

Climate Change and International Competition: The US Army in the Arctic Environment

A Monograph

by

MAJ Brian C. Harber
United States Army



School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

2015-01

Approved for public release; distribution is unlimited.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE (DD-MM-YYYY) 21-05-2015		2. REPORT TYPE SAMS Monograph		3. DATES COVERED (From - To) JUN 2014 – MAY 2015	
4. TITLE AND SUBTITLE Climate Change and International Competition: The US Army in the Arctic Environment				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) MAJ Brian C. Harber				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Command and General Staff College ATTN: ATZL-SWD-GD Fort Leavenworth, KS 66027-2301				8. PERFORMING ORG REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Advanced Operational Arts Studies Fellowship, Advanced Military Studies Program.				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT As Arctic sea ice recedes due to global warming, the region is facing an unprecedented increase in maritime activity creating new conditions for emerging national security concerns. This research evaluates the United States (US) Army's Arctic capability to determine if it possesses the means to achieve the strategic objectives articulated in the 2013 <i>National Strategy for the Arctic Region</i> and 2013 Department of Defense <i>Arctic Strategy</i> . This monograph argues that the US Army has an Arctic capability gap at the operational level. The capabilities are evaluated within the domains of the current US doctrinal definition of Doctrine, Organization, Training, Materiel, Leadership and Education, and Facilities (DOTMLPF). For the purposes of this monograph, DOTMLPF serves as a broad analytical framework to identify the US Army's Arctic capability gaps. This monograph concludes by addressing how the US Army can align an Arctic capability with the operational requirements of this complex environment.					
15. SUBJECT TERMS US Army Cold Weather Doctrine; US Army Arctic Operational Capability; ULO; Mission Command; Arctic Council; UNCLOS; DOTMLPF					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. PHONE NUMBER (include area code)
(U)	(U)	(U)	(U)	54	MAJ Brian C. Harber (907)347-4637

Monograph Approval

Name of Candidate: MAJ Brian C. Harber

Monograph Title: Climate Change and International Competition: The US Army in the Arctic Environment

Approved by:

_____, Monograph Director
Anthony E. Carlson, PhD

_____, Seminar Leader
Yan Poirier, LCOL, Canadian Army

_____, Director, School of Advanced Military Studies
Henry A. Arnold III, COL, IN

Accepted this 21st day of May 2015 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, PhD

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

Abstract

Climate Change and International Competition: The US Army in the Arctic Environment, by MAJ Brian C. Harber, 46 pages.

As Arctic sea ice recedes due to global warming, the region is facing an unprecedented increase in maritime activity creating new conditions for emerging national security concerns. This research evaluates the United States (US) Army's Arctic capability to determine if it possesses the means to achieve the strategic objectives articulated in the 2013 *National Strategy for the Arctic Region* and 2013 Department of Defense *Arctic Strategy*. This monograph argues that the US Army has an Arctic capability gap at the operational level. The capabilities are evaluated within the domains of the current US doctrinal definition of Doctrine, Organization, Training, Materiel, Leadership and Education, and Facilities (DOTMLPF). For the purposes of this monograph, DOTMLPF serves as a broad analytical framework to identify the US Army's Arctic capability gaps. This monograph concludes by addressing how the US Army can align an Arctic capability with the operational requirements of this complex environment.

Contents

Acronyms	v
Figures	vii
Introduction	1
The Arctic Operational Environment	6
The United States Arctic Strategy	15
Capabilities of the US Joint Force and US Arctic Allies	19
US Army Arctic Operational Capability Analysis	28
Conclusion.....	43
Bibliography.....	47

Acronyms

AOC	Army Operating Concept
ATS	Army Training Strategy
ATTP	Army Tactics, Techniques, and Procedures
AMWS	Army Mountain Warfare School
CATS	Combined Arms Training Strategy
FM	Field Manual
IPCC	Intergovernmental Panel on Climate Change
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities
DOD	Department of Defense
EEZ	Exclusive Economic Zone
NSPD-66/HSPD-25	National Security Presidential Directive-66/Homeland Security Presidential Directive-25
NATO	North Atlantic Treaty Organization
NORAD	North American Aerospace Defense Command
NSR	Northern Sea Route
NSS	National Security Strategy
NWP	Northwest Passage
NWTC	Northern Warfare Training Center
USPACOM	United States Pacific Command
PDD/NSC-26	Presidential Decision Directive/National Security Council Paper 26
TRADOC	Training and Doctrine Command
TEO	Training and Evaluation Outline
TOE	Table of Equipment
TPR	Transpolar Route
USCG	United States Coast Guard

USN	United States Navy
USARAK	United States Army Alaska
UNCLOS	United Nations Convention on the Law of the Sea
USAF	United States Air Force
USNORTHCOM	United States Northern Command

Figures

	Page
1 Arctic Seasonal Sea Lanes	2
2 Arctic Boundary as Defined by Congress.....	8

Introduction

The Arctic, part of the NORAD [North American Aerospace Defense Command] area of operations and USNORTHCOM [United States Northern Command] AOR [Area of Responsibility], is historic key terrain for DOD [Department of Defense] in defense of North America. With decreasing seasonal ice, the Arctic is evolving into a true strategic approach to the homeland.

— General Charles H. Jacoby, Jr., US Army Commander of USNORTHCOM and NORAD

Arctic sea ice is melting at a previously unanticipated rate—potentially enabling access to its formerly inaccessible natural resources and opening sea-lanes across the Arctic Ocean.

International competition is likely to rise as nations and corporations pursue additional energy commodities and commercial ventures, including oil and gas exploration, mineral extraction, commercial shipping, tourism, and fishing. According to the United States Geological Survey's 2008 assessment, "the Arctic accounts for about 13 percent of the undiscovered oil, 30 percent of the undiscovered natural gas, and 20 percent of the undiscovered natural gas liquids in the world."¹ The Arctic also includes multiple prominent commercial shipping routes, the Northern Sea Route (NSR) that parallels the northern coastline of Russia, the Northwest Passage (NWP) that runs along the Arctic coast of North America, and the Transpolar Route (TPR) that runs approximately through the center of the Ocean (See Figure 1). Currently, maritime travel in the Arctic is limited, but climate change is gradually uncovering the polar region and projections suggest that, by 2030, retreating ice will allow approximately 55 days of open water access along the NSR and 45 days for the TPR while reliable navigability through the NWP will remain limited.²

¹ "90 Billion Barrels of Oil and 1,670 Trillion Cubic Feet of Natural Gas Assessed in the Arctic," US Geological Survey, last modified July 23, 2008, accessed January 30, 2015, www.usgs.gov/newsroom/article.asp?ID=1980#.VMrh68b4tFJ.

² US Navy, *US Navy Arctic Roadmap 2014-2030* (Washington DC: Government Printing Office, 2014), 13.



Figure 1: Arctic Seasonal Sea Lanes

Source: US Department of the Navy, *US Navy Arctic Roadmap 2014-2030* (Washington, DC: Government Printing Office, 2014), 14.

Irrespective of the assortment of political views about the anthropogenic causes of global warming, the Arctic ice cap is receding. The Intergovernmental Panel on Climate Change (IPCC), a scientific organization under the auspices of the United Nations (UN), amasses scientific data on the impact, nature, and rate of climate change and the resulting environmental and geopolitical consequences. The IPCC’s principal function is to provide information for policymakers about the global impact of climate change.³ The IPCC “was established by the United Nations Environment Programme and the World Meteorological Organization in 1988 to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.”⁴ Three working groups provide

³ “Organization,” Intergovernmental Panel on Climate Change, n.d., accessed November 24, 2014, <http://www.ipcc.ch/organization/organization.shtml>.

⁴ Ibid.

assessment reports that articulate the scientific view of the IPCC. The working group's authors include hundreds of leading scientists who recruit experts from around the globe as contributing authors to augment the reports with specific knowledge. Thousands of other experts and editing teams review the assessments and ensure that the reports are comprehensive, accurate, and representative of the sciences as a collective body.⁵ The working groups also prepare a synthesis report, entitled a *Summary for Policymakers*, which is subject to approval by UN member governments before final release.⁶ The caliber of the aforementioned professional body and the review process has established the IPCC as the legitimate clearinghouse for scientific research about global climate change. The IPCC's 2013 Summary for Policymakers stated that "the annual mean Arctic sea ice extent decreased over the period 1979 to 2012 with a rate that was *very likely* in the range 3.5 to 4.1% per decade."⁷

The gradual receding of Arctic sea-ice, accelerated by global warming, will probably lead multinational corporations to exploit previously inaccessible natural resources. Indeed, this competition for natural resources will likely multiply security challenges for the United States (US) Joint Force in the Arctic region. The US Joint Forces Command 2010 *Joint Operating Environment* study evaluated the geopolitical consequences of climate change in the Arctic region.

Climate change is included as one of the ten trends most likely to impact the Joint Force. For example, sea ice has been shrinking dramatically in Arctic regions each summer, and in the future this could open new shipping routes across archipelagic Canada and Northern Russia that could dramatically shorten transit times between Europe and

⁵ "Structure," Intergovernmental Panel on Climate Change, n.d., accessed November 24, 2014, http://www.ipcc.ch/organization/organization_structure.shtml.

⁶ "Organization," Intergovernmental Panel on Climate Change, n.d., accessed November 24, 2014, <http://www.ipcc.ch/organization/organization.shtml>.

⁷ Intergovernmental Panel on Climate Change, 2014: Summary for Policymakers. In: "Climate Change 2014: Synthesis Report." Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, United Kingdom and New York, USA, 2014), 4.

Northeast Asia. Furthermore, shrinking sea ice opens new areas for natural resource exploitation, and may raise tensions between Arctic nations over the demarcation of exclusive economic zones and between Arctic nations and maritime states over the designation of important new waterways as international straits or internal waters.⁸

During and after the Cold War, the Arctic remained free of military conflict. In 2007, the operational environment changed dramatically when satellites recorded a significant ice recession.⁹ This presents several challenges for policymakers and today's Joint Forces. To what extent will receding Arctic sea-ice influence maritime activity, regional interaction, and global politics? Will international efforts focus on the preservation of large socio-ecological systems or will growing competition for control over natural resources result in heated jurisdictional claims between Arctic nations? Will this act as an impetus to resolve disputes cooperatively or will international natural resource competition usher in the return of Arctic militarization similar to during the Cold War era?

Since the dawn of oceanic navigation, sailors have gone to extraordinary lengths in search of opportunity. Dating back to the sixteenth century, the discovery of shorter shipping routes and abundant resources in a specific area increased economic activity and eventually triggered violent conflicts.¹⁰ Considering humanity's violent track record, the current geopolitical climate, and the ongoing consequences of global climate change, President Barack H. Obama's administration published the 2013 National Strategy for the Arctic Region.¹¹ The National Strategy promotes a collaborative global effort to maintain regional stability and

⁸ US Joint Forces Command, *The Joint Operating Environment 2010* (Washington DC: Government Printing Office, 2010), 32.

⁹ "Arctic Sea Ice Shatters All Previous Record Lows," National Snow and Ice Data Center, October 1, 2007, accessed November 24, 2014, http://nsidc.org/news/newsroom/2007_seaiceminimum/20071001_pressrelease.html.

¹⁰ Malyn Newitt, *A History Of Portuguese Overseas Expansion, 1400-1668* (Abingdon, England: Routledge, 2005), 19.

¹¹ Barack Obama, "National Strategy for the Arctic Region" (May, 2013): 2.

considers changes in the Arctic climate as an opportunity to strengthen relationships with partners and allies. In the same year, the Department of Defense (DOD) also released an Arctic strategy with a goal of ensuring that the Arctic remains free of conflict as it implements the President's National Strategy for the Arctic Region. The desired endstates of the DOD strategy is to provide regional security and stability, safeguard US national interests, protect the homeland, and address challenges through international cooperation.¹² Furthermore, the 2013 strategy "articulates two main supporting objectives: ensure security, support safety, and promote defense cooperation, and prepare to respond to a wide range of challenges and contingencies—operating in conjunction with other nations when possible, and independently if necessary—in order to maintain stability in the region."¹³

As receding sea-ice enables an increasing number of ships to navigate the NSR and NWP, the potential for Arctic conflict will intensify. According to the US Government Accountability Office, "In 2011, northern transshipping routes opened during the summer months, which permitted more than 40 vessels to transit between June and October 2011. The Northern Sea Route opened by mid-August, and appeared to remain open through September, while the Northwest Passage opened for periods in the summer for the fifth year in a row."¹⁴ The US Coast Guard (USCG) and US Navy (USN) primarily maintain regional stability in the Arctic, but as maritime activity continues to increase, security responsibilities for all branches of the Joint Force and Homeland Security will multiply. The US Army, particularly the US Army Alaska (USARAK), will play a significant role in meeting these requirements and must take steps

¹² US Department of Defense, *Arctic Strategy* (Washington, DC: Government Printing Office, 2013), 2.

¹³ Ibid.

¹⁴ US Government Accountability Office, *Arctic Capabilities: DOD Addressed Many Specified Reporting Elements in its 2011 Arctic Report but Should Take Steps to Meet Near- and Long-Term Needs* (Washington, DC: Government Printing Office, 2012), 5-6, last modified 2015, accessed February 24, 2015, <http://www.gao.gov/products/GAO-12-180>.

to prepare for conducting Arctic operations. Although USARAK has renewed its emphasis on Arctic skills training, the training remains primarily focused at the tactical level. This monograph will argue that the US Army has an Arctic capability gap at the operational level. Therefore, the US Army must leverage USARAK's nascent capability to provide the Joint Force with an Arctic operational capability to achieve the objectives of maintaining security and stability in the region, as described in the 2013 National Strategy for the Arctic Region.

