SUSTAINMENT OPERATIONS DURING THE ALEUTIAN ISLANDS CAMPAIGN

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Global climate change is increasing access to previously closed sea lanes and land masses to exploitation by interested countries. Increasing challenges in the Arctic from countries like the Russian Federation and People's Republic of China threaten stability and access in the Arctic. The US commitment to presenting a credible military deterrence in the Arctic demands an Arctic capable force that can operate in a variety of Arctic conditions, including Arctic islands. The Aleutian Islands Campaign as a case study, can provide examples, lessons, and insights into sustaining modern Arctic operations.

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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

SUSTAINMENT OPERATIONS DURING THE ALEUTIAN ISLANDS CAMPAIGN, by Major Paul A. Guzman, 111 pages.

Global climate change is increasing access to previously closed sea lanes and land masses to exploitation by interested countries. Increasing challenges in the Arctic from countries like the Russian Federation and People's Republic of China threaten stability and access in the Arctic. The US commitment to presenting a credible military deterrence in the Arctic demands an Arctic capable force that can operate in a variety of Arctic conditions, including Arctic islands. The Aleutian Islands Campaign as a case study, can provide examples, lessons, and insights into sustaining modern Arctic operations.

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ACRONYMS

A2AD	Anti-access/Area Denial
APOD	Aerial Port of Debarkation
APS	Army Pre-Positioned Stocks
C2	Command and Control
CATF	Commander, Amphibious Task Force
CCDR	Combatant Commander
CCMD	Combatant Command
CCO	Combat Cargo Officer
CLF	Commander, Landing Force
CONUS	Continental United States
CUL	Common User Logistics
CWI	Cold Weather Injury
DoD	Department of Defense
DoS	Days of Supply
ECWCS	Extended Cold Weather Clothing System
GFC	Ground Force Commander
GLOC	Ground Line of Communication
ISB	Intermediate Staging Base
JLOTS	Joint Logistics Over-The-Shore
JTF	Joint Task Force
LCVP	Landing Craft, Vehicle, Personnel
LCM	Landing Craft Mechanized
LFSP	Landing Force Support Party

LOC	Line of Communication
LOTS	Logistics Over-the-Shore
LSCO	Large-Scale Combat Operations
OTH	Over the Horizon
POL	Petroleum, Oils, and Lubricants
SLOC	Sea Line of Communication
SPOD	Seaport of Debarkation
STS	Ship-to-Shore
TACLOG Group	Tactical Logistics Group
TEO	Team Embarkation Officer
US	United States
USTRANSCOM	United States Transportation Command

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CHAPTER 1

INTRODUCTION

Background

Global climate change is reshaping the Arctic and increasing accessibility of sea routes and resources within the Arctic. A warming Arctic is causing ice sheets, glaciers, and sea ice to melt, reducing snow accumulation on land, and increasing tundra greenness.[1] These environmental factors combine to allow greater freedom of movement and access to resources in previously closed or difficult to access Arctic regions.

The greater accessibility to Arctic regions spurred by climate change allows Arctic and non-Arctic countries to compete for access to resources, trade routes, and basing.[2] The 2019 DoD Arctic Strategy names Russia and, to a lesser extent, China as the two principal countries seeking to militarize, control, and exploit the Arctic. Russia has invested in its Arctic military capabilities to control the Northern Sea Route and defend its national interests in the region. Russia created new Arctic military units, upgraded aging infrastructure, created a new naval headquarters for Arctic operations, and stationed anti-access and area denial (A2AD) systems in the region.[3] China, with a much smaller Arctic presence than Russia, invested in icebreaking ships and regional infrastructure to facilitate their economic exploitation of the Arctic and the development of the Polar Silk Road.[4] Figure 1 shows a comparison of the Polar Silk Road (Northern Sea Route) and the current sea route from Asia to Europe.

Figure 1. The Malacca/Suez and the Polar Silk Road Shipping Routes

Source: Headquarters, Department of the Army, *Regaining Arctic Dominance: The US Army in the Arctic*, (Washington, DC: Department of the Army, January 2021), 19.

The Department of Defense (DoD) released its updated Arctic Strategy in June 2019, and the United States (US) Army released its nested Arctic Strategy in January 2021. These two documents require the Joint Force to deter, and if necessary, defeat great power aggression in Arctic regions.[5] The Joint Force must be able to respond to contingencies in Arctic regions and will require agile, capable, and expeditionary forces

with the ability to flexibly operate and project power from, into, and across Arctic regions.[6]

Historical case studies can provide a valuable source of concepts and challenges for leaders to examine when contemporary military operations fail to provide an appropriate simulacrum with the required situation, terrain, weather, and type of operation. With a renewed focus on Arctic operations, the US Army and the Joint Force need sources of practical knowledge in sustaining a geographically dispersed Joint Force during large-scale combat operations (LSCO) in an Arctic environment.

The most recent US LSCO in an Arctic environment is the Aleutian Islands Campaign of World War II. This campaign began with the Empire of Japan invading and capturing the Aleutian Islands of Attu and Kiska in June of 1942 until US forces recaptured the islands in May and August of 1943. The campaign encompasses multiple US operations including Operation Landcrab, the retaking of Attu, and Operation Cottage, the retaking of Kiska. See figure 2 for an orientation of the Aleutian Islands area of operations.

