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Introduction and overview of the specific needs.

Good afternoon to you Mr. Chairman, ranking member and distinguished Members of the Subcommittee in Washington D.C. It is a genuine privilege and a pleasure to discuss U.S. Coast Guard Capabilities for Safeguarding National Interests and Promoting Economic Security in the Arctic.

I have the honor to serve as the Director of the Arctic Domain Awareness Center, (ADAC) a Department of Homeland Security Center of Excellence in Maritime Research in support of the United States Coast Guard's Arctic mission, hosted by the University of Alaska at the University of Alaska Anchorage. Please know that ADAC and the Center's associated research and education network are truly committed to being the best possible support to the U.S. Coast Guard (USCG) as we can individually and collectively muster. Accordingly, we in ADAC seek to be supportive of the U.S. Coast Guard's 2019 Arctic Strategic Outlook, (ArcSO) as well as the U.S. Coast Guard's 2018 Maritime Commerce Strategic Outlook (MCSO). I respectfully commend the Subcommittee's interest and support of the implementation of the U.S. Coast's Arctic Strategic Outlook and the Maritime Commerce Strategic Outlook in an Arctic context, as important and believe is greatly appreciated by many who are concerned about these topics in Alaska, across our nation and with America's closest Arctic partners and allies, in particular, our allies in Canada.

In addition to serving and supporting the U.S. Coast Guard in leading ADAC, I respectfully relay that I was recently appointed as a Commissioner to the U.S. Arctic Research Commission by the President of the United States. In the coming months and years, I look forward to supporting and serving with the Commission in meeting statutory requirements as directed in the Arctic Research Policy Act of 1984. As is the case with many in the research community, I have the privilege to serve in other committees and volunteer endeavors, and list the following as the more significant of these collateral activities: U.S. Delegation lead for Situational Awareness, International Cooperative Engagement for

Polar Research, U.S. Office of Naval Research, Global Fellow, Polar Institute, Woodrow Wilson Center for International Scholars, Co-Chair, Alaska Civil Armed Services Team (ACAST), State of Alaska.

I respectfully submit the reflections contained in this document are mine alone, and do not necessarily represent the views of the U.S. Coast Guard, the Department of Homeland Security, the State of Alaska, the University of Alaska, the Office of Naval Research, the Wilson Center or the U.S. Arctic Research Commission. These reflections do represent however, many years of Arctic focused endeavors ranging from military operations to military and national strategy development, multinational military engagement focused on Defense Support to Civil Authorities, policy and planning for defense and security formulation, and directing a multidiscipline center of Arctic maritime research.

While many of these experiences are oriented at the federal or multinational level, they also include time spent listening, learning and working with Alaska's indigenous communities of leaders, gaining understanding and insights of the Bering, Chukchi and Beaufort Sea areas from these leaders in local and place-based knowledge. No meaningful work can happen in this region without the insight, involvement and collaboration with these communities.

Due to the close collaboration we have at ADAC with DHS and the multiple echelons of Arctic-oriented service within the USCG, we identify our Center as an extended member of the DHS and Coast Guard family and celebrate their successes, while trying to lessen the burden of their operational challenges. The Center achieves this effort in a cost-effective manner by harnessing the power of the University of Alaska and our network of partners and collaborators, which contain research nodes across the United States, extensive research collaboration across Canada and some additional collaborations with America's Nordic Allies and partners as well. Strategically, ADAC's research, educational programs and convening activities continue to seek solutions that support the USCG's statutory missions associated with Coast Guard's Title 10 and Title 14 Authorities.

At the outset, I very much hope the committee recognizes my reflections are oriented to be supportive of the challenges our nation's Coast Guard faces in securing and protecting the U.S. Arctic maritime region. Against the backdrop of one of the most difficult operational theaters on the planet, the selfless service of the U.S. Coast Guard makes the challenging look easy in conducting search and rescue, disaster response, law enforcement and support to civil authorities. As a career military pilot with three decades of service that includes operating in the Arctic and across many other operational demanding areas, please let me assure you…what America's Coast Guard does every day in the Arctic is supremely demanding, requiring daunting courage, expert skills and a matchless fidelity to duty.

The USCG has long made the case of needing to revitalize their ability to project persistent sovereign power into the ice-laden regions of the U.S. Arctic as well as the international waters of the Central Arctic. This persistent power is best advanced via Polar Security Cutters. The authorization of six and the appropriation of one Polar Security Cutter (PSC) was critically needed and hopefully additional appropriations for more Polar Security Cutters will be coming sooner than later, as the

current capability of the U.S. Coast Guard in this capacity is greatly diminished and well below what is needed for the mission.