This monograph is divided into six sections. The first section serves as the introduction. The next section frames the Arctic operational environment and describes potential geopolitical disputes that could possibly lead to conflict and/or regional militarization. The third section evaluates the US National Strategy for the Arctic Region and the DOD Arctic Strategy in order to assess the feasibility of the US Army meeting the strategic objectives as set forth in the appropriate documents. Section four highlights the current Arctic capabilities across the US Joint Force and presents considerations based on existing equipment, infrastructure, and policies for the DOD to consider and to analyze challenges the US Army faces. This section also highlights the current capabilities of the Arctic coastal states to provide context and relevance for why the US Army must examine its operational capabilities. The fifth section specifically addresses the US Army's Arctic operational capabilities and gaps utilizing the analytical framework of DOTMLPF. The final section concludes with a summary of Arctic capability gaps and potential solutions to mitigate operational risks for the US Army if called upon to conduct operation in the Arctic.

The Arctic Operational Environment

Climate change is warming the Arctic at a much faster rate than the rest of the world. For centuries, sea ice extent in the Arctic returned to its historical maximum each year during the

winter refreezes.¹⁵ However, beginning in 1979, the annual average extent of the ice started to decline.¹⁶ In 2007, sea ice retreated to a record low and captured international attention. In the following years, sea ice never returned to its historical maximum and, in 2012, retreated to record lows. The continuing decline of sea ice during this period “brought the Arctic to the attention of major powers around the world, including China, India, and the European Union—attracted by the region’s natural resources—and Korea and Japan—interested in the prospects for commercial shipping in the region.”¹⁷ As Arctic ice continues to recede, providing access to the region’s abundant natural resources and commercially lucrative maritime routes, sovereignty disputes and national security concerns may trigger geopolitical disputes. Before examining Arctic geopolitics and sources of contention, it is important to define the region’s geographic boundaries for context and clarity.

The geographical space between the North Pole and the internationally recognized southern boundary defines the area known as “the Arctic.” Several variations of the Arctic’s southern boundary exist to serve scientific and political purposes. The Arctic Circle, located at sixty-six degrees, thirty-two minutes North latitude, is the most common southern boundary delineation used for scientific purposes.¹⁸ The US Congress defines the Arctic as the region north of this delineation, with the exception of extending a segment of the Arctic Circle southward to

¹⁵ Katherine Leitzell, “Arctic sea ice before satellites,” National Snow and Ice Data Center, January 31, 2011, accessed January 28, 2015, <http://nsidc.org/icelights/2011/01/31/arctic-sea-ice-before-satellites/>.

¹⁶ Intergovernmental Panel on Climate Change, 2014: Summary for Policymakers. In: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, United Kingdom and New York, USA 2014), 4.

¹⁷ Oran Young, “Arctic Politics in an Era of Global Change,” *Brown Journal of World Affairs*, no. 19 (Fall/Winter 2012): 167.

¹⁸ “What is the Arctic,” National Snow and Ice Data Center, n.d., accessed January 28, 2015, <https://nsidc.org/cryosphere/arctic-meteorology/arctic.html>.

include additional land in northern Alaska, the Bering Sea, and the Aleutian Islands for governmental planning and budgeting purposes.¹⁹ References to the Arctic throughout this monograph refer to the region as defined by the US Congress. (See figure 2.)



Figure 2: Arctic Boundary as Defined by US Congress

Source: US Arctic Research Commission, *Arctic Boundary Map: Alaska with Polar Inset*, May 27, 2009, accessed November 26, 2014, <http://www.arctic.gov/maps.html>.

Within this defined geographical area of the Arctic, there are diverse terrains and weather conditions that impact military operations. The Arctic's physical terrain includes ice caps, tundra, and permafrost. Icecaps consist of a dense layer of ice and snow, encompassing up to 50,000

¹⁹ "Frequently Asked Questions About the Arctic," National Oceanic and Atmospheric Administration, last modified 2015, accessed March 6, 2015, <http://www.arctic.noaa.gov/faq.html#1>.

square kilometers.²⁰ Temperatures consistently remain below freezing and movement over an icecap typically requires specialized training and equipment. Tundra is the most common Arctic terrain feature, with limited tree growth due to cold temperatures and short growing seasons. Tundra consists of various grasses and mosses that often develop into clumps of vegetation, known as tussocks, with standing water collecting around them due to a permanently frozen layer of ice beneath the surface preventing adequate drainage.²¹ The frozen ground underneath the tundra is known as permafrost. According to the US Arctic Research Commission, “the effects of climatic warming on permafrost and the seasonally thawed layer above it (the active layer) can severely disrupt...human infrastructure such as roads, bridges, buildings, utilities, pipelines, and airstrips.”²² The impact of rising global temperatures on terrain restricts both mounted and dismounted mobility and presents numerous challenges to increasing and maintaining the critical infrastructure required to support continuous Arctic operations.²³ Although warming presents numerous mobility challenges, the region’s extreme cold weather exponentially increases the difficulty of conducting Arctic military operations.

Arctic winter weather directly impacts military operations. The average mean temperature at the North Pole during the winter is -40 degrees Fahrenheit.²⁴ In the US Arctic, the lowest recorded surface air temperature of -80 degrees Fahrenheit occurred in 1971 at Prospect

²⁰ “Encyclopedic Entry: Ice Cap,” National Geographic, n.d., accessed March 6, 2015, http://education.nationalgeographic.com/education/encyclopedia/ice-cap/?ar_a=1.

²¹ Army Tactics, Techniques, and Procedures (ATTP) 3-97.11, *Cold Region Operations* (Washington, DC: Government Printing Office, 2011), 1-4.

²² US Arctic Research Commission, *Climate Change, Permafrost, and Impacts on Civil Infrastructure*, US Arctic Research Commission Permafrost Task Force Report, December 2003, ii, accessed January 10, 2015, <http://www.arctic.gov/publications/other/permafrost.html>.

²³ ATTP 3-97.11, 1-5.

²⁴ “Compare the Poles: Weather,” Woods Hole Oceanographic Institution, accessed March 3, 2015, <http://polardiscovery.whoi.edu/poles/weather.html>.

Creek, Alaska.²⁵ Military units that fail to mitigate extreme cold weather risks increase the potential of unnecessary casualties. During World War II and the Korean War, cold weather contributed to nearly 95,000 casualties.²⁶ In the fight to recapture the Aleutian Island of Kiska from the Japanese in 1943, US forces suffered more casualties from cold weather than from enemy fire.²⁷ Recognizing the impact of temperature on personnel and equipment, the Army in Army Tactics, Techniques, and Procedures (ATTP) 3-97.11 developed cold temperature categories to assist leaders when preparing to conduct military operations. During Extreme Cold, temperatures range from -25 to -40 degrees Fahrenheit and cause most individuals to become withdrawn or focus on physical comfort.²⁸ Hazardous Cold Conditions exist at temperatures below -40 degrees Fahrenheit, and units must have extensive training to operate effectively in such extremes.²⁹ Beyond extreme temperatures, additional weather conditions range from ice fog that reduces visibility, to the aurora borealis, which disrupts radio communication. Commanders and planners must consider all weather phenomena when planning and conducting Arctic operations in order to reduce risk and avoid catastrophic loss. Forecasting weather in the Arctic is difficult, but success at the tactical and operational level begins with terrain and weather analysis.³⁰

Following the Cold War, the Arctic Council formed in 1996 to promote cooperation between the Arctic states, but excluded issues of military security in order to avoid

²⁵ “NOAA Weather Radio All Hazards Information: Alaska Weather Interesting Facts and Records,” National Oceanic and Atmospheric Administration, n.d., accessed March 6, 2015, <http://www.arh.noaa.gov/docs/AKWXfacts.pdf>.

²⁶ ATTP 3-97.11, 3-1.

²⁷ “Battle of the Aleutian Islands,” History.com, last modified 2009, accessed March 15, 2015, <http://www.history.com/topics/world-war-ii/battle-of-the-aleutian-islands>.

²⁸ ATTP 3-97.11, 1-8.

²⁹ Ibid.

³⁰ Ibid., 1-6.

confrontation.³¹ Members of the council include: the United States, Russia, Canada, Denmark (Greenland), Norway, Iceland, Sweden, Finland, and 500,000 indigenous peoples of the Arctic represented by six organizations. The Council is an international and intergovernmental forum, dedicated to addressing “environmental protection and sustainable development issues in the Arctic region.”³² However, explicitly avoiding security issues will complicate matters as Arctic nations become increasingly dependent on fossil fuels and meteoric global population growth increases the demand for protein-rich fisheries and water.

In 2007, when sea ice receded to a record low, media outlets and pundits predicted that regional conflict would erupt between Arctic coastal states fighting over jurisdictional rights to extract sub-sea resources as well as access to commercial shipping routes.³³ For example, Arctic shipping routes reduce sea voyage distances comparatively to traditional maritime trade routes through the Suez Canal or Panama Canal and potentially present a significant economic benefit for export-driven nations.³⁴ The NSR will reduce distances between East Asia and Western Europe by 7,000 kilometers, shortening total transit time by up to fifteen days. The NWP will reduce distances between the Western US and Western Europe by 10,000 kilometers.³⁵ The media attention led governments around the world to issue statements attempting to become part

³¹ Arctic Council, *Declaration on the Establishment of the Arctic Council* (Ottawa: Joint Communique of the Governments of the Arctic Countries on the Establishment of the Arctic Council, 1996), 2, accessed September 23, 2014, <http://www.arctic-council.org/index.php/en/document-archive/category/5-declarations?download=13:ottawa-declaration>.

³² “Arctic Council,” US Department of State, n.d., accessed March 6, 2015, <http://www.state.gov/e/oes/ocns/opa/arc/ac/>.

³³ Oran Young, “The Arctic in Play: Governance in a Time of Rapid Change,” *The International Journal of Marine and Coastal Law*, no. 24 (2009): 424.

³⁴ “The Emerging Arctic,” Council on Foreign Relations, n.d., accessed March 6, 2015, [http://www.cfr.org/arctic/emerging-arctic/p32620#/#/](http://www.cfr.org/arctic/emerging-arctic/p32620#/).

³⁵ “The Geography of Transport Systems,” Hofstra University, accessed 12 January, 2015, <https://people.hofstra.edu/geotrans/eng/ch1en/conc1en/polarroutes.html>.

of the Arctic's future; Arctic nations published strategic guidance to address the changing geopolitical landscape.³⁶ In reaction to media stories suggesting militarization of the Arctic over resource competition, the five Arctic coastal states of the Arctic Council released the Ilulissat Declaration on May 28, 2008 during the Arctic Ocean Conference in Greenland.³⁷ The declaration announced that the coastal states intended to settle disputes under existing international law and block any "new comprehensive international legal regime to govern the Arctic Ocean."³⁸ The Arctic coastal states committed to resolving overlapping jurisdictional issues within the framework of the United Nations Convention on the Law of the Sea (UNCLOS).

UNCLOS is an international treaty that establishes a comprehensive set of rules governing the world's oceans. The regulatory framework provides coastal states with sovereignty rights over territorial waters and an Exclusive Economic Zone (EEZ). Territorial waters, considered sovereign territory of the state, extend out to twelve nautical miles from a nation's coastline and include the sea, seabed, and subsoil.³⁹ The EEZ extends out to 200 nautical miles from the coastline and provides a state with "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil."⁴⁰ According to Article 76 of

³⁶ "Arctic Strategies," The Arctic Council, n.d., accessed February 25, 2015, <http://www.arctic-council.org/index.php/en/document-archive/category/12-arctic-strategies>.

³⁷ Jess Worth "There's Little Real Conflict So Far Over Arctic Sovereignty," *CCPA Monitor* 16, no. 4 (September 2009): 8.

³⁸ "The Ilulissat Declaration," *Ocean Law*, January 1, 2014, accessed February 25, 2015, <http://www.newarcticfuture.org/content/ilulissat-declaration>.

³⁹ United Nations Environment Programme, *New Awareness of and Opportunities for UNEP to Address Climate Change in the Arctic* (Nairobi: The Governing Council/Global Environmental Ministerial Forum, 2013), 5.

⁴⁰ United Nations, *United Nations Convention on the Law of the Sea: Agreement Relating to the Implementation of Part XI of the Convention*, pt. 5, art. 55-57, n.d., accessed February 25, 2015, http://www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm.

UNCLOS, coastal states can also extend their EEZ beyond 200 nautical miles if they can prove the submerged prolongation of landmass along the seafloor is a geological extension of their country's continental shelf.⁴¹

Territorial claims beyond the EEZ, under Article 76, require nations to submit supporting evidence to the UN Commission on the origin and limits of the Continental Shelf.⁴² Although Arctic coastal states claim they are committed to resolving overlapping jurisdictional issues within the framework of UNCLOS, underlying tension is increasing between the coastal nations over unresolved sovereignty disputes. For example, determining if the origin of the resource rich underwater mountain range, the Lomonosov Ridge, is an extension of Russia, Denmark, or Canada's continental shelf, remains undecided by the UN commission.⁴³ A second example exists between the United States and Canada. Part III of UNCLOS stipulates that vessels from all states can exercise the right of innocent passage through archipelagic waters. However, Canadian officials dispute the distinction of sovereign rights versus international rights as described by UNCLOS and view the waters of their Arctic Archipelago as internal waters, subject to the absolute sovereignty of Canada.⁴⁴ In contrast, the US considers the waters along Canada's mainland coast as an international strait, arguing that the international rights of innocent passage apply.⁴⁵ Resolving jurisdictional and sovereignty rights favorably could equate to considerable

⁴¹ United Nations, *United Nations Convention on the Law of the Sea: Agreement Relating to the Implementation of Part XI of the Convention*, pt. 6, art. 76, n.d., accessed September 29, 2014, http://www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm.