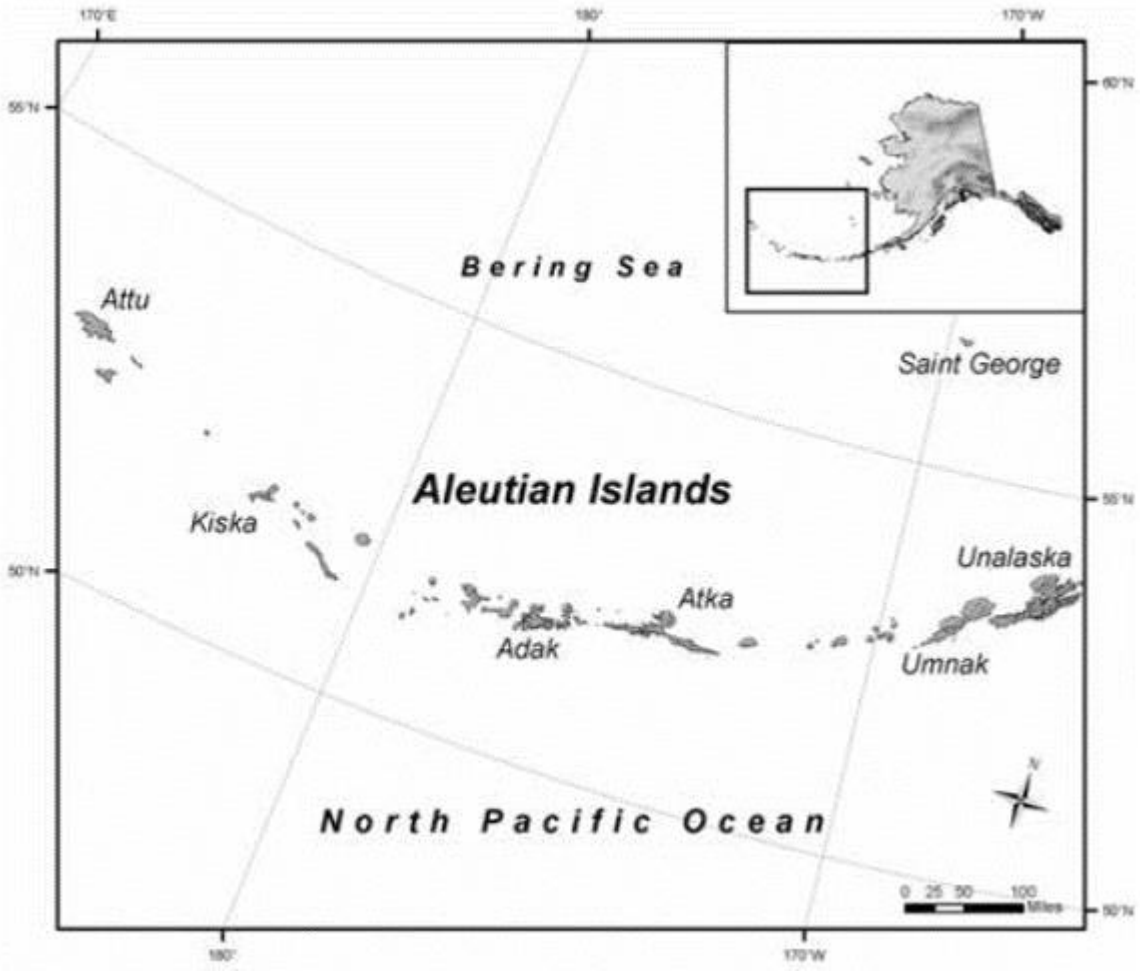

Figure 2. Map of the Aleutian Islands

Source: John Hailey Cloe, *Attu, the Forgotten Battle* (Washington, DC: U.S. Department of the Interior, 2017), 2, https://home.nps.gov/aleu/planyourvisit/upload/Attu-Forgotten-Battle-Optimized-508.pdf.

The Aleutian Islands Campaign is a valuable stand in for a modern Arctic operation in that the terrain and weather of the World War II Alaskan Theater of Operations reflects the harsh conditions in Arctic, subarctic, and extreme cold weather regions around the world. The relative recency of the Aleutian Islands Campaign means the doctrine, capabilities, and logistical requirements of the operation are more familiar to

a modern audience. This recency contributes to the overall applicability of this campaign to modern operations.

Problem Statement

The Army and the Joint Force have not conducted LSCO in an Arctic, subarctic, or extreme cold weather environment since the Korean War with the Aleutian Islands Campaign as the last true Arctic LSCO. With this lack of recent applicable operations, a renewed emphasis on Arctic operations, and the US military refocusing on LSCO, military planners and sustainment organizations are short on experience and applicable examples on sustaining Arctic forces and providing the capability to extend operational reach in an Arctic LSCO environment.

Current sustainment doctrine contained in JP 4-0, ADP 4-0, and FM 4-0 does not address considerations for sustainment operations in extreme cold weather or Arctic conditions. The current major doctrinal repositories for Arctic or cold weather sustainment operations are ATP 3-90.97, *Mountain Warfare and Cold Weather Operations* (April 2016), and ATP 3-21.50, *Infantry Small Small-Unit Mountain and Cold Weather Operations* (August 2020). While new doctrinal publications to specifically address strategic and operational Arctic sustainment may not be necessary or justified, appropriate case studies may provide much of the requisite pool of knowledge for modern planners.

Purpose of the Study

The purpose of this study is to explore the sustainment challenges for the Allied Joint Task Force (JTF) during the Aleutian Islands Campaign. The study will focus on

US preparations for the Arctic, sustainment plans, and the execution of sustainment operations surrounding and during the operations to retake the islands of Attu and Kiska from Japanese Forces. Further, this study will examine the planning considerations and adaptations regarding anticipated and emergent challenges caused by the environmental conditions in the Aleutian Islands. Finally, this study will attempt to communicate themes, concepts, and challenges peculiar to sustaining LSCO in an Arctic environment to modern military planners and academics for further development of US Arctic warfighting capability in fulfillment of the DoD Arctic Strategy.

Research Questions

Research Question: What lessons in sustainment operations can a current joint force learn and apply from the Aleutian Islands Campaign to a modern conflict in a similar environment?

1. What challenges did the Aleutian environment present to the Joint Force?
2. How did the Joint Force conduct sustainment operations and overcome the challenges of the Aleutian environment?
3. Using current doctrine and strategy as a framework, what lessons from the campaign can we apply to today's force?

Assumptions

This case study will use a number of essential assumptions to frame the exploration of sustainment in the Aleutian Islands Campaign. The first assumption is that the sustainment efforts of the Imperial Japanese Army and Navy did not directly impact allied planning and execution of its sustainment operations. While Japanese movement,

maneuver, and fires had direct and tangible impacts on Allied sustainment, Imperial Japanese sustainment would support these efforts and not appreciably affect allied sustainment operations. With this reasoning, this study will not explore Japanese sustainment in any form save for the use by allied forces of captured assets and supplies. This study will incorporate considerations of how Japanese movement, maneuver, and fires may have affected allied sustainment.

Secondly, this study will assume that primary sources will accurately describe events as they experienced them but that these accounts are not completely impartial accounts of activities as they occurred. Authors will demonstrate bias towards friendly forces and describe allied and their own personal actions in a more positive light. Conversely, primary sources will color their descriptions of enemy actions according to wartime anti-Japanese sentiments. The act of combat and the emotions that often accompany it can also shape how authors describe events and the downstream impact of the operational plans.