While the platforms matter, as persistent presence is not achieved without them, it is useful to consider a comprehensive systems approach to projecting such persistence. USCG PSC's without connectivity or communications may be unable to respond when and where most needed in a timely manner for crisis response. PSC's that have lagging or incomplete operational domain awareness may not be able to ascertain risk or have sufficient tactical knowledge and understanding to conduct an assigned mission. For safety and mission assurance PSCs must be manned by crews and leadership that have been trained and educated to fully comprehend a complex operating environment. PSC's that do not have minimal logistics and support located within the theater they operate, may have to forfeit their operational tasking and retrograde thousands of miles back to home port to effect repairs when mechanical issues arise that are beyond the ability to repair at sea.

As such, creating a systems approach in support of projecting persistence, that include PSCs, and complementary capabilities in communications & connectivity, domain awareness, institutionalized training and in-theater logistics support can result in PSCs providing a presence that signals to friend and foe alike…the U.S. Coast Guard is on the watch and vigilantly ready to protect and secure the U.S. maritime Arctic.

Further, ensuring the U.S. Coast Guard is supported with the best understanding science and technology can deliver in characterizing the ever-changing Arctic at fine scale for U.S. Coast Guard operational and tactical decision makers, is a persistent and enduring need.

The following paragraphs are presented to describe the challenge, present the key drivers of concern, offering solutions to consider and reflecting on opportunities to advance an improved chance of success for the U.S. Coast Guard and the Homeland Security Enterprise in better securing our Arctic maritime national interests.

A discussion on the geostrategic challenges facing the Coast Guard and our national interests in the Arctic.

Alaska and Alaska's maritime region make the U.S. an Arctic nation. While it may not be evident to many, and likely, most Americans, the Arctic region is vital to U.S. national interests and Alaska's maritime regions of the Bering, Chukchi and Beaufort Seas are the Arctic approaches to U.S. sovereign territory. It is a region that is experiencing great change due to rising temperatures, now rising at more than twice the rate as lower latitudes and as forecasts indicate, this trend is posed to continue, and bring unique challenges that will strain all the inhabitants' ability to resiliently adapt…flora, fauna and people alike.

When the United States became an Arctic nation in 1867, the nation became responsible for facilitating domestic security and defending national sovereignty across a significant frontier, known to the generations of Alaska Native residents and a handful of explorers, miners, trappers and

settlers from the continental U.S., Canada, Russia or other places. In the more than a century and half since the Alaska purchase, the national security challenges within America's Arctic have fundamentally changed. As seasonal Arctic ocean sea ice levels continues to diminish, the barriers of access are opening the Arctic region to natural resource development, maritime trade, and tourism, all of which is substantially transforming the security landscape of the high latitude north. New international actors now look to the Arctic for opportunity, while existing Arctic nations are now advancing efforts to better realize the region's economic potential.

As the changing Arctic presents new economic and geopolitical opportunities, environmental change poses a significant threat to current economic systems and traditional lifestyles in the Arctic. Thawing (and sometimes melting) permafrost is compromising the land that serves as the foundation for coastal Arctic communities and the small number of connecting roads and ports. With less sea ice cover, weather systems are becoming more volatile, allowing for stronger storm systems that further exacerbate coastal erosion through storm surges, high winds and coastal flooding. Environmental changes in the Bering Sea is now having an impact to traditional commercial and subsistence fisheries as fish stocks are starting to move north, risking and in some instances, already dislocating traditional food sources for marine mammals and Alaskan Arctic residents alike. Collectively, these environmentally focused changes pose a significant threat to existing coastal communities, local economies and associated infrastructure within the region.

The opportunities of an opening Arctic are an incentive for Arctic and non-Arctic nations alike to pursue easier to access and extract mineral and petrochemical resources, pursue fish proteins (at present, outside of the Central Arctic Ocean), conduct maritime transport, advance tourism and project sovereign influence through national flagged vessels.