⁴² Ibid.

⁴³ Natalie Mychajlyszyn, "The Arctic: Geopolitical Issues," October 24, 2008, Canadian Parliamentary Information and Research Service, 3, accessed February 25, 2015, <http://www.parl.gc.ca/Content/LOP/researchpublications/prb0806-e.htm>.

⁴⁴ Francesco Stipo et al., "The Future of the Arctic: A Key to Global Sustainability," *Cadmus Journal* 1, no. 5 (October 2012): 44, accessed January 10, 2015, <http://cadmusjournal.org/node/220>.

⁴⁵ Ibid.

benefits for a nation. Globalization and the growth of multinational corporations potentially bring other interests into the Arctic, such as the large non-Arctic nations providing capital to develop resources to feed growing populations.⁴⁶

Nations facing rising natural resources demands due to population growth will likely turn to the Arctic's natural resources. With one in eight people in the world not getting enough to eat and the global population expected to exceed nine billion by the year 2050, there will be fierce competition over food sources and natural resources.⁴⁷ According to the IPCC in their "Summary for Policymakers" in *Climate Change 2014: Impacts, Adaptation, and Vulnerability*: "all aspects of food security are potentially affected by climate change, including food access, utilization, and price stability."⁴⁸

In 2014, the Food and Agriculture Organization of the United Nations recommended to increase food production and improve distribution methods to reduce the number of an estimated 805 million people in the world chronically undernourished. Non-Arctic nations will likely rely on extracting the Arctic's natural resources and shorter shipping routes to meet demands while Arctic nations may exploit this opportunity to shore up weaknesses in their economies.⁴⁹ For

⁴⁶ "Arctic Economies: Megaprojects," The Arctic Portal, n.d., accessed March 6, 2015, <http://arcticportal.org/features/699-arctic-economies-megaprojects>.

⁴⁷ Dennis Dimick, "As World's Population Booms, Will its Resources be Enough for Us," National Geographic, September 21, 2014, accessed March 1, 2015, <http://news.nationalgeographic.com/news/2014/09/140920-population-11billion-demographics-anthropocene/>.

⁴⁸ Intergovernmental Panel on Climate Change, 2014: Summary for Policy Makers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, (Cambridge, United Kingdom and New York, USA: Cambridge University Press, 2014), accessed November 14, 2014, http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf.

⁴⁹ Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, and World Food Programme, *The State of Food Insecurity in the World 2014: Strengthening the enabling environment for food security and nutrition* (Rome: Food and Agriculture Organization of the United Nations, 2014), ii.

instance, facing economic sanctions and losing energy markets in the West, Russia has turned to the east to bolster its energy-based economy.⁵⁰ The most prominent non-Arctic nation with an interest in the Arctic is China. Since the imposition of sanctions on Russia by the European Union and the United States, Russia has signed several export agreements for natural gas and oil to China.⁵¹ Russia's Arctic resources provide another avenue for China to assert its interest to meet their growing demand for energy. According to the US Joint Forces Command, "Skilled Chinese engineers, technicians, and scientists are deeply involved in scientific discovery around the world and in building the infrastructure upon which its future prosperity and global integration might be built."⁵²

The United States Arctic Strategy

The 2010 *National Security Strategy* (NSS) refers to the United States "as an Arctic Nation with broad and fundamental interests in the Arctic region, where we seek to meet our national security needs, protect the environment, responsibly manage resources, account for indigenous communities, support scientific research, and strengthen international cooperation on a wide range of issues."⁵³ This recognizes a long-term US interest in the Arctic. Prior to the purchase of Alaska from the Russian Empire in 1867, US military and business interests were active in the region. Heightened demand for whale oil and increased competition for whaling grounds witnessed American whalers begin hunting the waters of the Bearing Straits in the 1840s. So extensive and pronounced was US whalers' presence that a storm in 1871 sunk 34 whaling

⁵⁰ "Russian Sanctions, China, and the Arctic," *The Diplomat*, January 3, 2015, accessed March 6, 2015, <http://thediplomat.com/2015/01/russian-sanctions-china-and-the-arctic/>.

⁵¹ *Ibid.*

⁵² US Joint Forces Command, *The Joint Operating Environment 2010* (Washington, DC, Government Printing Office, 2010), 40-41.

⁵³ Barack Obama, "National Security Strategy," (May 2010): 50.

vessels.⁵⁴ The Arctic, then as now, remains a contested space. During the Civil War, Confederate Commerce Raiders caused significant damage to Union merchant vessels and New England's whaling industry in the northern Pacific, with the C.S.S. Shenandoah particularly known as the scourge of the Arctic Whaling Fleet.⁵⁵

Following the purchase of Alaska, the US became an Arctic nation with sovereign territory within the Arctic Region. The acquisition of Alaska coincided with the beginning of the decline in the importance of whale oil, which was replaced by kerosene. The discovery of Gold, and the resulting Klondike Gold Rush of 1899, paved the way for development of sub-arctic Alaska. The discovery of oil at Prudhoe Bay in 1968 inside the Arctic, coupled with the geopolitics of the Cold War, cemented the importance of an Arctic Strategy.

During the Cold War, the US focus on the Arctic emphasized the ability to detect or repulse a Soviet attack. The US also tapped the Prudhoe Bay oil supplies to mitigate the impact of the 1973 Arab oil embargo.⁵⁶ After the Soviet Union collapsed and the Cold War ended, President William Jefferson Clinton, in 1994, issued the first modern policy document addressing the Arctic. President Clinton's Presidential Decision Directive/National Security Council Paper 26 (PDD/NSC-26) sought to forge international consensus to develop the Arctic in an environmentally sustainable manner.⁵⁷

PDD/NSC-26 laid out six principal objectives. The first three objectives include: meeting

⁵⁴ John Bockstoe, *Whales, Ice, & Men: The History of Whaling in the Western Arctic* (Seattle: University of Washington Press, 1986), 93.

⁵⁵ John Baldwin and Ron Powers, *Last Flag Down: The Epic Journey of the Last Confederate Warship* (New York: Crown Publishing Group, 2008), 242.

⁵⁶ Arlon Tussing, "Reflections on the End of the OPEC Era," *Alaska Review of Social and Economic Conditions* 19, no. 4 (December 1982): 1.

⁵⁷ William J. Clinton, Presidential Decision Directive/National Security Council-26 (PDD/NSC-26), "United States Policy on the Arctic and Antarctic Regions," *Federal Register* 20270 (June 9, 1994): 5.

post Cold War national security and defense needs, protecting the Arctic environment, and conserving its natural resources. These objectives addressed US security interests and emphasize environmental sustainability.⁵⁸ The three additional descriptive objectives govern the accomplishment of the first three. They include: strengthening institutions for cooperation among the Arctic Nations, involving Indigenous people in decisions making, and enhancing scientific monitoring and research into local, region, and global issues.⁵⁹

The current Strategy for the Arctic Region expands upon President Bush's National Security Presidential Directive-66/Homeland Security Presidential Directive-25 (NSPD-66/HSPD-22), published in 2009, which superseded PDD/NSC-26.⁶⁰ A changing geopolitical environment and a greater understanding of the Arctic environment influenced the policies set forth in NSPD-66/HSPD-22. As opposed to PDD/NSC-26, NSPD-66/HSPD-22 transcends the objectives and principals that govern Arctic policy, articulating a policy with measurable and specific goals. Unlike PDD/NSC-26, which charges an Interagency Working Group with developing policy, NSPD-66/HSPD-22 orders the Departments of State, Defense, and Homeland Security to achieve specific policy goals. This includes developing the capabilities necessary to protect air, land, and sea borders in the Arctic region, increase domain awareness, and to project a sovereign maritime presence while encouraging the peaceful resolution of disputes in the Arctic Region.⁶¹ Although NSPD-66/HSPD-22 likely influenced the inclusion of Arctic interests in national strategy for the first time, the 2010 NSS primarily articulates the objectives of the US.

⁵⁸ William J. Clinton, Presidential Decision Directive/National Security Council-26 (PDD/NSC-26), "United States Policy on the Arctic and Antarctic Regions," Federal Register 20270 (June 9, 1994): 2.

⁵⁹ Ibid.

⁶⁰ George W. Bush, National Security Presidential Directive-66/Homeland Security Presidential Directive-22 (NSPD-66/HSPD-22), "Arctic Region Policy" (January 9, 2009), accessed January 4, 2015, <http://fas.org/irp/offdocs/nspd/nspd-66.htm>.

⁶¹ Ibid.

The 2010 NSS outlines the four enduring goals of the US: maintain security of the US and its allies, promote respect for our values at home and abroad, maintain the international order, and increase the prosperity of the US.⁶² These goals provided the basis for the 2012 Defense Strategic Guidance (DSG), which builds upon the 2010 NSS with three pillars to achieve these goals. They include: protect the homeland, build security globally, and project power and win decisively.⁶³ The ability to project power and win decisively articulated in the 2012 DSG is the foundation of maintaining international order. This is the foundation of DOD's Arctic requirements.

Although the Arctic is not specifically mentioned in the 2014 Quadrennial Defense Review or DSG, the 2010 NSS proclaims: "The United States is an Arctic Nation with broad and fundamental interests in the Arctic region, where we seek to meet our national security needs, protect the environment, responsibly manage resources, account for indigenous communities, support scientific research, and strengthen international cooperation on a wide range of issues."⁶⁴ With this proclamation, and in recognition of the changing environment, the United States published the 2013 National Strategy for the Arctic Region. The National Strategy for the Arctic Region is similar to the 2010 NSS in that it outlines enduring goals and interests of the US in the Arctic. The goal of the strategy is: "an Arctic region that is stable and free of conflict, where nations act responsibly in a spirit of trust and cooperation, and where economic and energy resources are developed in a sustainable manner that also respects the fragile environment and the interests and cultures of indigenous peoples."⁶⁵ To achieve the desired state, the strategy

⁶² Barack Obama, "National Security Strategy," (May 2010): 17.

⁶³ US Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*, Strategic Guidance (Washington, DC: Government Printing Office, January 2012), 2.

⁶⁴ Barack Obama, "National Security Strategy," (May 2010): 50.

⁶⁵ Barack Obama, "National Strategy for the Arctic Region," (May 10, 2013): 4.

establishes three lines of effort: to advance US security interests, pursue responsible Arctic region stewardship, and to strengthen international cooperation.⁶⁶

Capabilities of the US Joint Force and US Arctic Allies

This section will highlight the current Arctic capabilities of the Joint Force and present considerations based on existing equipment, infrastructure, and policies. It will emphasize pacing units, which critically impact their respective service's primary mission, or the wartime tasks within the service's operational domain.

The United States Air Force (USAF). The USAF has maintained a significant Arctic presence since World War II with a legacy of providing capabilities in the region. Under the Lend-Lease Act, passed in 1941, the USAF delivered nearly 8,000 combat planes to the Soviet Union along the Alaska-Siberia Route.⁶⁷ Following WWII, the USAF maintained a presence in Alaska with fighter aircraft stationed at forward bases to intercept Soviet long-range bombers capable of targeting the Northwestern US with nuclear weapons from Arctic staging bases near Alaska.⁶⁸ In response to the growing nuclear threat, the United States and Canadian governments established the Distant Early Warning (DEW) Line to prevent a preemptive Soviet attack. The DEW line, combined with the operational establishment of NORAD in 1957, played an integral role in the defense of the US and Canada for nearly three decades.⁶⁹

⁶⁶ Barack Obama, "National Strategy for the Arctic Region," (May 10, 2013): 6.

⁶⁷ "Fort Wainwright History," Fort Wainwright, n.d., accessed March 26, 2015, http://www.wainwright.army.mil/history/FWA_history.pdf.

⁶⁸ John Cloe, "The Cold War Year 1946-1991," Alaska Historical Society, n.d., accessed March 23, 2015, <http://alaskahistoricalsociety.org/discover-alaska/glimpses-of-the-past/the-cold-war-years-1946-1991/>.

⁶⁹ North American Aerospace Defense Command, "NORAD History," n.d., accessed March 6, <http://www.norad.mil/AboutNORAD/NORADHistory.aspx>.

Today, NORAD conducts aerospace warning and control, as well as maritime warning, in partnership with Canada to defend North America.⁷⁰ To exercise sovereignty and preserve domain awareness, the USAF maintains an Arctic aviation capability at Joint Base Elmendorf-Richardson (JBER), Alaska, and Stratton Air National Guard Base in Scotia, New York. The 11th Rescue Coordination Center is located on JBER along with two Airlift Squadrons, three Rescue Squadrons, and an Air Control Squadron which include the C-17 Globemaster III, HC-130N, C-130, and HH-60G Pave Hawk aircraft—all capable of operating in Arctic conditions.⁷¹ These squadrons maintain a 24-hour immediate alert status to conduct Search and Rescue (SAR) with the HC-130N conducting in-flight refueling primarily to extend the range and endurance of the HH-60G Pave Hawk SAR helicopters.⁷² The 109th Airlift Wing in New York maintains twelve of the DODs only ski-equipped LC-130 Hercules aircraft, capable of operating “from prepared and unprepared snow fields, floating ice sheets, glaciers, and traditional paved runways.”⁷³ The Airlift Wing deploys up to seven of their twelve aircraft to Antarctica from October to March each year to conduct transport and scientific missions for the National Science Foundation.⁷⁴ The 109th also deploys three aircraft to Greenland from April to August each year to support US and European scientists.⁷⁵

Although tasked with conducting operations in Greenland and Antarctica throughout the

⁷⁰ Select Committee on House Armed Services, Statement of General H. Jacoby, Jr., United States Army Commander United States Northern Command and North American Aerospace Defense Command Before the House Armed Services Committee, 113th Cong., February 26, 2014, HR Rep., 5.