The final assumption is that, despite the ongoing transformation of the Arctic due to global climate change, the environment of the Aleutian Islands chain will present similar challenges to modern sustainment efforts as it did to the US force in the Aleutian Islands Campaign. Some solutions for sustainment challenges will differ due to changes in technology and doctrine while others will be largely unchanged from their antecedent solutions. The relatively enduring nature of the environmental challenges will provide constant against which a military planner can measure and evaluate the applicability of modern and historical solutions.

Definition of Terms

Defining the Arctic can be a challenge as its definition and the geographic area to which it refers can vary greatly depending on which definition one chooses to use. A common definition for the Arctic is the geographical area within the Arctic Circle at and above a line of 66 degrees 33 minutes north. The Arctic can also mean the northern limit of stands of trees on land (the tree line), or the line where the average July temperature is 10° Celsius (C), also called the 10° C isotherm.[7] The United States uses a definition of the Arctic that is atypical amongst other Arctic nations and the scientific community at large. The US Congress set forth the legal definition for the Arctic in 15 United States Code (U.S.C.) § 4111. This law defines the Arctic as all US and foreign territory north of the Arctic Circle and all US territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas; and the Aleutian Islands chain.[8] This study will use the definition set forth in 15 U.S.C. § 4111. Figure 3 illustrates the 15 U.S.C. § 4111 definition of the Arctic.

Figure 3. Arctic Boundary Defined in 15 U.S.C. § 4111

Source: US Arctic Research Commission, "Arctic Boundary s Defined by the Arctic Research and Policy Act (ARPA)," accessed September 3, 2021, https://www.arctic.gov/uploads/assets/ARPA_Polar_300dpi.jpg.

While most may believe they know what someone means when they the weather is cold, it is vital to establish baselines of temperature against which one can evaluate the prevailing conditions present in an area of operations and its impacts to operations. ATP 3-90.97, *Mountain Warfare and Cold Weather Operations* divided cold temperatures into five categories ranging from 39° Fahrenheit (F) to below -40° F.[9] Figure 4 illustrates the cold categories from ATP 3-90.97.

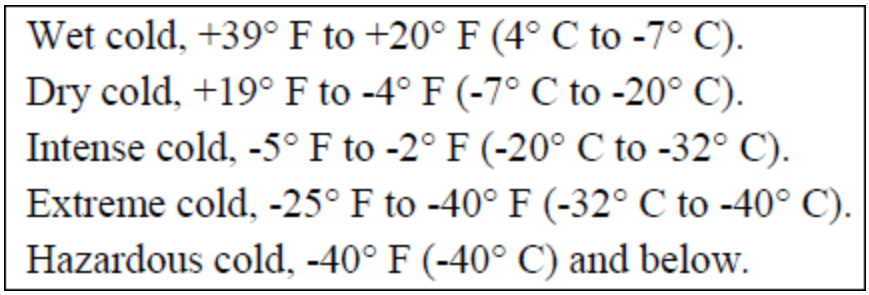

Figure 4. Cold Categories

Source: Headquarters, Department of the Army, Army Techniques Publication 3-90.97, *Mountain Warfare and Cold Weather Operations* (Washington, DC: Army Publishing Directorate, April 2016), B-1.

The Arctic presents a unique collection of challenges to military operations. Most military organizations do not have the necessary training or equipment for operations in the Arctic. This study will consider Arctic capable military units using the definition in the Army's 2021 Arctic Strategy. This strategy defines Arctic capable units as units that are enabled by doctrine, trained at echelon, with the right equipment, and staffed by personnel with the appropriate knowledge, skills, and abilities to successfully operate in the Arctic.[10]

Scope

This study will focus its exploration of sustainment challenges to one historical large scale combat operation in Arctic conditions, the Aleutian Islands Campaign of 1942 and 1943. Using the Aleutian Islands Campaign as a case study will provide modern leaders with a historical event to illuminate their own sustainment plans. This study will focus on the strategic, operational, and tactical levels of sustainment with emphasis on the latter two. This study will not examine Japanese sustainment challenges and operations but will instead concentrate on allied forces.

This study will not be an exhaustive examination or comparison of historical and modern sustainment doctrines. Instead, it will use modern doctrine as a framework within which to examine the planning, preparation, and execution of sustainment for the Aleutian Islands Campaign. Modern doctrine and capabilities may also present solutions not available to the original planners or altogether eliminate certain challenges they faced. Contemporary doctrine will at times serve to demonstrate the logic of how planners arrived at their decisions within the contexts of their era.

Limitations and Delimitations

Time constraints will limit the depth and breadth of this study of Arctic sustainment to only one historical case. This will not allow the study to examine all types of Arctic conditions or explore other historical events that may have value to a sustainment planner. The material and analysis included in this study will hold a classification level of unclassified. This constraint will not likely negatively impact the study due the elapsed time between the historical event and the present. The time and classification constraints are a requirement of the Command and General Staff College for its Master of Military Art and Science program of which this study is part.

The qualitative nature of this historical case study limits the applicability of plans, challenges, and solutions to other situations. Evolutions and changes in force structures, technology, strategic situation, military capability will also limit how this case study applies to modern operations. The case study will have the most applicability to other operations in Arctic environments that share similarities with the Aleutian Islands.

This study will not consider Japanese sustainment operations or doctrine because Japanese sustainment activities did not have a measurable impact on allied sustainment

operations and therefore, they have limited usefulness in the examination of allied operations. Japanese sustainment operations may be a viable avenue of consideration in a future study to explore the role sustainment operations had in the overall failure of their campaign.

This study will not consider high-altitude operations which can share many similarities with Arctic operations. Nor will the study consider terrain, weather, or other conditions outside of those present in the Aleutian Islands and the areas that hosted elements of the Aleutian Islands Campaign. The Aleutian Islands generally lack the mountainous terrain needed to expand the exploration of Arctic sustainment to mountainous Arctic areas.[11]

Significance of the Study

The US military has not engaged in an Arctic LSCO since 1943 and leaders planning sustainment for Arctic LSCO have few applicable historical examples from which they can draw lessons and look towards to inform current operations. Increased militarization and economic exploitation from Russia and China in the Arctic have increased regional tensions and forced the US to reprioritize Arctic competition. The US DoD placed a renewed focus on deterring competitors, improving military infrastructure, cooperating with multinational partners, and rebuilding the US military's Arctic capability.[12]

While leaders do not necessarily need direct historical analogs to create viable plans for Arctic sustainment operations, a historical case study can be immeasurably helpful in predicting challenges and providing possible solutions to overcome them. Historical studies and analyses of the Aleutian Islands Campaign tend to focus on

movement and maneuver and the overall narrative of defending the US homeland from the only invasion of US territory in World War II. This case study will provide academics and military planners with a sustainment focused analysis of the Aleutian Islands Campaign and a reference point on conducting sustainment operations in an Arctic environment in support of LSCO.