Reductions in sea ice have reduced the access barrier to maritime operations and as a result, increasing activity is gaining in the Bering, Chukchi and Beaufort Sea regions. as well of course the overall pan-Arctic, which includes the Northern Sea Route along Russia's northern shore and the Northwest Passage across Northern Canada. The Arctic's diminishing sea ice environment is increasing accessibility to the vast hydrocarbon deposits within the region, which allows for Arctic nation-states like the Russian Federation to expand resource extraction efforts. The diminishing ice Arctic is enabling sea lanes of the Arctic to open sooner and stay open longer through the summer months and increasingly into the fall. This past May as an example, saw the earliest recorded transit of the Northern Sea Route, a record that will likely be routinely broken repeatedly in the seasons to come. The emerging economic potential of the Northern Sea Route, and the possibility of a viable Transpolar route within this century have incentivized nations and industry to consider leveraging these new and shorter routes for transporting maritime commerce as an economic advantage.

The diminishing Arctic ice environment that is enabling rising competition is manifesting itself in a multifaceted manner. It is well understood the Russian Federation has restored and refurbished former Soviet bases along Russia's Arctic region, while creating new facilities and establishing forces at those stations capable of projecting power in and through the Arctic region, well beyond national borders. If this was simply establishing a safe and secure Russian Arctic in creating sound defense by having a more than capable offense, then such activities may be reasonable and possibly even

acceptable. However, Russian national decisions and associated defense planning, are opaque at best, and the asymmetric Arctic military advantage created in the Russian Federation should be met with resolve and strength by the U.S. and America's Allies…as resolve and strength has historically been successful to stabilize relations between Moscow and Washington D.C.

Russia's approach to managing the Northern Sea Route (NSR) bears monitoring. Their practices obliquely, if not directly, potentially restrict freedom of navigation and counter the aspect the NSR is an international waterway.

Russia is no doubt, a considerable Arctic maritime power. With a dominant number of ice breakers, that range from vessels suitable for riverine operations to nuclear-powered ocean-going vessels, the Russian military can project sovereign influence throughout the pan Arctic in multiple directions simultaneously.

Russian abilities to muster and project military forces into the Arctic are remarkable. The range and complexity of these activities have continued to grow substantially following their restart of Long-Range Aviation back in January 2007.

Russian military exercises in the Bering Sea in late August are a deeply worrying example where lack of understanding, communication and a willingness for provocation, places not only military forces and response measures at risk, but these actions also place U.S. citizens at risk, such as the U.S. fishing fleet that were interrupted and alarmed in their commercial activities by poorly understood and reportedly aggressive Russian military maneuvers.

Since the routine establishment of Extended Economic Zones (EEZ), normally 200 nautical miles from shore, as codified in the United Nations International Convention on the Law of the Sea (UNCLOS) in 1982, foreign vessels are granted the right of innocent passage, permitting transit and freedom of navigation as long as these vessels are not conducting items exclusively prohibited such as weapons testing, polluting, fishing or conducting scientific research. According to UNCLOS, it was allowable for the Russian navy to exercise in the U.S. EEZ, as long as the vessels stayed outside of U.S. territorial waters (12 nautical miles from shore).

However, the Russian navy aggressive actions against U.S. flagged Alaskan fishermen in late August this year, are unacceptable. The Alaskan fishermen where rightly operating in a region well known and well established as a profitable fishing ground. For U.S. vessels to be harassed and ultimately forced to depart the area and losing the associated economic opportunity should not be permitted, particularly, as these fishermen where operating within the U.S. EEZ and adhering to the usual and customary practices of UNCLOS and of course U.S. fishing regulations.

In past experiences while serving in uniform, I have been confronted by military members of the Russian Federation. While my reflections are anecdotal and not a full analysis, these experiences have created a personal reflection that Russian military rewards those who act aggressively, and restraint can often be seen as a sign of weakness.

As the Russian Federation is an Arctic nation who shares a critical waterways management challenge with the United States, it is in both nations' interests to resolve conflicts, effectively communicate

and find solutions to prevent escalation of tension and a rise in military actions along our shared and the economically increasingly important waterways in the Chukchi and Bering Seas.

From personal experience, it is my belief that Russia respects strength and resolve, and towards that end the U.S. National Security Strategy provides the antidote and guiding perspective…peace through strength, sustained in a competent, professional manner earns the respect of the Kremlin and Russian forces. This requires investment, training, proficiency and most importantly…persistent presence, oriented on a timetable and tempo of our choosing.

In sum, the U.S. cannot afford to be perceived as weak in our Arctic resolve to the Kremlin. Certainly, America should avoid over-reacting in a manner that may be seen as unrestrained escalation, but should reserve the right to escalate if needed to retain the initiative and in every case, ensure Russia understands, the United States of America will defend our citizens, our territory, our treaty Allies and our National Interests.