⁷¹ US Department of Defense, *Report to Congress on Arctic Operations and the Northwest Passage*, 111th Cong., 2d sess., May 2011, HR Rep. 5136, 18.

⁷² Ibid.

⁷³ Ibid.

⁷⁴ “About the 109th Airlift Wing,” US Air National Guard, January 17, 2014, accessed March 26, 2015, <http://www.109aw.ang.af.mil/resources/factsheets/factsheet.asp?id=12587>.

⁷⁵ Ibid.

year, the 109th Airlift Wing provides an invaluable capability for the US Army in the event of an Arctic humanitarian crisis, natural disaster, and a combat operation, or to conduct Defense Support of Civil Authorities missions in Alaska. Unfortunately, the USAF does not have LC-130 aircraft in Alaska and their prime mover of troops and cargo, the C-17 Globemaster IIIA, requires a paved runway of 3,500 feet in length and 90 feet wide to land and take off.⁷⁶ Alaska only has three runways above the Arctic Circle that meet these specifications.⁷⁷ Therefore, the US Army would primarily rely on rotary wing aircraft stationed at Fort Wainwright. On the other hand, the USAF has conducted semi-prepared runway operations on snow and successfully landed four times on gravel-snow and ice-covered runway.⁷⁸

The US Navy (USN). The USN did not have a significant interest in the Arctic before World War II. The invasion of Alaska's Attu and Kiska Islands by the Japanese Empire in 1942 provided an impetus to develop infrastructure and maintain a US Armed Forces Arctic presence. With the Soviet attempts to establish a blue water navy capable of projecting power in the Arctic, the USN established robust facilities on Adak Island, Alaska and Keflavik, Iceland to support Long Range Maritime Patrol Aircraft and Sound Surveillance System acoustic sensor networks.⁷⁹ The USN facility on Adak Island closed in 1997, and personnel moved to Kodiak Island.

⁷⁶ "C-17 Globemaster III," US Air Force, October 27, 2004, accessed March 26, 2015, <http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104523/c-17-globemaster-iii.aspx>.

⁷⁷ "State Owned Public Airports: Northern Region, Statewide Aviation," Alaska Department of Transportation and Public Facilities, n.d., accessed March 26, 2015, http://dot.alaska.gov/stwdav/airports_public_northern.shtml.

⁷⁸ Jerome Lessard, "8 Wing pilot performed world's first C-17 landing in Alert," Trenton Trentonian, April 28, 2010, accessed March 26, 2015, <http://www.trentonian.ca/2010/04/27/8-wing-pilot-performed-worlds-first-c-17-landing-in-alert>.

⁷⁹ Edward Whitman, "The Secret Weapon of Undersea Surveillance," *Undersea Warfare*, 2005, accessed December 8, 2014, http://www.navy.mil/navydata/cno/n87/usw/issue_25/sosus.htm.

Members of the USN stationed on Kodiak Island fall under the Command of Rear Admiral Daniel B. Abel, the Seventeenth Coast Guard District Commander. Although the USN is not permanently based in the Arctic, the recent designation of the US Fleet Forces Command in Norfolk, Virginia, as the Maritime Component Command for USNORTHCOM should result in an increased capability and focus on naval Arctic operations.⁸⁰

The USN possesses numerous assets available for the Joint Forces to support DOD strategy. Seasonally, the availability of the USN Surface Combatants and aviation assets provide maritime awareness, power projection, and sea control. Regardless of season, submarines can conduct sea control or denial of the seas.⁸¹ Despite having a minimal permanent presence in the Arctic, the USN has the most comprehensive Arctic policy document, entitled “US Navy Arctic Roadmap 2014-2030.” This document is a true roadmap building on the 2009 Arctic Roadmap, with measures of performance and assessment to determine requirements and progress.⁸² The document recognizes the changing conditions over the near (Present-2020), medium (2020-2030) and far future (2030 and beyond).⁸³ It highlights the changes in the environment, to include the navigability of all Arctic transit routes for at least two months per year by 2030.⁸⁴ The most significant inference from the roadmap is in implementation metrics. This document establishes a

⁸⁰ “About USNORTHCOM,” US Northern Command, n.d., accessed March 6, 2015, <http://www.northcom.mil/AboutUSNORTHCOM.aspx>.

⁸¹ US Department of Defense, *Report to Congress on Arctic Operations and the Northwest Passage*, 111th Cong., 2d sess., May 2011, HR Rep. 5136, 13.

⁸² US Navy, *US Navy Arctic Roadmap 2014-2030* (Washington DC: Government Printing Office, 2014), 16.

⁸³ *Ibid.*, 11.

⁸⁴ *Ibid.*, 11-12.

working group that will provide Program Objective Memorandum input to Chief of Naval Operation, which will provide funding for critical capabilities.⁸⁵

US Marine Corps (USMC). While not explicitly mentioned in the USN Roadmap, the USMC has an Arctic tradition dating to the Cold War, primarily in Northern Norway. The rotation of Marine Expeditionary Units (MEU) for exercises with Norwegian Forces reinforces the NATO Alliance and increases interoperability with other Arctic Nations.⁸⁶ The Marines provide the Joint Forces Commander with a number of unique capabilities that come from having an organic combined arms organization. Capabilities inherent in MEUs or Marine Air Ground Task Forces, such as organic small boat capabilities and OV-22 Osprey aircraft, are capable of air to air refueling and have a greater speed and range than US Army rotary wing aircraft.⁸⁷ These capabilities may prove very beneficial to both the USMC and the US Army for logistical and combat operations in the Arctic's austere environment.

United States Coast Guard (USCG). Although not formally part of the DOD, the USCG provides vital capabilities that support implementation of the National and DOD Arctic Strategies. The USCG seeks to improve domain awareness, modernize governance, and broaden partnership in the Arctic.⁸⁸ The USCG also enforces regulations in the maritime domain. In the

⁸⁵ US Navy, *US Navy Arctic Roadmap 2014-2030* (Washington DC: Government Printing Office, 2014), 22.

⁸⁶ US Department of Defense, *Report to Congress on Arctic Operations and the Northwest Passage*, 111th Cong., 2d sess., May 2011, HR Rep. 5136, 19.

⁸⁷ "V22 Osprey," Boeing, accessed March 26, 2015, n.d., <http://www.boeing.com/boeing/rotorcraft/military/v22/>.

⁸⁸ United States Coast Guard, *Arctic Strategy* (Washington DC: Government Printing Office, 2013), 22.

Arctic, the USCG integrates within the standing DOD structure, as the Commander of Coast Guard District 17 is the maritime component commander for Alaskan Command (ALCOM).⁸⁹

The USCG presence in the Arctic reflects the current shipping lanes, with the majority of assets concentrated below the Arctic Circle in the Gulf of Alaska. Prior to the proliferation of Global Positioning Systems, the USCG maintained a series of Long Range Aid to Navigation stations throughout the Arctic and Aleutian Islands. Currently, the main USCG installation is on Kodiak Island, supporting Cutter and aviation operations. However, the USCG is considering establishing a Forward Operating Location above the Arctic Circle in Nome Alaska, which would also benefit the US Army as a logistics hub for conducting operations in Northwest Alaska.⁹⁰

USCG elements are also present in the Northern Waters of the Arctic and the Bearing Straits. In recognition of the changing environment, the USCG is shifting focus to the North to establish a more permanent presence. Currently, the USCG is focusing efforts towards Port Clarence near Nome, Alaska, astride the Bering Strait, which Coast Guard Admiral Thomas Ostebo described as “what could become the most important international strait north of the Panama Canal.”⁹¹ Indeed, the USCG is maintaining stewardship of the 2,500-acre site and seasonally stationing a patrol vessel to respond to incidents and assist with maritime inspections.⁹²

The USCG has also adopted an Arctic Strategy. The strategy outlines three strategic

⁸⁹ “Military History in Alaska, 1867 – 2000,” Joint Base Elmendorf-Richardson, November 13, 2006, accessed November 21, 2014, <http://www.jber.af.mil/library/factsheets/factsheet.asp?id=5304>.

⁹⁰ Denise Michaels, “Arctic USCG Base Needed,” Institute of the North, n.d., accessed March 26, 2015, http://www.institutenorth.org/assets/images/uploads/articles/Arctic_USCG_Base_Needed_By_Mayor_Denise_Michels.pdf.

⁹¹ Anna MacArthur, “Admiral Ostebo Discusses Future of Port Clarence,” Alaska Public Media, January 27, 2015, accessed January 28, 2015, <http://www.alaskapublic.org/2014/01/27/admiral-ostebo-discusses-future-of-port-clarence/>.

⁹² Ibid.

objectives for the USCG, which nest with the *National Strategy for the Arctic Region* and *DOD Arctic Strategy*: seeking to improve domain awareness, modernizing governance, and broadening partnerships.⁹³ The USCG, however, differs in only having a ten-year time horizon as opposed to a much longer view by the Navy. The current force structure of the USCG does not support major arctic operations. Admiral Robert Papp elaborated, “while our Navy can go under the ice with submarines—and, when the Arctic weather permits, which is not all that often, we can fly over the ice—our nation has very limited Arctic surface capabilities. But surface capabilities are what we need to conduct missions like search and rescue, environmental response, and to provide a consistent and visible sovereign presence.”⁹⁴ The most significant obstacle preventing the USCG from accomplishing two of their strategic objectives is a gap in maritime capabilities, specifically an icebreaker capability.

Suitable ice-breaking capability is paramount to “enhance collection, fusion, and analysis of maritime information and intelligence” to improve maritime domain awareness.⁹⁵ Sufficient ice-breaking capability permits long-term Arctic access and would allow the United States to broaden partnerships. Most notable, an adequate ice-breaking capability enables the United States to conduct international maritime and aeronautical SAR as agreed to by the Arctic Council nations.⁹⁶ Currently, the US ice-breaking fleet consists of: a refurbished medium icebreaker (which is due to reach the end of its service life in less than ten years), a second medium

⁹³ US Coast Guard, *Arctic Strategy* (Washington, DC: Government Printing Office, May 2013), 4.

⁹⁴ Alan Dowd, “Breaking the Arctic Ice,” American Legion Landing Zone, November 19, 2014, accessed November 21, 2014, <http://www.legion.org/landingzone/225245/breaking-ice-arctic#sthash.cFFFKJ3p.dpuf>.

⁹⁵ US Coast Guard, *Arctic Strategy* (Washington, DC: Government Printing Office, May 2013), 24.

⁹⁶ “Secretary Clinton Signs the Arctic Search and Rescue Agreement with Other Arctic Nations,” US Department of State Fact Sheet, May 12, 2011, accessed March 6, 2015, <http://www.state.gov/r/pa/prs/ps/2011/05/163285.htm>.

icebreaker (which cannot operate in thicker ice), and one unfinished icebreaker.⁹⁷ In comparison with Russia's fleet of 40 icebreakers, which include six nuclear powered vessels, the United States obviously cannot maintain a maritime balance of power with Russia nor provide adequate coverage for SAR missions.⁹⁸

Although Russia has historically been an Arctic nation, the country's renewed Arctic focus became evident shortly after the United States published its Arctic strategy. Russian government television reported that Russia would be reactivating military bases in the Arctic Region, with President Putin describing them as "key...for the control of the situation in the entire Arctic region."⁹⁹ The potential order of battle includes 39 surface vessels, 45 submarines, and 2 "Arctic" brigades with 3,000 Arctic-trained soldiers under a newly-established Arctic Command.¹⁰⁰ As Vladimir Putin continues to publicly express a desire to control the "entire Arctic region," the perception that Russia may utilize its growing Arctic military to resolve continental shelf disputes is fueling the potential for conflict.¹⁰¹

US Arctic Allies. On the other side of the Arctic and the disputed Lomonosov Ridge, Canada is an ally of the United States and member of NATO. Among one of the first nations to

⁹⁷ US Coast Guard, "Major Icebreaker of the World Chart," last modified June 26, 2014, accessed March 26, 2015, <http://www.uscg.mil/hq/cg5/cg552/images/20140626%20Major%20Icebreaker%20Chart.pdf>.

⁹⁸ *Ibid.*

⁹⁹ "Putin orders Arctic military build-up in 2014," *Russia Today*, December 10, 2013, accessed December 14, 2014, <http://rt.com/news/arctic-russia-military-putin-000/>.

¹⁰⁰ Damien Sharkov, "Russian Troops Stationed Near Finnish Border as Putin Begins Move on Arctic," *Newsweek*, January 13, 2015, accessed January 21, 2015, <http://www.newsweek.com/3000-russian-troops-stationed-near-finish-border-putin-makes-moves-arctic-299129>.