Summary

The refocusing of the US military on LSCO and the prioritization of Arctic capabilities to counter the increasing competition in the Arctic demands that military leaders quickly gain competence in Arctic sustainment operations. The scarcity of applicable modern examples necessitates the study of a historical campaign which can provide a valuable starting point for planners. The Aleutian Islands Campaign meets several criteria that can enhance the understanding of sustaining combat operations in an Arctic environment. This case study will ensure modern planners have an example of the impacts on sustainment operations which long lines of communications and environmental considerations impart on an expeditionary force.

The study of Arctic operations and the Aleutian Islands Campaign requires a large body of knowledge on a variety of subjects. In order to understand the Arctic itself, researchers require knowledge on Arctic terrain, geography, weather, and infrastructure. The researcher must also understand the peculiarities of the Aleutian Islands and the campaign to recapture them from the Japanese. The aggregated literature will paint a comprehensive picture of the challenges surrounding the campaign and how the US overcame these challenges to ultimately succeed in retaking the islands.

[1] Richard L. Thoman, Jacqueline Richter-Menge, and Matthew L. Druckenmiller, *2020: Arctic Report Card* (Washington, DC: National Oceanic and Atmospheric Administration, U.S. Department of Commerce, December 2020), 2-4, https://arctic.noaa.gov/Report-Card/Report-Card-2020.

[2] Office of the Under Secretary of Defense for Policy (OUSDP), *Report to Congress: Department of Defense Arctic Strategy* (Washington, DC: Department of Defense, June 2019), 3-4, https://media.defense.gov/2019/Jun/06/2002141657/-1/-1/1/2019-DOD-ARCTIC-STRATEGY.PDF.

[3] Ibid., 4.

[4] "China's Arctic Policy," The State Council Information Office of the People's Republic of China, January 26, 2018, http://www.scio.gov.cn/zfbps/32832/Document/1618243/1618243.htm.

[5] OUSDP, *Department of Defense Arctic Strategy*, 2.

[6] Ibid., 8.

[7] Woods Hole Oceanographic Institution, "Arctic Location and Geography," Polar Discovery, 2006, http://www.polardiscovery.whoi.edu/arctic/geography.html.

[8] Arctic Research and Policy Act of 1984, Public Law 98-373, US Code 15 (1984), § 212.

[9] Headquarters, Department of the Army (HQDA), Army Technical Publication (ATP) 3-90.97, *Mountain Warfare and Cold Weather Operations* (Washington, DC: Army Publishing Directorate, April 2016), B-1.

[10] Headquarters, Department of the Army (HQDA), *Regaining Arctic Dominance: The US Army in the Arctic* (Washington, DC: Department of the Army, January 2021), 10, https://api.army.mil/e2/c/downloads/2021/03/15/9944046e/regaining-arctic-dominance-us-army-in-the-arctic-19-january-2021-unclassified.pdf.

[11] Ibid., 4.

[12] OUSDP, *Department of Defense Arctic Strategy*, 1-18.

CHAPTER 2

LITERATURE REVIEW

Introduction

The collected literature will serve to explore the Aleutian Islands Campaign and answer three questions vital to understanding how the sustainment portions of the campaign unfolded and how a modern reader can use the campaign to inform current operations. What challenges did the Aleutian environment present to the Joint Force? How did the Joint Force conduct sustainment operations and overcome the challenges of the Aleutian environment? Using current doctrine and strategy as a framework, what lessons from the campaign can we apply to today's force?

The identification of the sources in this study started with reading the current available research at the Army Command and General Staff College and online repositories. This research demonstrated the current state of research into the Aleutian Islands Campaign and provided extensive lists of additional sources to seek. The collected sources include doctrinal publications, official histories, combat narratives, journal articles, scientific articles, first person accounts, and the analysis of other authors into the campaign. The sources are accurate and reliable though readers must take care to remember the inherent biases and levels of expertise of the various authors. Some authors, exemplified by some soldiers incorrectly referring to muskeg as tundra, may use confusing language to describe things they may not be experts on. To illustrate the effect of incorrect Arctic terminology, Tundra is permanently frozen ground under solid soil while muskeg differs in being wet vegetation covered by soil.[1] The differences in these

types of soil can halt any mechanized movement if planners select transportation methods that are inappropriate for the terrain they will encounter.

Doctrine is a common starting point for reviewing and improving upon past military operations. This study incorporates a review of modern doctrine through which an audience can examine the Aleutian Islands Campaign through the lens of a modern commander or planner. The following doctrinal overview will not transform a reader into an expert on sustaining military forces but will instead highlight key doctrinal ideas that apply specifically to sustaining operations that combine large scale combat, amphibious operations, and an Arctic environment.

US Joint Doctrine

Current sustainment doctrine provides a framework for planners to consider a wide array of factors they need to account for in their plans.[2] The overarching Principles of Sustainment, detailed in chapter four, guide military planners in developing and executing sustainment activities.[3] However, Joint doctrine does not contain considerations for environmental or weather effects on sustainment operations. The individual service doctrinal publishing repositories the author could access only contained cold weather publications for the US Army and US Marine Corps. These doctrinal publications cover all the warfighting functions in general but do not have any particular focus on sustainment. No service or joint doctrine exists specifically for Arctic conditions or operations.