The Peoples Republic of China's efforts in the Arctic is manifesting itself differently than Russian actions. China continues to maximize it influence through use of its economic power to create potential for access to policy governance in forums such as the Arctic Council, and uses its economic strength to potentially position China to gain access to Arctic regional mineral wealth, fish proteins and more. China's economic partnership with Russia for Arctic region liquified natural gas (LNG) is one example of China's advancement on their declared Belt and Road initiative. China continues to project sovereign presence into and across the Arctic via Xue Long I and Xue Long II icebreaker cruises, with a third Xue Long to join future efforts. There are media reports that China is seeking to replicate Russian examples of developing nuclear powered ice breakers. In addition to investments in LNG on Russia's Arctic Yamal Peninsula, China's influence in gaining Iceland commercial port access and efforts to advance commercial mining interests in Greenland, signal China's strategic aims contain a comprehensive pan-Arctic approach. Based on their actions in other regions, it is a reasonable conclusion to state Chinese national need for raw resources such as mineral and fish proteins will continue to drive their aspirations and activities across the Arctic.

The People's Republic of China see the Arctic as integral to its global ambitions. It is fairly clear that China will continue efforts to gain access to resources and deliver products to market for economic benefit, while also establishing influence among the Arctic community who may be tempted by promises of infrastructure investment and economic development through Chinese investment. Chinese icebreakers continue to project presence in the Arctic region, to include operations in the Arctic basin outside of the U.S. Arctic EEZ in the Chukchi and Beaufort Seas. It is not inconceivable that such a presence could lead to mineral and other extractive measures in the future--closer to the U.S. Arctic maritime EEZ than we would likely prefer, particularly when considering the insufficient measures Chinese industry has made towards environmental stewardship in other regions across the globe.

China's willingness to support infrastructure in developing regions, provides many reasons for caution and close examination of any promise or offer made by the Chinese government or government supported industry. Regrettably, there are a number of instances elsewhere on the planet where such promises have yet to substantially deliver, where more is the case where profound

disappointment in these arrangements has been the result. One needs to simply review the many instances in Africa, South and Southeast Asia to get a full picture of the corresponding risks that await in the Arctic. China is not an Arctic nation, yet is acting as it has sovereign interests in the Arctic, and had its advocates continue to make remarks that China seeks and should be granted a role in Arctic Governance at a number of multinational forums such as the 2019 U.S. Arctic Research Commission and Woodrow Wilson Center hosted conference on the *Impacts of a Diminishing Ice Arctic on Naval and Maritime Operations*. In sum, China's effective use in leveraging its national economic strength as a means to gain political influence across the Arctic is competing and conflicting with corresponding U.S. National Interests.

To be sure, the Arctic is but one area in the growing array of geo-strategic challenges between the United States and China, but the pace of Chinese advancement in and across the pan Arctic region, to include their presence near U.S. Arctic waters is outpacing American countering efforts to deter and dissuade Chinese actions in the Arctic, which are counter to American national interest.

A similar intent may be implied about Russia. However, while Russian military strength and considerable reach of their forces across the Arctic, arrayed against Europe and deployed in the Middle East, are dispatched by a nation that has an insufficient economic engine to long-term sustain such force. Russian investments in military capability are to be taken seriously, however, Russian economic shortfalls compromise Russian military strength, particularly when compared to the economic muscle of China as the world's second largest economy. Accordingly, finding ways to manage tensions with the Russian Federation in the Arctic as fellow Arctic nations, should be sought, particularly from a position of U.S. strength. Such measures should seek to first, find a way to decouple joint approaches between Moscow and Beijing. This is possible through diplomatic rapprochement that does not condone or reward past and current malign Russian actions, but guided by realizing there are a number of common interests in the Arctic between Moscow and Washington D.C. This approach may be well aligned to American interests and serve to better manage escalation of military tensions in the Arctic.

The above discussions are a representative sample of the geostrategic challenges that face U.S. national interests in the Arctic. What is important to emphasize, Great Power Competition need not become Great Power Confrontation, and measures to manage and as useful, deescalate are important, if not critical. To be sure, escalation management requires the means and capabilities to back words with commensurate force. This is not only a Department of Defense matter…this includes ensuring needed capability within the national security enterprise, including the Department of Homeland Security and the United States Coast Guard.