¹⁰¹ Damien Sharkov, "Russian Navy to Focus Strategy on Arctic Zone and Black Sea," *Newsweek*, December 9, 2014, accessed January 21, 2015, <http://www.newsweek.com/russian-navy-will-focus-strategy-until-2030-arctic-zone-and-black-sea-290496>.

recognize changing environmental conditions, Canada began planning to improve its Arctic security and logistical capabilities in 2007. Canada prepositioned stocks to support extended and additional operations in the Arctic, increased the size of the indigenous Canadian Rangers to improve security, and started construction on an ice capable fleet.¹⁰² Despite issuing an ambitious plan, the Canadian Government placed several initiatives on hold or reduced the scale of individual projects due to associated costs.¹⁰³

Norway, another NATO member and Arctic coastal nation, has maintained a military presence in its Arctic territory where it anticipated an onslaught across a shared border with the Soviet Union. Along this border, Norway maintains a combined arms brigade to ensure its territorial integrity and has a significant maritime surveillance capability that utilizes ground based observers and Long Range Maritime Patrol Aircraft to provide early warning.¹⁰⁴ Due to its small size and proximity to Russia, Norway continues to request NATO involvement in the Arctic Region.¹⁰⁵ According to former Secretary General Anders Rasmussen, “the Arctic is a harsh environment. It rewards cooperation, not confrontation,” but later added that Norway still

¹⁰² “Expanding Canadian Forces Operations in the Arctic,” Office of the Prime Minister of Canada, August 10, 2007, accessed October 11, 2014, <http://www.pm.gc.ca/eng/news/2007/08/10/expanding-canadian-forces-operations-arctic>.

¹⁰³ David Pugliese, “Canadian Forces to stockpile military equipment in Arctic ‘hubs’ for faster response in case of emergency,” Postmedia News, August 21, 2014, last modified January 24, 2015, accessed September 27, 2014, http://news.nationalpost.com/2014/08/21/canadian-forces-to-stockpile-military-equipment-in-arctic-hubs-for-faster-response-in-case-of-emergency/#__federated=1.

¹⁰⁴ Robert Smol, “The Norwegian Juggernaut,” National Post, April 4, 2014, accessed November 17, 2014, <http://news.nationalpost.com/2014/04/04/robert-smol-the-norwegian-juggernaut/>.

¹⁰⁵ Luke Coffey and Daniel Kochis, “NATO Summit 2014: Time to Make Up for Lost Ground in the Arctic,” The Heritage Foundation, August 21, 2014, accessed March 26, 2015, <http://www.heritage.org/research/reports/2014/08/nato-summit-2014-time-to-make-up-for-lost-ground-in-the-arctic>.

has a legitimate expectation to enjoy the benefit of Article 5.¹⁰⁶

The last nation with direct access to the Arctic Ocean is Denmark by way of Greenland. Although Greenland is working toward independence, Denmark retains control over foreign affairs and the territorial defense of Greenland. Recognizing the increased importance of the Arctic, the Danish Military established an Arctic Command in 2012, consisting of a small headquarters and liaison element.¹⁰⁷ Other than SAR functions, the primary force in Greenland is the Sirius Sled Patrol. Serving in a similar role as the Canadian Rangers and US Inuit Scouts, the Sirius Sled Patrol's purpose is to exercise sovereignty over the sparsely populated landmass of Greenland.¹⁰⁸

US Army Arctic Operational Capability Analysis

The 2013 National and DOD Arctic strategies emphasize international cooperation and do not foresee the emergence of conflict in the region. President Obama has stated, "the Arctic region is peaceful, stable, and free of conflict. The United States and its Arctic allies and partners seek to sustain this spirit of trust, cooperation and collaboration, both internationally and domestically."¹⁰⁹ In response to a question whether the Arctic was already contested and on a path to militarization, President Ólafur Ragnar Grímsson of Iceland argued that the Arctic is "not

¹⁰⁶ Gerard O'Dwyer, "NATO Rejects Direct Arctic Presence," Defense News, May 29, 2013, accessed December 14, 2014, <http://archive.defensenews.com/article/20130529/DEFREG/305290022/NATO-Rejects-Direct-Arctic-Presence>.

¹⁰⁷ "Arctic Command," Defense Command Denmark, last modified February 13, 2013, accessed December 29, 2014, <http://www2.forsvaret.dk/eng/Organisation/ArcticCommand/Pages/ArcticCommand.aspx>.

¹⁰⁸ Michael Finkel, "The Cold Patrol," National Geographic, January 2012, accessed December 27, 2014, <http://ngm.nationalgeographic.com/2012/01/sled-dogs/finkel-text>.

¹⁰⁹ Barack Obama, "National Strategy for the Arctic Region," (May 10, 2013): ii.

the Wild West’ and is not reemerging as a new Cold War.¹¹⁰ However, Russia’s recent actions in Crimea, Ukraine, and the threatening posture of a five-day Arctic exercise that began on 16 March 2015, involving 38,000 soldiers, over 50 submarines and surface ships, and 110 military aircraft, may suggest otherwise.¹¹¹

The USN and USCG recognize that changing conditions in the Arctic have important national security implications. Both the USN and the USCG have published strategies to address their increasing responsibilities of defending US interests in the Arctic while the US Army has been far more passive. Published in the 2014 Training and Doctrine Command (TRADOC) Pamphlet titled *The US Army Operating Concept (AOC)*, TRADOC Commander General David G. Perkins writes: “One of our most important duties as Army professionals is to think clearly about the problem of future armed conflict. That is because our vision of the future must drive change to ensure the Army forces are prepared to prevent conflict, shape the security environment, and win wars.”¹¹² Heeding the advice of Perkins, this section of the monograph will address the US Army’s Arctic capability gaps and the negative implications for combat readiness in cold regions. As the primary land component of the DOD, the Army must consider how to support the Joint Force and project strategic land power in cold environments. This ability could necessitate modifications within the Army to address identified operational capability gaps. Evaluating a capability occurs within the “domains” of the current US doctrinal definition of

¹¹⁰ “The Future of the Arctic: A New Global Playing Field,” Council of Foreign Relations, April 16, 2013, accessed March 15, 2015, <http://www.cfr.org/arctic/future-arctic-new-global-playing-field/p30471>.

¹¹¹ “Lawmakers Press Top Officers for Arctic Plans,” Defense News, March 20, 2015, accessed March 20, 2015, <http://www.defensenews.com/story/defense-news/blog/intercepts/2015/03/20/lawmakers-press-pentagon-officials-for-arctic-plans/25092543/>.

¹¹² US Army Training and Doctrine Command (TRADOC) Pamphlet 525-3-1, *The US Army Operating Concept: Win in Complex World* (Washington, DC: Government Printing Office, 2014), i.

DOTMLPF.¹¹³ For the purposes of this monograph, DOTMLPF will serve as a broad analytical framework to identify the US Army's Arctic capability gaps.

Doctrine. US Army doctrine provides fundamental principles that guide the actions of military forces in support of national objectives.¹¹⁴ Doctrine reinforces US policy and supports strategy through its application. US Army doctrine, founded on extant capabilities, is authoritative except when the judgment of the commander or exceptional circumstances dictate otherwise. The US Army introduced Field Manual (FM) 70-15 *Operations in Snow and Extreme Cold* in 1944 after experiencing nearly 89,000 cold weather casualties during ongoing World War II operations.¹¹⁵ In 1959, it published FM 31-70 *Basic Cold Weather Manual* in response to suffering close to 10,000 cold weather casualties during the Korean War.¹¹⁶ Despite harsh battlefield lessons, subsequent cold weather manuals continued to articulate that all military operations, regardless of environmental conditions, follow the same basic doctrinal principles. However, cold weather conditions impose significant limitations on tactics and logistics, requiring specialized equipment and training to overcome these unique circumstances.¹¹⁷ Indeed,

¹¹³ Joint Capabilities Integration Development System (JCIDS) Manual, *Manual for the Operations of the Joint Capabilities Integration and Development System*, (Washington, DC: Government Printing Office, 2012), A4-A5. (DOTMLPF is a problem-solving construct for assessing current and future capabilities, while managing change. A capability is the ability to accomplish a desired outcome under established conditions that follow specific standards and a DOTMLPF analysis is an investigation of that capability within each domain of Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities.)

¹¹⁴ Army Doctrine Reference Publication (ADRP) 1-02, *Terms and Military Symbols* (Washington, DC: Government Printing Office, 2015), 1-28.

¹¹⁵ ATP 3-97.11, 3-1.

¹¹⁶ Ibid.

¹¹⁷ Field Manual (FM) 70-15, *Operations in Snow and Extreme Cold* (Washington, DC: Government Printing Office, 1944), 1.

cold weather doctrine primarily focused on individual tasks and small unit tactics in the decades following World War II.

It was not until 1971, with the publication of FM 31-71 *Northern Operations*, that the Army published doctrine pertaining to cold weather operations above the squad level. FM 31-71 was a drastic improvement over the preceding manual, FM 31-70. FM 31-71 added planning guidance and factors for combat, combat support, and combat service support operations up to the brigade level. The inclusion of a range of military operations up to the brigade level was a significant improvement over previous manuals, but an emphasis on cold weather training started to deteriorate soon after its release and cold weather doctrine was not updated for another forty years.

The focus on updating cold weather doctrine based on training experiences declined in the 1980s. Cold weather training also continued to decline after the collapse of the Soviet Union in 1991. After the collapse, “the primary military mission for US military forces shifted from defending Alaska to planning and conducting joint training for rapid, long range deployments.”¹¹⁸ With this change, units stationed in Alaska primarily conducted training during the summer months and deployed to the continental US during the winter to train in a warmer climate. In the 1990s, several units in Alaska were deactivated, including the 6th Infantry Division, during a 39 percent drawdown of US Army forces.¹¹⁹ During this period, cold weather training in Alaska rarely occurred and cold weather doctrine was not updated. Updating cold weather doctrine remained a low priority during the Global War on Terrorism until the climate change-driven recession of ice in the Arctic captured international attention in 2007. The changing conditions in

¹¹⁸ “Military History in Alaska, 1867-2000,” Joint Base Elmendorf-Richardson, November 13, 2006, accessed March 26, 2015, <http://www.jber.af.mil/library/factsheets/factsheet.asp?id=5304>.

¹¹⁹ Bernard Rostker, *Right-Sizing the Force: Lessons for the Current Drawdown of American Military Personnel* (Washington DC: Center for a New American Security, 2013), 13, accessed March 26, 2015, http://www.cnas.org/sites/default/files/publications-pdf/CNAS_RightSizingTheForce_Rostker_0.pdf.

the Arctic renewed the US Army's interest in cold weather operations, leading the US Army to replace FM 31-71 with ATTP 3-97.11 *Cold Region Operations*.

Basic tactics in the new manual resemble FM 31-71 and virtually all other information at the operational level is a direct transfer from Army Doctrine Reference Publication (ADRP) 3-0, with the exception of a few cold weather caveats. The manual places the hazards of extreme cold weather on par with enemy fire and posits that "severe environmental conditions...can render individuals and units combat ineffective without ever engaging the enemy."¹²⁰ The emphasis on the danger of cold weather and combat as synonymous with survival illustrates the need for the Army to authorize a proponent agency for cold weather doctrine that resides in a cold weather environment.

The Northern Warfare Training Center (NWTC), assigned to USARAK, is currently the source of institutional knowledge for the US Army in conducting cold region and mountain operations and is an excellent choice for a cold weather proponent agency.¹²¹ The current Program of Instruction comprises cold weather-training courses for soldiers, leaders, and units. The cold weather orientation course familiarizes commanders and staff officers with skills and knowledge to effectively plan and conduct cold weather operations.¹²² A leaders course trains squad and platoon leaders on the basic tasks to conduct small unit operations in a cold weather environment.¹²³ The Army should implement the necessary measures to disseminate this resident knowledge across the force. It is not feasible for every leader in the Army to attend the multiple

¹²⁰ ATTP 3-97.11, 1-1.

¹²¹ "Mission and METL," Northern Warfare Training Center, n.d., accessed November 14, 2014, <http://www.wainwright.army.mil/nwtc/mission.htm>.

¹²² "Cold Weather Orientation Course," NWTC, n.d., accessed February 15, 2015, <http://www.wainwright.army.mil/nwtc/cwoc.htm>.

¹²³ "Cold Weather Leaders Course," NWTC, n.d., accessed February 15, 2015, <http://www.wainwright.army.mil/nwtc/cwlc.htm>.

training courses offered at NWTC. Therefore, doctrine remains the best method of sharing this knowledge across the force to improve training. An authorized proponent agency for cold weather doctrine provides continuity for the US Army, which has limited units stationed in extreme cold weather environments.

The first task that requires proponent agency oversight is incorporating Arctic tasks into the Army Training Strategy (ATS). The current ATS and the associated Combined Arms Training Strategy (CATS) do not have Arctic Specific Training and Evaluation Outlines (TEO). This assumes that Arctic conditions do not pose additional risks and “one-size fits all” training and evaluation standards are acceptable. This does not recognize the unique requirements of conducting operations in the Arctic and contradicts the danger of extreme cold weather as described in ATTP 3-97.11. US Army TRADOC, in conjunction with the NWTC, Army Mountain Warfare School (AMWS), and USARAK, should determine which common tasks require unique Arctic or cold weather processes and then incorporate them into CATS with their own TEO.

The NWTC, as a proponent agency stationed in Alaska, is accustomed to the unique challenges of the Arctic and more likely to identify issues that require an integrated solution across the force. For example, due to the lack of developed infrastructure and unique sustainment requirements in the Arctic region, Army forces must rely on aerial delivery of supplies. With limited tactical airlift, and Strategic Lift being unresponsive to the emergent needs in an Arctic Conflict, NWTC, USARAK, the Sustainment Center of Excellence, and the MCOE should review and recommend changes to support doctrine. Changes to doctrine should include Arctic training tasks on US Army rotary-wing Container Delivery System drops in order to provide

responsive logistical support and perform sling load operations of fuel containers under extreme cold weather conditions in an Arctic environment.¹²⁴

The last significant consideration is strengthening international cooperation, a key emphasis of the National Strategy for the Arctic Region. The US Army should coordinate cold weather doctrinal changes with the NATO Cold Weather Center of Excellence in Bodo, Norway. The Center is the Cold Weather proponent for NATO and it has a philosophy that “being trained and equipped for cold weather operations makes adverse climate conditions a strong ally. Being unprepared will significantly reduce our combat effectiveness, and may ultimately lead to defeat.”¹²⁵ As the proponent for cold weather operations, the NATO Cold Weather Center of Excellence is responsible for developing standardization agreements that serve to increase alliance interoperability through common doctrine and operating procedures.¹²⁶

Organization. Organization is how the DOD organizes to fight. Organization establishes how subordinate units and elements coordinate with each other as a whole in order to enable the higher-level joint unit to accomplish its mission.¹²⁷ As a subordinate command to US Pacific Command (USPACOM) and USNORTHCOM and multiple component commands, USARAKs command relationship with its higher headquarters is complicated at best, and counterintuitive to unity of command. Although a geographical delineation divides responsibilities in the Arctic

¹²⁴ Army Techniques Publication (ATP) 4-48, *Aerial Delivery* (Washington, DC: Government Printing Office, 2014), 3-7.