Sustaining Joint Forces

Joint Publication (JP) 4-0, *Joint Logistics* is the primary doctrinal publication for sustaining the joint force. Joint doctrine addresses sustaining military forces for any operation spanning the strategic, operational, or tactical levels, and across all domains.[4] In a joint operation under a Combatant Command (CCMD), the supported Combatant Commander (CCDR) have coordinating authority for logistics planning in their CCMDs.[5] The supported CCMD leads sustainment planning with the supporting CCMDs and agencies.[6] The Secretary of Defense is the arbiter for competing requirements for resources amongst the CCDRs.[7] When the CCDR creates a subordinate JTF, the CCDR or JTF Commander establishes the accompanying command and support relationships amongst the contributing services and agencies.[8]

Generally, the services are responsible for the sustainment requirements of their contributions to a joint force. The supported commander, a CCDR or JTF Commander, may designate Single-Service Logistics Support, Lead Service Support, Lead Agency Support, or a combination thereof for Common Use Logistic (CUL) Support.[9] US Transportation Command (USTRANSCOM) provides common-user air, land, and sea transportation, terminal management, and aerial refueling to US forces.[10] USTRANSCOM leverages both military and civilian craft to transport cargo and passengers in fulfillment of its global mission.[11] USTRANSCOM will generally deliver cargo and personnel to a theater through an aerial port of debarkation (APOD) or seaport of debarkation (SPOD) for onward movement to an assembly area for the receiving CCMD or JTF.[12]

Strategic sea lift includes Joint Logistics Over-The-Shore (JLOTS), the dominant type of strategic level logistics efforts in the Aleutian Islands Campaign.[13] The US Navy and US Army have organic LOTS capabilities and provide their individual LOTS capabilities to a joint force commander to function in a joint capacity and sustain the joint force.[14] JLOTS allows a CCDR the flexibility to use a variety of austere or fixed SPOD locations to disembark personnel and equipment.[15] JLOTS can be the sole source of the SPODs available to a commander or augment existing port facilities to increase throughput.[16] JLOTS is not a tactical or operational level amphibious operation but a strategic effort on behalf of a CCDR or JTF Commander though JLOTS may follow a successful amphibious operation in the transition to other operations.

Sustaining Amphibious Operations

The main joint doctrinal publication is Joint Publication 3-02, *Amphibious Operations*. In joint amphibious operations the overall JTF commander designates a commander, amphibious task force (CATF), and a commander, landing force (CLF). The JTF commander also delineates responsibilities and relationships between the two subordinate commanders as needed to meet the specific challenges of the particular amphibious operation.[17] These two commanders are co-equally responsible for the planning, sustainment, and conduct of the amphibious operation. While they are co-equal, the delineations in responsibilities the JTF commander established will provide an operating framework for the commanders.[18] The commanders will determine a point prior to the conclusion of the amphibious operation during which primary command and control (C2) over sustainment activities transfer from the CATF to the CLF.[19] This

process helps to transition the amphibious operation to a land operation for follow-on operations.

The CLF determines the logistical requirements for the landing force while the CATF will determine the requirements for the amphibious force.[20] These two commanders synchronize their plans and requirements to develop a detailed unified sustainment plan for the operation. Embarkation and loading of the ships of the amphibious task force with the items needed to fulfill the landing force's logistical requirements is the responsibility of the landing force itself. While the amphibious force might do much of the heavy lifting in loading the ships, they will operate under the supervision of the supported landing force.[21]

On the opposite end, at the site of the amphibious operation, the offloading of ships falls under the control of the CATF in accordance with the plan the CATF and CLF established prior to executing the landing.[22] This plan accounts for and balances sustainment, maneuver, fires, and other requirements that compete for limited space aboard transportation platforms. The logistics ships and other assets do not just support the landing force but also support the requirements of the amphibious force during an amphibious operation.[23] Once the amphibious operation ends, supporting the logistical requirements of the land force transitions from the amphibious group to other organizations like a sustainment brigade or a contracted service.[24] This frees the ships of the amphibious task force to fulfill other requirements for the JTF commander. Figure 5 illustrates the amphibious assault sequence.

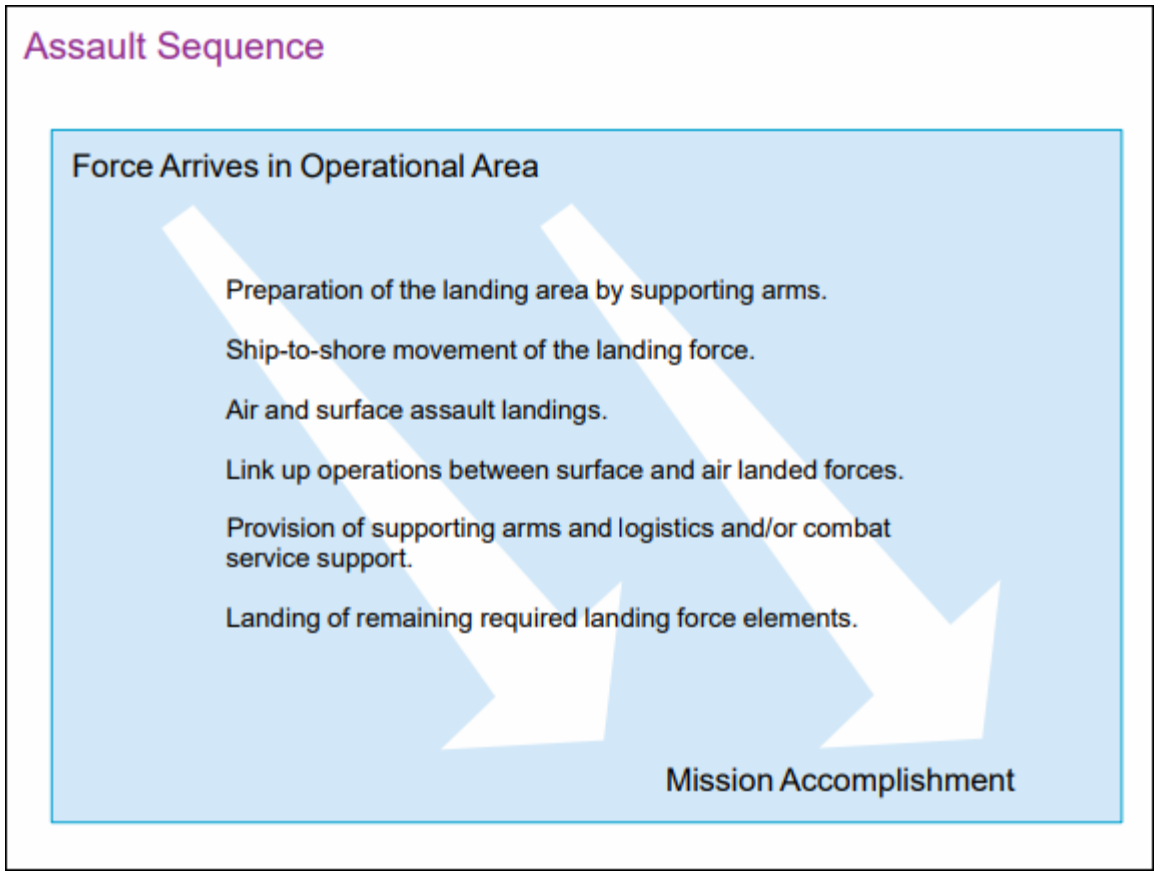

Figure 5. Amphibious Assault Sequence

Source: Chairman of the Joint Chiefs of Staff, Joint Publication 3-02, *Amphibious Operations* (Washington, DC: Joint Chiefs of Staff, January 2021), II-10.

