Coast Guard operating in the Arctic include the following:

- installing additional communications infrastructure and leveraging the growing number of commercial communications satellites in polar orbits
- exercising communications tactics, techniques, and procedures to train servicemembers in overcoming decisionmaking challenges associated with attenuated communications channels
- investing in remotely controlled air, sea, and amphibious craft for providing persistent wide-area surveillance, especially if these assets are networked together and to sensors on other assets to provide a common operating picture
- updating data-gathering and database construction processes to enhance the role of automation and thus improve data quality, make data accessible, and fuse information into a common operating picture
- developing operating concepts, plans, and investment strategies that recognize the need for agile, first-response assets; infrastructure; and logistics to sustain longer-term operations and conduct heavy lifting
- investigating remotely controlled airlift and oil-spill response capability
- adding small-boat landing capability to icebreakers
- increasing the number of forward operating locations and resources, including local and mobile elements pre-positioning key response items in partner communities
- enforcing new industry self-help regulations.

Question 2. What is a reasonable timetable to initiate broad infrastructure investments that will enable a ready Federal presence?

ANSWER. There is urgency for better enabling inherently intertwined safety, security, and stewardship activities in the Arctic. A big concern is that it will take one or more major disasters to motivate needed capability investments in communications, domain awareness, and response. Furthermore, many helpful assets (e.g., satellite communications, visualization tools, helicopters, trained personnel) can, in theory, be obtained or developed in the near term. Thus, certain investments can and should be made in the near term before a disaster occurs. There are several factors other than capability level to consider. Two of the most important include implications for indigenous and other local activities and the messaging to international stakeholders (e.g., to avoid the perception of an aggressive buildup of military capabilities that might elevate geopolitical tensions, which would be counterproductive to safety, security, and stewardship goals).

Uncertainty in the speed and precise nature of Arctic physical environment, economic, and other changes makes it difficult to assign precise investment timetables. However, it is important to be mindful of the multi-year process for bringing these types of investments to the point of providing utility for operations. Starting sooner rather than later will help avoid a reactive rather than proactive response to Arctic change.

QUESTIONS FROM HON. SEAN PATRICK MALONEY FOR HON. MEAD TREADWELL, COCHAIR, POLAR INSTITUTE, WOODROW WILSON CENTER

Question 1. Has the Administration's refusal to acknowledge climate change hindered our efforts in the Arctic?

ANSWER. Since 2017, the Trump Administration has been an active participant at the Arctic Council. The eight nations of the Arctic have continued—with U.S. leadership—to advance working group projects and coordinate measures to protect the ecosystems of the north. Included in that ongoing activity are efforts to eliminate methane releases and black carbon emissions, both of which are short term forcers of sea ice retreat in the north (President Trump and the President of Finland spoke per-

sonally about these issues at several meetings, including as recently as October 2019).

The size of the U.S. Arctic delegation has not decreased, and the U.S. remains committed to collaboration and engagement with member nations and observers. For example, in 2017 the U.S. hosted the 10th Ministerial in Fairbanks and signed the Fairbanks Declaration, which acknowledged climate change in the region and created a best-practices working group for Arctic shipping within PAME; in 2018, it negotiated and signed the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.

As the Administration reconciles U.S. Arctic policy with the National Security Strategy (NSS)/National Defense Strategy (NDS), I assess the U.S. will remain committed to upholding a stable regional order in the Arctic over the long-run.

Question 2. What role could port and maritime transportation infrastructure play in facilitating international cooperation and regional economic development?

ANSWER. Other nations in the Arctic, specifically Russia but also Finland, Norway, and Iceland, have spent billions of dollars over the last twenty-five to fifty years building ports and maritime transportation systems in their Arctic waters. The U.S. has lagged behind. Now, we lack the capabilities needed to sustain a robust presence in the region. This harms our interests in three ways.

First, it poses a direct threat to personal safety in the region. Without ports, airports, roads, and other critical infrastructure, search and rescue, law enforcement, and commercial services cannot operate as they do elsewhere in the U.S.

Second, it undercuts diplomatic efforts to advance U.S. interests in the region. With its limited presence in the Arctic, the U.S. lacks the civil, political, economic, or military power and influence it exerts elsewhere.

And third, it invites challenges to U.S. influence and to the influence of the other seven Arctic states by outside powers, specifically China.

By investing in critical maritime transportation infrastructure over the next one to three years, Congress would send a message not only to our friends in the Arctic but to the world at large that the U.S. is committed to securing its own backyard.

QUESTION FROM HON. ALAN S. LOWENTHAL FOR HON. MEAD TREADWELL, COCHAIR, POLAR INSTITUTE, WOODROW WILSON CENTER

Question 1. What types of oversight might reduce the likelihood of an oil spill in this region?

ANSWER. Congress should look at whether the Alternative Plans of Compliance (APC) provisions of OPA90, only recently put into effect, are sufficient to meet spill prevention risks. Congress should also review the series of studies that followed the 2004 *Selendang Ayu* disaster, particularly the Aleutian Island Risk Assessment published in February 2015. It is time for a better, fee-based spill prevention and response system in the Aleutians, Bering, and Arctic Regions, and for more robust tug and icebreaker capacity.

Additionally, Congress must ensure the Department of Homeland Security (DHS), the Coast Guard (USCG), and the National Oceanic and Atmospheric Administration (NOAA) have the resources required to enforce vessel compliance with the International Maritime Organization's Polar Code, as mandated by the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (MARPOL).

To do so, USCG will need to field and sustain an active presence in the region. That will require more than one new polar security cutter. Congress should also increase funding for the Alaska Ocean Observing System (AOOS), an affiliate program of NOAA's Integrated Ocean Observing System (IOOS), so that it can install the equipment needed to ensure safe navigation and maritime operations in the region. This equipment includes high-frequency radars and power modules, X-band radars for monitoring sea ice, wave and ice buoys, AIS stations, and other ecosystem monitoring devices.

QUESTIONS FROM HON. ANTHONY G. BROWN FOR HON. MEAD TREADWELL, COCHAIR, POLAR INSTITUTE, WOODROW WILSON CENTER

Question 1. What infrastructure investments can we make now to lower the "cost of doing business" in the Arctic in the long-run?

ANSWER. Investing in Arctic infrastructure *today* is critical to developing a maritime transportation system that generates revenues in the future. To get the ball rolling, Congress should take a strategic approach. Public funds should be allocated for what might be called Tier 1 projects—deep draft ports, airports, icebreakers, and roads—while a mixture of public and private funds are used for Tier Two projects—

shoreside facilities, fuel bunkering, communications equipment, etc. In this way, public funds are used to construct the "skeleton" of infrastructure—the large, expensive projects that often have complex permitting, design, and construction requirements—while private funds fill in the gaps. To encourage private investment, Congress should recognize the "developing" nature of the Arctic and offer tax and other financial incentives for investors and businesses that choose to invest in the region.

Question 2. What is a reasonable timetable to initiate broad infrastructure investments that will enable a ready Federal presence?

ANSWER. One to three years. If Congress waits any longer, it will bear the cost of doing nothing.

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