¹²⁵ “Centre of Excellence: Cold Weather Operations,” Norwegian Armed Forces, last modified October 22, 2014, accessed February 14, 2015, <http://mil.no/education-training/coe-cwo/Pages/about.aspx>.

¹²⁶ “Centres of Excellence,” North Atlantic Treaty Organization, last modified, September 24, 2014, accessed March 26, 2015, http://www.nato.int/cps/en/natohq/topics_68372.htm?selectedLocale=en.

¹²⁷ JCIDS Manual, *Manual for the Operations of the JCIDS* (2012), A-5.

between US European Command and USNORTHCOM, the majority of operations occur under the auspices of the respective services.¹²⁸ In Alaska, where the majority of Arctic land-force capabilities reside, USARAK is tasked with providing forces in support of worldwide unified land operations, supporting theater engagement in the Pacific, and conducting military operations in the Alaska Joint Operating Area as a part of homeland defense.¹²⁹ According to the current command structure, USARAK is under Administrative Control of US Army Pacific a subordinate component command to USPACOM. USARAK and ALCOM are a subordinate unified command to USNORTHCOM for Homeland Defense and DSCA operations. USARAK is under Tactical Control and Force Protection Condition of US Army North as well. Designating an Arctic Command, with the appropriate Army Element, will resolve USARAK's confusing command structure. Even if the Arctic Command is nothing more than a fully staffed headquarters with minimal organic forces, it provides a staff to develop a theater strategy and posture statement that will align units against existing or future contingencies.

As the AOC seeks to sustain a regionally-aligned force, it must possess an expert capability to conduct Arctic operations.¹³⁰ Designating USARAK as an Arctic spearhead, regionally-aligned with an Arctic Combatant Command, would achieve the goal as described in the AOC. This would enable USARAK to train specifically on Arctic mission tasks and provide the Army with an "expert" Arctic capability. Additionally, identifying other units as second and third responders to Arctic missions would provide the Army with a contingency force in the event of conflict and extended operations. These units will have their primary or secondary regional

¹²⁸ "Unified Command Plan 2011," US Department of Defense, last modified April 27, 2011, accessed March 3, 2015, http://www.defense.gov/home/features/2009/0109_unifiedcommand/.

¹²⁹ "Mission Statement," US Army Alaska, n.d., accessed March 26, 2015, <http://www.usarak.army.mil/main/default.asp>.

¹³⁰ US Army TRADOC Pamphlet 525-3-1, *The US Army Operating Concept: Win in Complex World* (Washington, DC: Government Printing Office, 2014), i.

alignment with the Arctic Command. Aligning Units for Arctic Command will require numerous modifications to other areas of DOTMLPF to include Professional Military Education (PME), unit training, Additional Skill Identifiers, and coding positions.

The current unit Table of Equipment (TOE) and organization of the modular brigade combat teams does not reflect the best practices for the Arctic Spearhead or Arctic follow on forces. Foremost, the USARAK Stryker Brigade Combat Team in Alaska does not make tactical sense. The limited over-the-snow capability of the Stryker vehicle is restricted to improved road surfaces during the winter, in a state twice the size of Texas with a limited road network. Alaska has approximately 14,000 miles of total road surface, of which only 2,500 miles is paved and roughly 60 percent of which is passable in the winter.¹³¹ Arctic and cold regions throughout the world have similar road networks and winter conditions. These regions also have similar issues in the summer when the Arctic tundra is not passable by wheeled vehicles. History and the ruggedness of terrain have demonstrated that a properly equipped light infantry organization possesses the most flexibility and assured mobility in an arctic environment. Therefore, the Army must examine and test the feasibility of establishing a new modular TOE for an Arctic BCT, or provide for a Modified Table of Organization and Equipment for USARAK as the Arctic Spearhead. Ensuring the success of secondary Arctic responders requires establishing a home station Table of Distributions and Allowances for a limited training capability on Arctic equipment.

Training. Training is the process by which the DOD prepares to fight tactically. This process includes individual and unit training designed to prepare the force to respond to strategic, operational, or tactical requirements considered necessary by the combatant commanders in the

¹³¹ “NWTC Brochure,” Northern Warfare Training Center, n.d., accessed February 15, 2015, http://www.wainwright.army.mil/nwtc/Classes/Brochure_NWTC.pdf.

execution of assigned or anticipated missions. The basic building block of operational success is individual training. Army cold weather training during basic training and outlined in Army Regulation 350-1 primarily focuses on survivability and the prevention of cold weather injuries. “While Soldiers...can train on some base skills and knowledge in the classroom or through self-study, experiential-based training in the terrain and weather are the only way to develop the skill set required to operate successfully.”¹³²

Unit collective training must occur to incorporate institutional knowledge and to learn the necessary skills to conduct successful cold weather operations.¹³³ Under the Maneuver Center of Excellence (MCOE), the Infantry School has two subordinate organizations that conduct cold weather training for individuals and units, the aforementioned NWTC and AMWS in Vermont. The institutional training provides soldiers and leaders with specific knowledge to enable successful unit cold weather operations. Graduates of various Cold Weather Indoctrination (CWI) courses offered at both institutions provide units with a cadre to lead, supervise, and assess individual and unit cold weather training. For example, the CWI training required for all USARAK units to complete utilizes personnel certified by the NWTC. The mandatory training prepares: “USARAK Soldiers in the critical skills required to conduct safe operations and training in an arctic environment.”¹³⁴ The training is a combination of classroom and field exercises that includes basic cold weather survival and mobility tasks. This training benefits units outside of USARAK by developing a baseline of cold weather skills and knowledge across the Army. More importantly, assigning graduates a military Additional Skill Identifier (ASI) enables Human

¹³² ATTP 3-97.11, 1-5.

¹³³ ADRP 7-0, *Training Units and Developing Leaders* (Washington, DC: Government Printing Office, 2012), 1-28.

¹³⁴ “Cold Weather Indoctrination Course,” Northern Warfare Training Center, n.d., accessed February 15, 2015, <http://www.wainwright.army.mil/nwtc/cwic.htm>.

Resources Command (HRC) to maintain continuity and manage equal distribution across the force to preserve institutional knowledge.¹³⁵

An additional consideration for preparing units to conduct extreme cold weather operations is the temperature tolerance specifications of automated targets at range complexes. In an Arctic environment, temperatures wildly fluctuate from day to day. Therefore, units must plan for training aid mechanical failure and develop contingencies to ensure training occurs even after the temperature reaches -50 degrees Fahrenheit. Although military specifications encompass a wide range of requirements for equipment, an example of reduced training capability is the function of automated targets at range complexes. The automated targets adhere to Army Regulation 70-38 specification design of “standard general-purpose” and typically do not function at temperatures below -20 degrees Fahrenheit.¹³⁶ This reduces the unit’s ability to train within established standards and requires the establishment of new procurement regulation to remedy this deficiency. Although Arctic equipment exists within the Defense Supply System, it may not be practical to provide Arctic equipment to units that are not stationed in a cold weather environment. Units designated as follow on Arctic responders should receive a training package to provide a baseline capability so they can deploy into the Arctic environment and seamlessly draw prepositioned equipment and conduct training missions.¹³⁷

Deploying to a remote environment to conduct operations is an example of capstone service or joint training that provides validation of tactics and serves as rehearsals for operational or contingency plans. Over the past year, several Emergency Deployment Readiness Exercise

¹³⁵ Army Regulation (AR) 611-1, *Military Occupational Classification Structure Development and Implementation* (Washington, DC: Government Printing Office, 1997), 16.

¹³⁶ AR 70-38, *Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions* (Washington, DC: Government Printing Office, 1979), 3.

¹³⁷ “About the U.S. Army Materiel Command,” US Army Materiel Command, last modified March 13, 2015, accessed March 26, 2015, <http://www.amc.army.mil/amc/about.html>.

operations occurred in the Arctic. For example, a unit assigned to USARAK parachuted into a remote location north of the Arctic Circle during the winter. However, these operations only lasted a few days, according to news releases.¹³⁸ Although this demonstrates a capability to enter and operate, it does not demonstrate the capacity to organize, employ, and sustain a larger fighting force for an extended period.

Materiel. Materiel includes all the equipment and related spares, repair parts, and support equipment necessary to enable DOD forces to operate effectively.¹³⁹ The Army's over-the-snow Small Unit Support Vehicle is no longer on the TOE of USARAK units, thus replacement parts cannot be order through the US Army supply system for the few vehicles remaining. As previously discussed, mobility in the Arctic is paramount to tactical and operational success. According to ATTP 3-97.11, "the most important element of a successful operation is the ability to maneuver to defeat or destroy the enemy."¹⁴⁰ Therefore, the Army should procure over snow vehicles with a capability to operate on improved and unimproved roads, in any snow of any depth, and across the Arctic tundra and muskeg in both the winter and summer months.¹⁴¹

In order to reduce cold weather injuries and improve over snow mobility, the Army should procure commercial Drag Sleds. Currently, soldiers moving over snow carry a rucksack on their back, which has two negative effects. First, it places pressure on the shoulders, causing reduced circulation to the hands, risking increased cold weather injuries. Second, when moving in

¹³⁸ US Army, "Exercise Spartan Pegasus demonstrates joint military partnership," last modified February 26, 2015, accessed March 18, 2015, http://www.army.mil/article/143555/Exercise_Spartan_Pegasus_demonstrates_joint_military_partnership/.

¹³⁹ JCIDS Manual, *Manual for the Operations of the JCIDS* (2012), A-5.

¹⁴⁰ ATTP 3-97.11, 2-1.

¹⁴¹ Brian Ragin, "Alaska paratroopers master winter operations at SUSV driver's training," US Army, February 10, 2015, accessed March 26, 2015, http://www.army.mil/article/142604/Alaska_paratroopers_master_winter_operations_at_SUSV_driver_s_training/.

Arctic conditions, soldiers generate increased levels of heat and become more susceptible to environmental injuries. A rucksack carried on Drag Sled behind a soldier, similar to an Ahkio Sled, reduces the risk of overheating. Beyond the benefit of reducing the risk of cold weather injuries, Drag Sleds increase the speed of mobility on snow by distributing weight over a larger area, which prevents soldiers from sinking to snow depths that hinder movement.¹⁴²

Another issue confronting cold weather operations is the reduced velocity and range of projectiles. Cold temperatures reduce muzzle velocity, shortening the range and lethality of projectiles.¹⁴³ Basic or applied scientific research can develop material solutions for weapon systems or new propellants less sensitive to environmental conditions. Overcoming the substantial effects of a cold weather environment is possible through either science or equipment, but both require leadership to implement these changes.

Leadership and Education. Education provides professional development for leaders to lead the fight. Leader development includes training, education, and experience gathered in the military education system, during operational assignments, and through self-directed learning.¹⁴⁴ Joint leadership and education is the “product of a learning continuum that comprises training, experience, education, and self-improvement. The role of joint PME is to provide the education needed to complement training, experience, and self-improvement to produce the most professionally competent individual possible.”¹⁴⁵

¹⁴² “Koenders Sleds,” Koenders Outback, n.d., accessed March 27, 2015 <http://www.koendersmfg.com/sled.html>.

¹⁴³ “NWTC Brochure,” Northern Warfare Training Center, n.d., accessed February 15, 2015, http://www.wainwright.army.mil/nwtc/Classes/Brochure_NWTC.pdf.

¹⁴⁴ ADRP 6-22, *Army Leadership* (Washington, DC: Government Printing Office, 2012), v.

¹⁴⁵ JCIDS Manual, *Manual for the Operations of the JCIDS* (2012), A-5.

Dispersed operations in Arctic conditions require leaders to train subordinates capable of understanding commander's intent and to operate with limited guidance. Conversely, it requires senior leader to engender trust with their subordinates. Operational success in a cold region environment is reliant upon well trained individuals and small units.¹⁴⁶ For a unit to seize, retain, and exploit the initiative in a cold weather environment, commanders must empower adaptive leaders to gain a position of relative advantage.¹⁴⁷ The Arctic presents several unique challenges that often place soldiers and subordinate leaders in isolated conditions. Commanders that fail to cultivate the 6 principles of mission command, as described in Army Doctrine Publication 6-0 *Mission Command*, in subordinate leaders and train under decentralized conditions will fail in extreme cold weather environments.¹⁴⁸

Personnel. The personnel component primarily ensures that qualified personnel possess the ability to support joint capabilities and the capacity to accomplish the mission. The synchronized efforts of joint force commanders and service components organize personnel support for the joint force and ensure the success of ongoing peacetime, contingency, and wartime operations. The US Army must make effective use of personnel exchange programs and international liaison officers to harness lessons learned from our more experienced Arctic allies and partners. Coding of positions with a skill identifier will enable the US Army to track Arctic leaders with experience and the capability to lead Soldiers in this harsh environment. Coding leadership positions within the Arctic spearhead and allocating five additional positions to second and third cold weather responders will dramatically increase the operational capability of these

¹⁴⁶ ATTP 3-97.11, 3-1.