Over-the-horizon (OTH) amphibious operations add additional layers of challenges and complexities to an amphibious operation.[25] An OTH operation may be a viable approach to an amphibious assault for cases in which an adversary can deny or contest access to an operational environment (OE) through the use of A2AD systems or other forces.[26] OTH operations increase the distance and transit time for any ship-to-shore (STS) traffic which can add friction to a sustainment plan and delay the building of a landing force's combat power.[27] This can spur the use of additional transportation assets to offset the time lost to traversing increased distances. The distance between the launch

and end points can preclude the use of vehicles with operational ranges that cannot span the required distance or can necessitate the prepositioning of refueling assets and increased overall fuel consumption.[28] Figure 6 illustrates additional considerations for OTH operations.

Figure 6. Over-the-Horizon Considerations

Source: Chairman of the Joint Chiefs of Staff, Joint Publication 3-02, *Amphibious Operations* (Washington, DC: Joint Chiefs of Staff, January 2021), IV-16.

Sustaining Arctic Operations

Joint doctrine does not address Arctic operations or Arctic sustainment. The body of joint doctrine as a whole does not address specific environmental or regional considerations. Instead, the individual services address these considerations in their own doctrinal publications to suit their service needs. Joint doctrine does however address

considerations for the air, land, sea, space, and information environment (cyber) domains.[29] For the purposes of this study, the primary doctrinal resource will be US Army doctrine and publications.

US Army and Marine Corps Doctrine

Army sustainment doctrine includes umbrella publications encompassing the gamut of Army sustainment and publications on niche sustainment activities. Army sustainment doctrine does not contain a publication that focuses on Arctic sustainment. Considerations for cold weather or arctic sustainment exist across the spectrum of Army sustainment doctrine but also in publications that addresses cold weather operations in general. Combined, these publications can provide general planning considerations for sustainment operations in cold weather.[30] In the case of amphibious operation, the Army does not have its own doctrine and instead this study will use joint and Marine Corps doctrine.

Sustaining Army Forces

Army doctrine emphasizes the joint nature of modern military sustainment and the need to synchronize and integrate sustainment at every echelon.[31] Doctrine focuses on enabling a CCDR or Army Force's freedom of action, operational reach, and prolonged endurance across the range of military operations and conflict continuum.[32] Army doctrine requires a multi-domain approach, and the ability to operate in contested domains, as all of the domains can influence or disrupt Army sustainment operations.[33]

Doctrine describes the types of Army sustainment organizations from the strategic level to the tactical and their roles within the total force.[34] Effective sustainment planning

requires a comprehensive and current analysis of all the factors influencing sustainment.[35] Sustainment doctrine leads its operations with shaping activities which include setting the theater, sustainment preparation of the operational environment, and other activities.[36] Planners must develop and execute these shaping activities well before an operation to enable a successful operation and will often need to continue their shaping activities past the end of the designated operation.[37] In setting a theater, planners establish the conditions necessary to sustain operations which may include theater opening, establishing a distribution network, receiving forces, and more.[38] To execute sustainment preparation of the operational environment, planners determine the environmental, infrastructure, and resource considerations that impact the Army's ability to sustain a commander's plan.[39] Army Pre-Positioned Stocks (APS) is one resource commanders can leverage to help deploy and sustain early entry forces in a theater.[40]

Sustaining Arctic Operations

The Army's primary publication concerning cold weather operations is ATP 3-90.97, *Mountain and Cold Weather Operations*. Other doctrinal publications address cold weather operations in subchapters or subparagraphs within the designated topic of the publication. For example, ATP 4-43, *Petroleum Supply Operations* addressess the spectrum of considerations for petroleum operations but also addresses cold weather and Arctic effects on the management of static electricity around fuel.[41]

Army doctrine comes to the general consensus that cold weather and Arctic operations impact all aspects of sustainment and increases the expenditure rate of all classes of supply which forces commanders and their staffs to plan for and mitigate for unique conditions. For example, the act of storing and supplying Class I items can face

different hurdles in Arctic environments. Cold temperatures will force units to store Class I in a manner to prevent freezing or use heating devices to thaw frozen water and rations. Cold temperatures also increase the required caloric intake personnel require to perform at high levels in Arctic environments. Planners may need to consider special rations with lower or no water content to mitigate freezing.[42]

Individual clothing and equipment must provide protection from cold weather, manage moisture, and protect from other weather conditions. Personnel also require shelters to insulate them from cold weather or provide heat in the absence of adequate insulation. Ground personnel will also require specialized equipment to travel in extreme cold or wet cold conditions. Items such as snowshoes, skis, boot crampons, and other items will increase mobility and allow travel over snow restricted terrain.[43]

Extreme cold also impacts equipment and machinery. Metal, plastic, and rubber materials become brittle and can fail in extreme cold which requires additional care to prepare equipment for use to avoid damaging equipment.[44] The Petroleum, Oils, And Lubricants (POL) consumption rate will increase by 30-40 % in extreme cold weather. POL must also be of a formulation designed to operate effectively at the anticipated cold weather category.[45]

Distribution operations require the use of vehicles with improved cross-country capabilities to move personnel, equipment, and supplies. Rugged terrain and lack of quality infrastructure in the Arctic can require off-road movement, travel on unimproved surfaces, combined with snow and ice hazards. Tracked vehicles are ideal over wheeled variants for restricted terrain and negotiating the aforementioned snow and ice hazards.