Against this backdrop, it is important for the nation to continue to invest in real capabilities and invest in efforts that continue to innovate DHS and U.S. Coast Guard presence and ability to project and sustain activities in the Arctic region, particularly, U.S. Arctic maritime regions. Real capabilities such as PSCs, but also the means to make these platforms more versatile, more connected and more interoperable with the rest of the U.S. joint force and with our Allies and partners.

A discussion on civil safety and security challenges facing the U.S. Coast Guard in the Arctic.

While rising competition among the Great Powers is a pacing interest on Arctic matters, the spectrum of challenges that impact the U.S. maritime Arctic are considerable, and yet often times overshadowed by the higher profile provided to Great Power Competition.

In order to prepare for these existing and increasingly complex security challenges, the U.S. Coast Guard released the USCG Arctic Strategic Outlook in 2019, significantly updating the prior 2013 Strategy to focus three "complementary lines of effort" to the USCG will endeavor in order protect national interests: 1. Enhance Capability to Operate Effectively in the Dynamic Arctic. 2. Strengthen Rules-Based Order. 3. Innovate and Adapt to Promote Resilience and Prosperity. In order to prepare for the challenges facing the USCG in supporting the changes of American Maritime Commerce the USCG released the Maritime Commerce Strategic Outlook in 2019. Along the Aleutians (the U.S. Congressional Southern Boundary of the Arctic), through the Bering, Chukchi and Beaufort Seas provides the USCG an opportunity to view both the ArcSO and the MCSO in an integrated manner, providing opportunities to advance safety, security, waterways management and protection to maritime commerce for the benefit of the nation, industry and communities in the region.

The Arctic region continues to experience unprecedented change in terms of environment, weather patterns, and human activity. Over the past year, rapidly warming trends have contributed to decreasing extant of Arctic Ocean sea ice and spurred seasonal increases in storm severity, via significantly stronger winds and coastal storm surges buffeting shores across the North American Arctic. As the Arctic continues to warm, the foundations of coastal regions securely frozen for centuries are now thawing and becoming increasingly vulnerable to intensifying severe weather patterns. Across the U.S. Arctic, this thawing terrain has an unusually high susceptibility to erosion, which is of great concern to associated infrastructure and communities. Characterizing these changes at fine scale, remains a research challenge that has yet to be fully addressed.

Enabled by a changing environment, human activity across the Arctic is rising and includes increased commercial marine traffic, bolstered adventure tourism, (albeit temporarily dampened due to the Coronavirus pandemic) and expanded efforts to develop and conduct resource exploration and extraction methodologies. Newly opened pathways from the diminishing ice environment is a draw for nefarious influences in the region and can possibly contribute to unconventional marine safety and security threats including increased illicit trafficking and criminal activity. While modest global crude oil prices continue to dampen off-shore Arctic oil exploration activities in the Chukchi and Beaufort Seas, current favorable U.S. government exploration policies and historically fluctuating crude oil prices are likely to ensure that long-range oil and gas exploration activities will likely increase across the North American Arctic in the coming years.

Transportation networks across the North American Arctic are principally limited to air and seasonal marine conveyance. Economic development remains limited due to remoteness, lack of infrastructure, high cost, and difficulty establishing new roads, ports, and facilities. In context of the U.S. National Security Strategy and the USCG Arctic Strategic Outlook, there is a need to consider how DHS and USCG will safeguard and secure new economic developments within the U.S. Arctic coastal and maritime regions in order to meet broad strategic goals for regional security.

An increasingly dynamic Arctic continues to affect populations whose ancestors have inhabited the region for generations. Subsistence lifestyles continue but are increasingly threatened by retreating ice and increased regional industrial activity (such as marine shipping and resource extraction), which affect marine mammal activities and populations. Sincere consideration and active participation of local populations' lifestyles, practices, and customs should guide new U.S. federal initiatives and inform DHS and USCG regional activities.

As trends indicate, human activity across the Arctic continues to increase in scope and magnitude. As new Arctic expansion and operations bring a more diverse and less experienced population and the rapidly changing Arctic environment confounds traditional understanding, the percentage of those truly prepared for the Arctic environment is in decline. This leads to risk-prone behaviors that stress resources and challenge the U.S. Coast Guard's ability to conduct search and rescue, humanitarian assistance missions, protect fisheries and marine life and lead disaster response operations. Additionally, as more outsiders enter the Arctic, the reasons for their arrival become more diverse resulting in increased need for vigilance in enforcing national laws and regulations.