¹⁴⁷ ADRP 3-0, *Unified Land Operations* (Washington, DC: Government Printing Office, 2012), 1-1.

¹⁴⁸ ADRP 7-0, *Mission Command* (Washington, DC: Government Printing Office, 2012), 2-1.

units. This structure is similar to numerous infantry positions being coded for Ranger-qualified personnel and would enable qualified personnel to impart their expertise to improve the readiness of their respective units.¹⁴⁹

Once an ASI is established, modifying assignment policies must occur to take advantage of the acquired skills. Current personnel policy dictates a 36-month tour of duty at one duty location before transferring to another post. Compressed timelines for field grade officers usually reduces this time to 24-months in order to meet the needs of their respective branches. Because of assignment policies, the senior leaders of US Army organizations may have the least experience operating in Arctic conditions. Although senior Non Commissioned Officers can remain in a duty location longer and provide important advice, the commanding officer is ultimately responsible for what the unit does or fails to do. Additionally, modifying assignments that increase the length of a tour enables personnel to gain valuable Arctic experience needed for successful cold weather operations. Personnel management procedures should reassign leaders with previous cold weather experience to a cold weather region. This would maintain institutional knowledge in cold weather units and not rely solely on Department of the Army Civilians at the NWTC.¹⁵⁰

Facilities. Facilities consist of the real property, installations, and industrial facilities that support DOD forces. Real property is one or more of the following: a building, a structure, a utility system, pavement, or underlying land. Key facilities constitute command installations and

¹⁴⁹ Army Regulation (AR) 611-1, *Military Occupational Classification Structure Development and Implementation* (Washington, DC: Government Printing Office, 1997), 16.

¹⁵⁰ AR 614–30, *Overseas Service* (Washington, DC: Government Printing Office, 1997), 7.

industrial facilities of primary importance to support military operations or military production programs. A key facilities list is prepared under the policy direction of the Joint Chiefs of Staff.¹⁵¹

Sustainment in the Arctic is difficult, requiring specialized commodities and unusual quantities. Establishing storage facilities with 30 days of supply for a battalion-size force will provide the Arctic Spearhead and follow-on-forces the ability to surge and operate independently without requiring large amounts of lead-time or additional forces. Existing road networks and the current infrastructure do not permit Arctic ground movement. Despite having interior lines in theory, Alaska does not have the appropriate facilities required to conduct extended Arctic military operations. USARAK should seek public-private partnership to develop humidity and climate-controlled warehouses, billeting facilities, and petroleum storage facilities north of the Arctic Circle. This provides the opportunity for innovative arrangement and partnership with private industry to develop infrastructure to ensure future operational success.

Conclusion

Immediately following World War II, global tensions escalated due to fears about a nuclear war between the United States and Russia. The Cold War continued for more than four decades and pushed the two superpowers into a space race and militarization of the Arctic region. The space race received the most attention while the Arctic region quietly emerged as the location “where the United States, the Soviet Union, and allied states conducted air and naval maneuvers and tested ballistic missiles.”¹⁵² In 1991, political tensions subsided after the Cold War ended and the Arctic emerged a region of scientific exploration. In 2007, sea ice retreated to a record low

¹⁵¹ Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, 2011), 209.

¹⁵² Ronald O’Rourke, “Changes in the Arctic: Background and Issues for Congress,” 2014, Congressional Research Service, accessed March 14, 2015, <http://www.cfr.org/arctic/crs-changes-arctic-background-issues-congress/p30656>.

and the Arctic reemerged as a popular topic among strategists and prevalent in political discourse. As climate change continues to gradually uncover the Arctic, economic activity may increase as the region's natural resources become accessible and shorter maritime trade routes become available. Undoubtedly, the escalation of economic activity and human traffic in the Arctic region will increase the security responsibilities of the Joint Force. According to Joint Publication 3-27: "DOD takes responsible steps to anticipate and prepare for Arctic operations. Capabilities are reevaluated as conditions change, and gaps are addressed in order to prepare for operations in a more accessible Arctic."¹⁵³

The near term strategic environment in the Arctic is one of escalating interest. This monograph broadly evaluated the Army's current Arctic capabilities within the framework of DOTMLPF. Recognizing the impact of a resource constrained environment, the US Army should initially focus on leadership, training, and doctrine, as these require the least amount of fiscal outlays to accomplish. In the long-term, the US Army should establish an Arctic Combatant Command and designate USARAK as its Arctic spearhead, procure over-snow vehicles to increase mobility, acquire storage facilities north of the Arctic circle, and authorize NWTC as a proponent agency for cold weather doctrine. These steps will significantly mitigate operational risks in the Arctic region.

The first task for NWTC as the proponent agency calls for incorporating current doctrine and Arctic tasks into the ATS. NWTC, as the proponent, in conjunction with the AMWS and USARAK, should determine which common tasks require unique Arctic or cold weather processes and then incorporate them into CATS with their own TEO. Once the current doctrine is incorporated into the ATS, USARAK should conduct a series of Arctic exercises to validate doctrine and the TEOs. The most important outcome is to ensure doctrine supports Arctic

¹⁵³ JP 3-27, *Homeland Defense* (Washington DC: Government Printing Office, 2013), 3-30.

operations. Operational doctrine will determine the requirements for how to optimize the force to carry out its mission, in material, personnel, and organizational terms.

Mobility in the Arctic is paramount to tactical and operational success. Regionally aligned under an Arctic Command as the spearhead, USARAK should procure over-snow vehicles with a capability to operate on improved and unimproved roads, in any snow depth, and across the Arctic tundra and muskeg in both the winter and summer months. Successful Arctic operations require mobility and an ability to sustain the force. Sustainment in the Arctic is difficult, requiring specialized commodities and unusual quantities. Therefore, storage facilities with 30 days of supply for a battalion-size force are required to provide the Arctic Spearhead, and follow-on-forces, the ability to surge and operate independently without requiring large amounts of lead-time or additional forces. USARAK should seek public-private partnership to develop humidity and climate-controlled warehouses, billeting facilities, and petroleum storage facilities north of the Arctic Circle. This provides a possible basis for innovative arrangement and partnership with private industry to develop infrastructure to ensure future operational success.

Leadership and personnel are the most important capabilities for all US Army operations. Maintaining institutional knowledge through experienced leadership is critical to USARAK's success. Retaining Arctic experience would enable USARAK to: build cohesive teams through mutual trust, create shared understanding, and exercise disciplined initiative.¹⁵⁴ These guiding principles of mission command are essential to the success of Arctic military operations. Therefore, leaders with specific Arctic experience should receive an ASI to enable the HRC to track these personnel and assign them based on the needs of USARAK and the Army. Coding leadership positions within the Arctic Spearhead and allocating five additional positions to second and third cold weather responders will dramatically increase the operational capability of these

¹⁵⁴ Army Doctrine Publication (ADP) 6-0, *Mission Command* (Washington, DC: Government Printing Office, 2012), iv.

units.

This monograph argues that the US Army has an Arctic capability gap at the operational level. Focusing on leadership, training, and doctrine as articulated in section four offers the US Army with an increased Arctic capability in the near-term strategic environment. This nucleus serves as a pillar on which to build, as resources permit, to meet the long-term objectives of the 2013 DOD Arctic strategy. As further resources become available, acting on the remaining issues identified in section four will ensure that the US Army can shape, deter, and if called upon—win in a contested Arctic environment.

Bibliography

- Alaska Department of Transportation and Public Facilities. "State Owned Public Airports: Northern Region." Statewide Aviation. Accessed March 26, 2015. http://dot.alaska.gov/stwdav/airports_public_northern.shtml.
- Arctic Council. "Arctic Strategies." Accessed February 25, 2015. <http://www.arcticcouncil.org/index.php/en/document-archive/category/12-arctic-strategies>.
- . *Declaration on the Establishment of the Arctic Council*. Ottawa: Joint Communique of the Governments of the Arctic Countries on the Establishment of the Arctic Council, 1996. Accessed September 13, 2014. <http://www.arcticcouncil.org/index.php/en/document-archive/category/4-founding-documents#>.
- Army Doctrine Publication (ADP) 6-0, *Mission Command*. Washington, DC: Government Printing Office, 2012.
- Army Doctrine Reference Publication (ADRP) 6-22, *Army Leadership*. Washington, DC: Government Printing Office, 2012.
- . 1-02, *Terms and Military Symbols*. Washington, DC: Government Printing Office, 2015.
- . 7-0, *Training Units and Developing Leaders*. Washington, DC: Government Printing Office, 2012.
- . 3-0, *Unified Land Operations*. Washington, DC: Government Printing Office, 2012.
- Army Regulation (AR) 611-1, *Military Occupational Classification Structure Development and Implementation*. Washington, DC: Government Printing Office, 1979.
- . 614-30, *Overseas Service*. Washington, DC: Government Printing Office, 1997.
- . 70-38, *Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions*. Washington, DC: Government Printing Office, 1979.
- Army Tactics, Techniques, and Procedures (ATTP) 3-97.11, *Cold Region Operations*. Washington, DC: Government Printing Office, 2011.
- Army Techniques Publication (ATP) 4-48, *Aerial Delivery*. Washington, DC: Government Printing Office, 2014.
- Baldwin, John and Ron Powers. *Last Flag Down: The Epic Journey of the Last Confederate Warship*. New York: Crown Publishing Group, 2008.
- Bockstoe, John. *Whales, Ice, & Men: The History of Whaling in the Western Arctic*. Seattle: University of Washington Press, 1986.

- Boeing. "V22 Osprey." Accessed March 26, 2015. <http://www.boeing.com/boeing/rotorcraft/military/v22/>. Cloe, John. "The Cold War Year 1946-1991." Alaska Historical Society. Accessed, March 23, 2015, <http://alaskahistoricalsociety.org/discover-alaska/glimpses-of-the-past/the-cold-war-years-1946-1991/>.
- Coffey, Luke and Daniel Kochis. "NATO Summit 2014: Time to Make Up for Lost Ground in the Arctic." The Heritage Foundation. August 21, 2014. Accessed March 26, 2015. <http://www.heritage.org/research/reports/2014/08/nato-summit-2014-time-to-make-up-for-lost-ground-in-the-arctic>.
- Council on Foreign Relations. "The Emerging Arctic." Accessed March 6, 2015. [http://www.cfr.org/arctic/emerging-arctic/p32620#/?](http://www.cfr.org/arctic/emerging-arctic/p32620#/)
- . "The Future of the Arctic: A New Global Playing Field." April 16, 2013. Accessed March 15, 2015. <http://www.cfr.org/arctic/future-arctic-new-global-playing-field/p30471>.
- Defense Command Denmark. "Arctic Command." Last modified February 13, 2013. Accessed December 29, 2014. <http://www2.forsvaret.dk/eng/Organisation/ArcticCommand/Pages/ArcticCommand.aspx>.
- Department of Homeland Security. *Innovative Public-Private Partnership: A Pathway to Effectively Solving Problems*. July, 2010.
- Dimick, Dennis. "As World's Population Booms, Will its Resources be Enough for Us." National Geographic. September 21, 2014. Accessed March 1, 2015. <http://news.nationalgeographic.com/news/2014/09/140920-population-11billion-demographics-anthropocene/>.
- Division for Ocean Affairs and the Law of the Sea. "United Nations Convention on the Law of the Sea." pt. 5, art. 55, 43. Accessed February 25, 2015. http://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm.
- Dowd, Alan. "Breaking the Arctic Ice." American Legion Landing Zone. November 19, 2014. Accessed November 21, 2014. <http://www.legion.org/landingzone/225245/breaking-ice-arctic#sthash.cFFFKJ3p.dpuf>.
- Doyle, Michael and Koh, Hongju. "The Case for International Law: A Response to the War of Law." Foreign Affairs. Accessed February 25, 2015. <http://www.foreignaffairs.com/articles/140169/harold-hongju-koh-and-michael-doyle/the-case-for-international-law>.
- Field Manual (FM) 31-70. *Basic Cold Weather Manual*. Washington, DC: Government Printing Office, 1959.
- . *Basic Cold Weather Manual*. Washington, DC: Government Printing Office, 1968.
- Field Manual 31-71. *Northern Operations*. Washington, DC: Government Printing Office, 1971.
- Field Manual 70-15. *Operations in Snow and Extreme Cold*. Washington, DC: Government Printing Office, 1944.