Human-powered sleds or pack animals may be the best option for distribution operations through severely restricted Arctic terrain.[46]

The Arctic may force organizations to winterize their equipment and facilities to withstand the conditions they will experience. Winterization efforts requires planning and preparation well in advance of the anticipated date of use for the selected materiel. Units needed to order material and equipment well in advance of the winterization date. Planners must determine their winterization requirements to prioritize heating, insulation, and construction materials for the winterization effort. For example, maintenance and some storage facilities will require heated structures while class IV storage may only require overhead cover to keep snow from burying it.[47]

Extreme cold weather will increase water viscosity which causes it to move at a slower rate through objects like filters, pipes, and circulation systems. Water purification in extreme cold weather is a slower process than in temperate weather and mass water purification may not be a suitable course of action for an operation. Instead, small groups or individual troops may have to create their own water through melting ice or snow and purifying the water through boiling or other means.[48]

In Arctic conditions, class III consumption increases not just for vehicle use but also in tent heating systems and squad cook systems. The increase in fuel consumption also imposes risk on personnel as cold fuel can cause instant frostbite on an individual if it makes contact with unprotected skin.[49] Lubricating oils with specialized formulations are necessary for operations in extreme cold weather and can replace a multitude of other POL. Standard lubricating oils, power steering fluid, and hydraulic fluid can seize and fail in extreme cold weather.[50]

Metal, plastic, rubber, and electronic components can fail in extreme cold weather.[51] Equipment operators must take care not to place undue stress on vulnerable components and minimize the direct exposure to extreme cold. Sustainment planners must account for an increased failure rate in components by keeping enough stocks on hand to replace vital components and order enough replacement parts to keep pace with the realized expenditure rate.[52] Units may need to increase its stock of class IX by 300 % to meet their operational needs.[53]

Sustaining Amphibious Operations

The US Army does not have an amphibious operations doctrine. Instead, Army doctrine refers readers to JP 3-02, *Amphibious Operations*.[54] The US Marine Corps has additional doctrinal publications concerning amphibious sustainment in MCTP 3-40B, *Tactical-Level Logistics*, MCTP 13-10B, *Combat Cargo Operations,* and MCTP 13-10C, *Unit Embarkation Handbook*. For the purposes of this study, Marine Corps and Joint publications will mitigate the lack of current Army amphibious doctrine.

Task force planners design the load plans for the ships of an amphibious task force to support the landing force's scheme of maneuver.[55] Creating a ship's load plan is the responsibility of the landing force's ship level Team Embarkation Officer (TEO) and amphibious task force level Landing Force Embarkation Officer. Through the ship's Combat Cargo Officer (CCO), the TEO and Landing Force Embarkation Officer submit their load plan to the ship's commanding officer for approval. This load plan prioritizes the ability to debark the landing force and its equipment for combat and not efficiency while at port or underway, economy of space, or other considerations.[56]

During an amphibious operation, the US Marine Corps divides landing force supplies into three categories: basic load, prepositioned emergency supplies, and remaining supplies.[57] The basic load consists of the supplies a landing force is physically carrying either by individual or mechanized means.[58] Prepositioned emergency supplies consist of supplies designated and prepared for on-call and immediate delivery to a commander ashore to fulfill emergent requirements. These prepositioned emergency supplies are available for delivery by aerial or surface assets as appropriate.[59] Remaining supplies are the largest portion of an amphibious task force's supplies and falls in general support of the amphibious task force as needed. The remaining supplies will form the task force's onshore stockpile for the duration of the operation and transition to land operations.[60] Distribution operations follow the standard doctrine of the supporting service, supported service, or joint doctrine as determined by the Joint Task Force commander.

Marine Corps doctrine further divides the responsibility of sustaining an amphibious assault amongst two groups: the Landing Force Support Party (LFSP) and Tactical-Logistical (TACLOG) Group.[61] The LFSP is a temporary task organization of Navy and Marine Corps elements that provides combat service support to the landing force during an amphibious assault.[62] The TACLOG group is a temporary organization that imbeds with and advises Navy STS C2 organizations on the landing force's support requirements and helps control STS movement.[63] Reference Figure 7 for an illustration on how the landing force requests and receives prepositioned emergency supplies and remaining supplies during an amphibious landing. Once an amphibious operation

transitions to subsequent operations, standard service sustainment doctrine replaces amphibious centered doctrine.[64]