The preceding paragraphs outline a series of concerns and a series of needs to consider in realizing a future U.S. maritime Arctic region better matched to national interests and the U.S. citizens who call the region home. Addressing these challenges are not only limited to the U.S. Arctic maritime region but should be conducted in a manner that better allows the U.S. Arctic maritime region to serve as the point of departure for increased efforts in the National Interest across the Arctic basin. To be sure, the investment costs to realize a substantial gain of economic prosperity for the region is sizeable, but so too is the potential opportunity.

The Arctic is an exceptional region. Arctic "exceptionalism" in the size, breadth and depth of ongoing collaboration in facets such as Arctic science, economic endeavors, recognition of indigenous peoples and governance-related activities such as the mechanisms associated with the Arctic Council are the envy of many other regions across the globe. However, continuation of these aspects of Arctic exceptionalism is by no means assured and U.S. investment of Arctic initiatives of science, economics, and measures to ensure U.S. security and sovereignty, are well within U.S. national interests.

A discussion on solutions and supporting concepts.

Responding to the drivers of concern…it is important, if not critical to provide sustained support to the U.S. Coast Guard with improvements and capability to smartly project presence and enforcement to preserve and protect U.S. interests within our sovereign spaces, which ranges in providing the clenched fist of resolve to security missions to the hand of help to respond to civil crisis and to advance science and research in a pan-Arctic context to support the public good.

What this means, is the real and critical value to field the Polar Security platforms validated to support the U.S. Coast Guard polar requirements. This also means providing these platforms the ability to serve as fully capable instruments of national sovereignty, capable to deter, dissuade and defend in like manner to USCG National Security Cutters. Advancing U.S. Coast Guard Arctic and

Antarctic capabilities requires working with science and technology research and providers to gain smart abilities to receive and conduct command and control and to establish situational awareness and overall domain understanding, across remote and austere regions that have well understood limitations in communications and logistics infrastructure.

This summer's recent mishap aboard the U.S. Coast Guard Cutter Healy, highlights the challenges of the long lines of communications from the Healy's homeport in Seattle to the U.S. Arctic region. Establishing a home port closer to the Arctic with full depot level repair capability is a considerable, and in fact, a quite massive investment in heavy infrastructure, base development, family quarters and more, particularly since no corresponding commercial infrastructure fully exists in Alaska.

Homeporting of capital U.S. Coast Guard assets should be located at a robust multimodal transportation (air, road/rail, and seaport) node, with co-located heavy marine industry, piers, housing, schools, communications and logistics capability already exists. While I truly wish such facilities did exist in Alaska, and in particular, in the Arctic, and I would heartily advocate for smart and long-term commitment to establish joint civil-government development of Alaskan ports. As a former Headquarters U.S. Air Force programmer, I am guided by the principal of programmatic road maps that create capability via "ramps" …guided by a joint vision and sustained incremental advances that over a multi-year period to realize the vision. In sum--until a comprehensive Alaskan Arctic/near Arctic commercial port facility is realized, it may be wise to consider maintaining PSC home ports in Seattle, leveraging the existing commercial investments, that reduce the cost to the U.S. taxpayer.

However, there should be consideration and deliberation in either developing or enhancing existing infrastructure in Alaska to serve an expeditionary/intermediary function providing logistical and affordable level of repair function for PSC Arctic operations. Locating one or more Polar Security Cutter expeditionary support/logistics facilities at locations near existing USCG facilities at Seward, Kodiak or a refurbished location at Dutch Harbor in the Aleutians or alongside future developments at a deep-water port in Nome, can possibly provide the USCG PSC's (and other USCG plus U.S. Navy vessels) an important third option between repair at sea or return to home port in Seattle. The idea advanced by others in a port complex between the Port of Nome and the natural deep water port region known as Port Clarence is likely a highly useful future port construct.

Quite frankly, advancing expeditionary support/logistics activities in or near the Alaskan Arctic region could prove the most helpful start in creating the programmatic ramp that could result in a multiyear approach to smart civil/military solutions to enable PSC homeporting, particularly, as industry sees opportunity to also invest in Arctic maritime transportation, tourism and extraction activities. From a geostrategic vantage, I do respectfully recommend that planners and programmers focus on increasing capabilities at/near the Bering Strait, as this maritime chokepoint could become as important as the Straits of Malacca or the Panama Canal to global maritime commerce.