- Finkel, Michael. "The Cold Patrol." National Geographic. January 2012. Accessed December 27, 2014. <http://ngm.nationalgeographic.com/2012/01/sled-dogs/finkel-text>.
- Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, and World Food Programme. *The State of Food Insecurity in the World 2014: Strengthening the enabling environment for food security and nutrition*. Rome: Food and Agriculture Organization of the United Nations, 2014.
- Fort Wainwright. "Fort Wainwright History." Accessed March 26, 2015. http://www.wainwright.army.mil/history/FWA_history.pdf.
- . "Military Airlift." Report to Congressional Committee. July 19, 1994. Accessed March 6, 2014. <http://www.gpo.gov/fdsys/pkg/GAOREPORTS-NSIAD-94-225/pdf/GAOREPORTS-NSIAD-94-225.pdf>.
- Hancock, Lyn. "Electronic Sentinels Guard the North." National Geographic. Accessed March 6, 2015. <https://news.google.com/newspapers?id=oAYhAAAIBAJ&sjid=gHYFAAAAIBAJ&pg=2966,2840333&dq=early-warning+radar-site+to-open&hl=en>.
- History.com. "Battle of the Aleutians." Last modified 2009. Accessed March 15, 2015. <http://www.history.com/topics/world-war-ii/battle-of-the-aleutian-islands>.
- Hofstra University. "The Geography of Transport Systems." Accessed January 12, 2015. <https://people.hofstra.edu/geotrans/eng/ch1en/conc1en/polarroutes.html>.
- Intergovernmental Panel on Climate Change. "Organization." Accessed November 24, 2014. <http://www.ipcc.ch/organization/organization.shtml>.
- . "Structure." Accessed November 24, 2014. http://www.ipcc.ch/organization/organization_structure.shtml.
- Intergovernmental Panel on Climate Change. Intergovernmental Panel on Climate Change, 2014: Summary for Policymakers. In: "Climate Change 2014: Synthesis Report." Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, United Kingdom and New York, USA, 2014).
- . Intergovernmental Panel on Climate Change, 2014: Summary for Policymakers. In: "Climate Change 2014: Impacts, Adaptation, and Vulnerability." Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, United Kingdom and New York, USA, 2014).
- Joint Base Elmendorf-Richardson, "Military History in Alaska, 1867-2000." November 13, 2006. Accessed March 26, 2015. <http://www.jber.af.mil/library/factsheets/factsheet.asp?id=5304>.
- Joint Capabilities Integration Development System Manual. *Manual for the Operations of the Joint Capabilities Integration and Development System*. Washington, DC: Government Printing Office, 2012.

- Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*. Washington, DC: Government Printing Office, 2011.
- . 3-27, *Homeland Defense*. Washington, DC: Government Printing Office, 2013.
- Koenders Outback. “Koenders Sleds.” Accessed March 27, 2015. <http://www.koendersmfg.com/sled.html>.
- Leitzell, Katherine. “Arctic Sea Ice Before Satellites.” National Snow and Ice Data Center. January 31, 2011. Accessed January 28, 2015. <http://nsidc.org/icelights//2011/01/31/arctic-sea-ice-before-satellites/>.
- MacArthur, Anna. “Admiral Ostebo Discusses Future of Port Clarence.” Alaska Public Media. January 27, 2015. Accessed January 28, 2015. <http://www.alaskapublic.org/2014/01/27/admiral-ostebo-discusses-future-of-port-clarence/>.
- Michaels, Denise. “Arctic USCG Base Needed.” Institute of the North. Accessed, March 26, 2015. http://www.institutenorth.org/assets/images/uploads/articles/Arctic_USCG_Base_Needed_By_Mayor_Denise_Michels.pdf.
- Mychajlyszyn, Natalie. “The Arctic: Geopolitical Issues.” October 24, 2008. Canadian Parliamentary Information and Research Service, 3. Accessed February 25, 2015. <http://www.parl.gc.ca/Content/LOP/researchpublications/prb0806-e.htm>.
- National Geographic. “Encyclopedic Entry: Ice Cap.” Assessed March 6, 2015. http://education.nationalgeographic.com/education/encyclopedia/ice-cap/?ar_a=1.
- National Oceanic and Atmospheric Administration. “Frequently Asked Questions About The Arctic.” Last modified 2015. Accessed March 6, 2015. <http://www.arctic.noaa.gov/faq.html#1>.
- National Oceanic and Atmospheric Administration. “NOAA Weather Radio All Hazards Information: Alaska Weather Interesting Facts and Records.” Accessed March 6, 2015. <http://www.arh.noaa.gov/docs/AKWXfacts.pdf>.
- National Snow and Ice Data Center. “Arctic Sea Ice Shatters All Previous Record Lows.” October 1, 2007. Accessed November 24, 2014. http://nsidc.org/news/newsroom/2007_seaiceminimum/20071001_pressrelease.html.
- . “What is the Arctic.” Accessed January 28, 2015. <http://nsidc.org/cryosphere/arctic-meteorology/arctic.html>.
- Newitt, Malyn. *A History of Portuguese Overseas Expansion, 1400-1668*. England: Routledge, 2005.
- North American Aerospace Defense Command. “NORAD History.” Accessed March 6, 2015. <http://www.norad.mil/AboutNORAD/NORADHistory.aspx>.

- North Atlantic Treaty Organization. "Centres of Excellence." Last modified, September 24, 2014. Accessed, March 26, 2015. http://www.nato.int/cps/en/natohq/topics_68372.htm?selectedLocale=en.
- Norwegian Armed Forces. "Centre of Excellence: Cold Weather Operations." Last modified October 22, 2014. Accessed February 14, 2015. <http://mil.no/education-training/coe-cwo/Pages/about.aspx>.
- Northern Warfare Training Center. "Cold Weather Indoctrination Course." Accessed February 15, 2015. <http://www.wainwright.army.mil/nwtc/cwic.htm>.
- . "Mission and METL." Accessed November 14, 2014. <http://www.wainwright.army.mil/nwtc/mission.htm>.
- . "NWTC Brochure." Accessed February 15, 2015. http://www.wainwright.army.mil/nwtc/Classes/CWSH_Original_Modified2.pdf.
- Ocean Law. "The Ilulissat Declaration." January 1, 2014. Accessed February 25, 2015. <http://www.arcticgovernance.org/the-ilulissat-declaration.4872424.html>.
- O'Rourke, Ronald. "Changes in the Arctic: Background and Issues for Congress." 2014, Congressional Research Service. Accessed March 14, 2015. <http://www.cfr.org/arctic/crs-changes-arctic-background-issues-congress/p30656>.
- Office of the Prime Minister of Canada. "Expanding Canadian Forces Operations in the Arctic." August 10, 2007. Accessed October 11, 2014. <http://www.pm.gc.ca/eng/news/2007/08/10/expanding-canadian-forces-operations-arctic>.
- Ragin, Brian. "Alaska paratroopers master winter operations at SUSV driver's training." Army.mil. February 10, 2015. Accessed March 26, 2015. http://www.army.mil/article/142604/Alaska_paratroopers_master_winter_operations_at_SUSV_driver_s_training/.
- Rostker, Bernard. *Right-Sizing the Force: Lessons for the current Drawdown of American Military Personnel*. Washington DC: Center for a New American Security, 2013. Accessed March 26, 2015. http://www.cnas.org/sites/default/files/publications-pdf/CNAS_RightSizingTheForce_Rostker_0.pdf.
- Sharkov, Damien. "Russian Navy to Focus Strategy on Arctic Zone and Black Sea." *Newsweek*. December 9, 2014. Accessed January 21, 2015. <http://www.newsweek.com/russian-navy-will-focus-strategy-until-2030-arctic-zone-and-black-sea-290496>.
- . "Russian Troops Stationed Near Finnish Border as Putin Begins Move on Arctic." *Newsweek*. January 13, 2015. Accessed January 21, 2015. <http://www.newsweek.com/3000-russian-troops-stationed-near-finish-border-putin-makes-moves-arctic-299129>.
- Stipo, Francesco et al. "The Future of the Arctic: A Key To Global Sustainability." *Cadmus Journal* 1, no. 5 (October 2012): 44-52. Accessed January 10, 2015. <http://cadmusjournal.org/node/220>.

- The Arctic Portal. "Arctic Economies: Megaprojects." Accessed March 6, 2015. <http://arcticportal.org/features/699-arctic-economies-megaprojects>.
- Tussing, Arlon. "Reflections on the End of the OPEC Era." *Alaska Review of Social and Economic Conditions* 19, no. 4 (December 1982): 1-16.
- United Nations. *United Nations Convention on the Law of the Sea: Agreement Relating to the Implementation of Part XI of the Convention*. pt. 6, art. 76. Accessed September 29, 2014. http://www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm.
- . *United Nations Convention on the Law of the Sea: Agreement Relating to the Implementation of Part XI of the Convention*. pt. 5 art. 55-57. Accessed February 25, 2015. http://www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm.
- United Nations Environment Programme, *New Awareness of and Opportunities for UNEP to Address Climate Change in the Arctic*. The Governing Council/Global Environmental Ministerial Forum, 2013.
- US Air Force. "C-17 Globemaster III." October 27, 2004. Accessed March 26, 2015. <http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104523/c-17-globemaster-iii.aspx>.
- US Air National Guard. "About the 109th Airlift Wing." January 17, 2014. Accessed, March 26, 2015. <http://www.109aw.ang.af.mil/resources/factsheets/factsheet.asp?id=12587>.
- US Arctic Research Commission. *Climate Change, Permafrost, and Impacts on Civil Infrastructure*. December 2003. Accessed January 10, 2015. <http://www.arctic.gov/publications/other/permafrost.html>.
- US Army. "Exercise Spartan Pegasus demonstrates joint military partnership." Last modified February 26, 2015. Accessed March 18, 2015. http://www.army.mil/article/143555/Exercise_Spartan_Pegasus_demonstrates_joint_military_partnership/.
- US Army Alaska. "Mission Statement." Accessed March 26, 2015. <http://www.usarak.army.mil/main/default.asp>.
- US Army Materiel Command. "About the U.S. Army Materiel Command." Last modified March 13, 2015. Accessed March 26, 2015. <http://www.amc.army.mil/amc/about.html>.
- US Army Training and Doctrine Command (TRADOC) Pamphlet 525-3-1. *The US Army Operating Concept: Win in Complex World*. Washington, DC: Government Printing Office, 2014.
- US Coast Guard. *Arctic Strategy*. Washington, DC: Government Printing Office, 2013.
- . "Major Icebreaker of the World Chart." Last Modified June 26, 2014. Accessed March 26, 2015. <http://www.Uscg.mil/hq/cg5/cg552/images/20140626%20Major%20Icebreaker%20Chart.pdf>.

- US Coast Guard. "Protecting the Last Frontier." Last modified November 17, 2014. Accessed November 21, 2014. <http://www.uscg.mil/d17/>.
- US Congress. House. Statement of General H. Jacoby, Jr., United States Army Commander United States Northern Command and North American Aerospace Defense Command Before the House Armed Services Committee. 113th Cong., February 26, 2014.
- US Department of Defense. *Arctic Strategy*. Washington, DC: Government Printing Office, 2013.
- . *Report to Congress on Arctic Operations and the Northwest Passage*. 111th Cong., 2d sess., May 2011, HR Rep. 5136.
- . *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*. Washington, DC: Government Printing Office, 2012.
- . "Unified Command Plan 2011." Last modified April 27, 2011. Accessed March 3, 2015. http://www.defense.gov/home/features/2009/0109_unifiedcommand/.
- US Department of the Interior. "The Lend-Lease Program and the Alaska-Siberia Route." National Park Service. Accessed March 26, 2015. <http://www.nps.gov/nr/twhp/wwwlps/lessons/146LaddField/146facts2.htm>.
- US Department of State. "Arctic Council." Accessed March 6, 2015. <http://www.state.gov/e/oes/ocns/opa/arc/ac/>.
- . "Secretary Clinton Signs the Arctic Search and Rescue Agreement with Other Arctic Nations." May 12, 2011. Accessed March 6, 2015. <http://www.state.gov/r/pa/prs/ps/2011/05/163285.htm>.
- . "The Collapse of the Soviet Union." Office of the Historian. Last modified October 31, 2013. Accessed March 6, 2015. <https://history.state.gov/milestones/1989-1992/collapse-soviet-union>.
- US Geological Survey. "90 Billion Barrels of Oil and 1,670 Trillion Cubic Feet of Natural Gas Assessed in the Arctic." Last modified July 23, 2008. Accessed January 30, 2015. www.usgs.gov/newsroom/article.asp?ID=1980#.VMrh68b4tFJ.
- US Government Accountability Office. *Arctic Capabilities: DOD Addressed Many Specified Reporting Elements In Its 2011 Arctic Report But Should Take Steps to Meet Near-and Long-Term Needs*. Last modified 2015. Accessed February 24, 2015. <http://www.gao.gov/products/GAO-12-180>.
- US Joint Forces Command. *The Joint Operating Environment 2010*. Washington, DC: Government Printing Office, 2010.
- US Navy. *US Navy Arctic Roadmap 2014-2030*. Washington, DC: Government Printing Office, 2014.
- US Northern Command. "About USNORTHCOM." Accessed March 6, 2015. <http://www.northcom.mil/AboutUSNORTHCOM.aspx>.

- US President. Presidential Decision Directive/National Security Council-26. "United States Policy on the Arctic and Antarctic Regions." *Federal Register* 20270. (June 9, 1994).
- . National Security Presidential Directive-66/Homeland Security Presidential Directive-22 (NSPD-66/HSPD-22). "Arctic Region Policy." (January 9, 2009). Accessed January 4, 2015. <http://fas.org/irp/offdocs/nspd/nspd-66.htm>.
- . "National Security Strategy." May, 2010.
- . "National Strategy for the Arctic Region." May, 2013.
- Whitman, Edward. "The Secret Weapon of Undersea Surveillance." *Undersea Warfare*. Last modified 2005. Accessed December 8, 2014. http://www.navy.mil/navydata/cno/n87/usw/issue_25/sosus.htm.
- Woods Hole Oceanographic Institution. "Compare the Poles: Weather." Accessed March 6, 2015. <http://polardiscovery.whoi.edu/poles/weather.html>.
- Worth, Jess. "There's Little Real Conflict So Far Over Arctic Sovereignty." *CCPA Monitor* 16, no. 4 (September 2009): 8-9.
- Young, Oran. "Arctic Politics in an Era Of Global Change." *Brown J. World Affairs* 19, no. 1 (Fall 2012): 165-178.
- . "The Arctic in Play: Governance in a Time of Rapid Change." *The International Journal of Marine and Coastal Law*, no. 24 (2009): 424-437.