While USCG Search and Rescue in Alaska and the U.S. Arctic is well known and highly regarded, providing pollution and other environmental response across Alaska's coastal and maritime region is

a thankless and exacting mission for the USCG. Spill response is costly, and proactive prevention is difficult and logistically straining. Scientific research and oil spill response communities provide important support to the efforts, but to be sure, advancing science of spill response and improving inspections using science and autonomous systems to better monitor across storage facilities across vast and remote regions will grow more important as facilities age and are more compromised by thawing permafrost and other environmental changes underway across the Arctic.

Advancing the U.S. Coast Guard's Arctic and overall polar capabilities also means advancing trusted relationships, with other Arctic Coast Guards as conducted via the Arctic Coast Guard Forum, but importantly with Russian counterparts (for Bering & Chukchi Sea waterways management), Canadian Allies and with the Kingdom of Denmark as well as representative government on Greenland. Sustaining trusted relationships are a domestic matter as well. U.S. Coast Guard Arctic relations across Federal Departments and Agencies, State of Alaska, Alaska Native Communities and Academic partners take time to develop and once established, should be nurtured and sustained. In particular, it remains critical to consult and understand the challenges faced by the U.S. citizens of the Arctic who see first- hand, the changing Arctic maritime and can provide uniquely important insights beneficial to safety and security responders. The adage that you can't surge trust or a trusted relationship…applies in full measure to the Arctic.

While the Arctic region is increasingly impacted by the changing physical terrain and a rise in a variety of human activities, the Arctic also provides some of the best examples of international cooperation on the planet. Highlights include the Arctic Council, led by 8 nations and 6 internationally recognized Arctic Indigenous groups, and supported by outstanding scientific research and focused working groups; the International Maritime Organization (and the IMO's supporting Polar Code); the International Arctic Science Committee; the University of the Arctic; the Arctic Coast Guard Forum; and the Arctic Security Forces Roundtable.

While I am certain the Committee is familiar with the United Nations Convention on the Law of the Sea, as a former military operator and someone familiar with international maritime operations, in an Arctic context, the United States could realize a stronger advantage by ratifying the treaty. In understanding there are both pros and cons towards ratification, failure to ratify reduces the influence in advancing U.S. interests in rules-based order across the international maritime region. The United States is fortunate to have Canada as our closest Arctic defense and security partner and ally. This includes a shared defense commitment through the North Atlantic Treaty Organization, shared protection via protecting respective aerospace domains and the maritime approaches to Canadian and American sovereign territory via the North American Aerospace Defense Command (NORAD) and a complementary defense arrangement through United States Northern Command and Canada's Joint Operations Command. This bi-national defense cooperation is supported by the Canada-U.S. Permanent Joint Board of Defense (PJBD), established in 1940 by joint declaration between the U.S. President and the Canadian Prime Minister. PJBD today has 4 CANUS departments represented: DoD, DHS and Canada's Department of National Defense and Department of Public Safety. As useful as the forum is towards advancing bi-national defense and security cooperation, it remains perhaps, a bit underleveraged in both Washington and Ottawa.

While fortunate to have Canada as a close and enduring ally in securing and defending the North American Arctic, there are key drivers of concern that warrant increased support to our national security efforts in the Arctic region, and in particular, support to the USCG.

While the Department of Defense has rightly benefitted in gaining increased readiness and capability through national reinvestments, the USCG has lagged in gaining the needed appropriations to renew and improve operational capability and supporting infrastructure to support this sea service to conduct its statutory assigned missions in both defense and security in the U.S. Arctic EEZ in the Bering, Chukchi and Beaufort regions and providing the ability to project sovereign U.S. maritime surface presence into the international ice laden waters east of North America. For a nation with Global interests and an implied intent to operate across the global commons of the Polar regions, the nation's Coast Guard does not have the numbers of PSCs or the supporting capabilities to operate, command and control and sustain presence to match interests.

What may not be clear to the Committee, is the role the Arctic Domain Awareness Center (ADAC) at the University of Alaska provides to supporting the U.S. Coast Guard or other Department of Homeland Security Arctic missions. ADAC is a Center of Excellence in Maritime Research that is part of the DHS Science and Technology Office of University Programs (DHS S&T OUP). ADAC was founded in the Summer of 2014, received its first funding in January 2015 and is now in its seventh year of providing science and technology research, professional workforce research assistance-ships (at both the undergraduate and graduate levels) and planning an array of conferences and workshops, convening Arctic minded professionals in security, defense and supporting disciplines, virtually all inclusive of Canadian participation, with many also including Nordic Allies and partners. It is important to note, that ADAC works comprehensively to characterizing the dynamics of change (as previously discussed), in platforms, models, decision support and knowledge products to assess the associated impact to crisis response at granular levels, to enable smarter decisions and smarter decision making.

ADAC and its associated research network have developed an important new capability in oil spill response via autonomous underwater vehicles and communications systems suited to the Arctic region. ADAC has created and greatly advanced a construct called the "Arctic Incidents of National Significance" method which creates new research by convening operators, scientists and industry to address specific concerns oriented to "what keeps the commander up at night" to create solutions for gaps and shortfalls in Arctic capabilities. This approach has generated new awareness tools, decision support science and advances in Arctic search and rescue and marine pollution response.

ADAC has recently commenced a new research project using unmanned aerial systems from the University of Alaska Fairbanks to train and equip local operators Unalakleet for monitoring of fuel storage facilities to support U.S. Coast Guard marine inspection requirements. ADAC is just about ready to commence a new comprehensive Arctic and Alaskan communications and connectivity assessment, oriented to a whole of mariner community approach.

In sum, this center of maritime research led by the University of Alaska is creating domain awareness across a region that is woefully lacking in such knowledge.

If/as desired, I would be pleased and honored to provide more information about the Center as meets the desires of the Committee. If/as desired, the following website provides a substantial insight to the Center's people, programs and activities: https://arcticdomainawarenesscenter.org/ In sum, ADAC has built trusted relationships across DHS and USCG, across the U.S. Federal and State of Alaska governments, Alaska Arctic communities, Arctic science professionals across the United States and with Canadian counterparts in each corresponding facet. To be sure, our team serves everyday focused to advance science and technology and other programs to benefit the DHS and USCG in their Arctic mission.

Conclusion.

I respectfully submit, it is not my place to recommend to the Coast Guard or the Department of Homeland Security in how to present the requirements for Congressional funding or which of the myriad of competing demands for funding in the department or the service should receive the highest priority. In equal measure, it is not my place to recommend to this Committee, what funding priority that is presented to the Committee should receive highest consideration. I would recommend however, the U.S. Coast Guard is the nations' vanguard to secure the U.S. Arctic maritime region, protecting fisheries and other marine life, rescuing people, responding and recovering from marine pollution events, supporting the science community to the benefit of many and projecting American sovereign power across the ice laden waters of the Arctic. Supporting USCG Arctic and Polar capability, is in the national interest. Providing this selflessly serving community of USCG mariners the capability to meet the full spectrum of statutory missions to respond at strength in and across the Arctic, will preserve our resources, advance national power to meet the rising challenge from other competing nations, support civil safety and security and will provide America's Arctic allies and partners, needed assurance of U.S. commitment towards the peaceful opening of the Arctic.

The State of Alaska's official motto "North to the Future" is a relevant now as ever. Accordingly, I believe the importance of the Arctic will continue to rise. As the community of science projects Arctic warming will continue, associated environmental changes will continue accelerate, and accordingly, measures to address, adapt and increase resilience will need critical continued investment.

The economic opportunity of the Arctic and in particular, the U.S. Arctic seem quite profound, but should be viewed at more than just another opportunity access natural wealth. Economically developing the Arctic in a sustained and responsible manner is a critical national interest and a flourishing economy that integrates existing culture, respectful to Alaskan Natives and other long-standing Arctic residents holds needed promise to lift a region to the benefits of these regions, the State of Alaska and the nation.

Waterways in the Bering and Chukchi could one day prove as one of the globe's most important to maritime commerce. Managing the incredibly important fisheries and marine life in the U.S. Arctic maritime, providing safety at sea, securing U.S. EEZs and being vigilant and prepared to respond to crisis and disaster in one of the most pristine areas on the planet provides a remarkable task list for the U.S. Coast Guard. I do believe that prioritizing the needs of the Coast Guard to address this task list is critical for the Committee to consider and to address in a substantial way.

Thank you for the opportunity to provide these reflections, and please know how appreciative I am of your service to our nation in providing political leadership in these difficult times. I genuinely appreciate your support and enabling efforts to ensure the U.S. Coast Guard can safely and properly meet the challenges and secure the opportunities of the developing Arctic region. I respectfully look forward to addressing your questions.