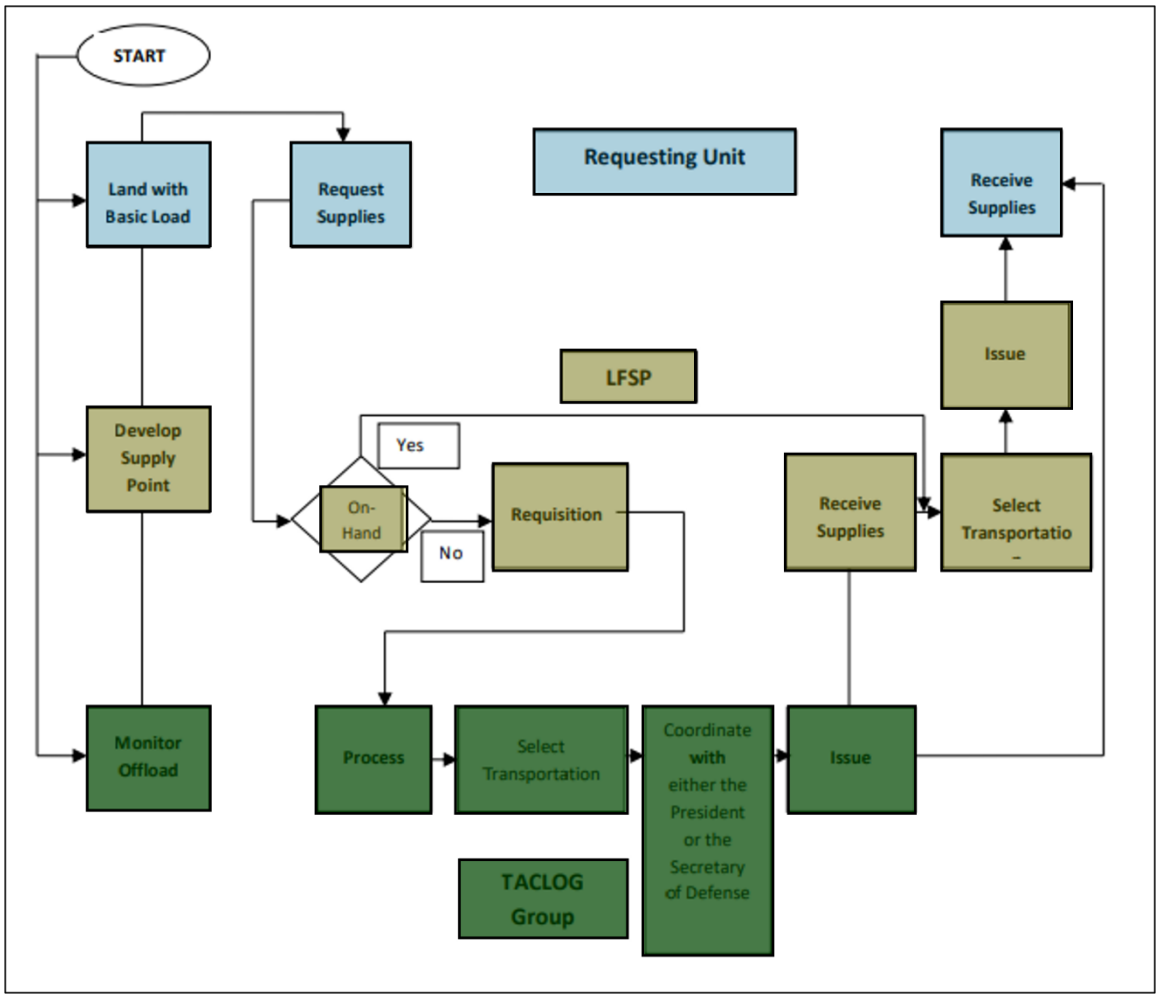

Figure 7. Supply Support during the Amphibious Landing

Source: Headquarters, United States Marine Corps, Marine Corps Tactical Publication 3-40B, *Tactical-Level Logistics* (Washington, DC: Marine Corps Combat Development Command Doctrine Division, April 2018), 2-3. Colorized by author.

Scientific Publications on the Arctic

Much of modern scientific inquiry into the Arctic tends to focus on the effects of global climate change and how it is reshaping the Arctic.[65] This climate change spurs other scientific endeavors focused on the exploitation of Arctic resources and shipping lanes for the economic benefit of the Arctic nations and China.[66] Though this study of the Aleutian Islands Campaign is not a scientific endeavor, it is vital to understand the Arctic environment and how changes within that environment can impact people and geopolitics which can spur competition between nations.

Changing Environment

In the year 2020, the average surface air temperature in the Arctic was 1.9° C above the previous 20-year average and recorded the second highest average temperature since before 1900. The years between 2011 and 2020 recorded nine years in which the yearly average rose at least 1° C above the 20-year average.[67] Over the past 50 years, Arctic air and permafrost temperatures increased while spring snow cover, sea ice, and glacier mass all declined.[68] The most extreme examples of climate change are the increase of winter air temperature from 1971 to 2017 by 3.1° C, 2.8° C above the Northern Hemisphere average, and Arctic sea ice coverage in 2012 reaching its lowest extent since the start of satellite imaging of Arctic ice.[69] These changes present opportunities for interested parties to take advantage of in international competition.

Economic Impacts

The changing Arctic can provide increased economic opportunities as nations seek shorter and more efficient shipping routes to bypass canal systems or sailing around

the southern tips of Africa and South America. As a share of the total Arctic economy, Russia contributes the largest percentage at 73% with the US (Alaska) in second contributing 10% and the remaining 17% spread among the other Arctic nations.[70] Illustrating the increasing popularity of Arctic Sea routes, from 2013 to 2019 alone shipping through the Arctic increased by 25%[71] with the Northwest Passage experiencing a 44% increase in unique ship traffic.[72] The Northern Sea Route, large sections of which runs through Russian territorial waters, also saw an increase in shipping due to the increasingly accessible waterways. Shipping tonnage through the Northern Sea Route increased from 2 million tons in 2013 to 32 million in 2020.[73]

Climate change also allows nations greater freedom to exploit natural resources in the Arctic. The reduced snow and ice on land and sea grant easier access to locations rich in resources. In the Russian Arctic, petroleum extraction and mining operations increased 8% from 2015 to 2018 while the total economic output of the region, spurred by natural resource exploitation, increased 45% in the same time span.[74] The US Arctic did not experience a comparable level of economic growth and instead experienced negative economic growth largely due to reduced oil extraction on the North Slope.[75] The rest of the Arctic countries experienced positive economic growth in their Arctic territories through resource extraction, fishing, and other activities.[76]

Impact on Human Physiology

The human body's defense mechanism against cold exposure results in the body drawing blood from its extremities in favor of keeping the core and vital areas warm. The body draws blood away from the extremities towards its vital areas to avoid convective heat loss through those extremities and decrease the surface area from which the body

can lose heat. This mechanism does preserve core body temperature but increases the chance of cold weather injury (CWI) to the sacrificed extremities.[77]

The body may also increase its metabolic heat production to increase heat production. The body can increase this output through shivering or voluntary physical exertion (exercise). Performing physical exercises may prevent the onset of involuntary shivering and allow the individual to manage their own heat loss prevention.[78] Metabolic heating requires an increase in caloric intake and nutritional requirements over a regulating body temperature in a temperate environment.[79] The body uses these calories to replenish the bodyfat and carbohydrates it uses to fuel its warming process.[80] Generally, the need for additional nutrition increases in proportion to the level of cold which an individual encounters though effective winter clothing or shelter can prevent the need to employ metabolic warming.[81]

Feeding, digestion, and processing food produces heat for the body in addition to providing the necessary calories and nutrients for sustenance.[82] Protein heavy diets tend to produce more heat than low protein diets.[83] Troops in Arctic conditions should intake around 60 calories per kilogram of bodyweight of food daily,[84] assuming a moderate level of physical activity, to maintain their current levels of bodyfat and ensure high performance in Arctic conditions.[85]

Water intake can be a problem for troops in Arctic conditions. Sweating and dry air both contribute to fluid loss even in hazardous cold conditions.[86] Troops may refrain from drinking water due to the temperature of the water itself, the desire to avoid exposing oneself to urinate, or not realizing the need to maintain a healthy level of

hydration.[87] Dehydration in cold environments can reduce the body's ability to produce blood and body water which reduces the ability to distribute heat throughout the body.[88]

Literature on the Aleutian Islands Campaign

The body of literature on the Aleutian Islands Campaign tends to focus on maneuver and geopolitical concerns. Sources that focus on addressing sustainment considerations are few and far between. To compensate for the lack in sustainment publications for the campaign, sources that can illuminate the portions of the sustainment challenges will supplement the available sustainment publications. It is important for readers to compare sources against each other to eliminate outliers and detect bias amongst the collected works. The assembled literature fits broadly into six categories: academic publications, books, contemporary official reports, journal articles, official histories and narratives, and operations orders.

Academic Publications

Academic works on the Aleutian Islands Campaign largely focus on personal accounts, operational maneuver, and preparations for the campaign. The personal accounts, written within four years after the campaign, contain the experiences of officers involved in the operations to occupy Adak and retake Attu and Kiska from Japanese forces. The personal accounts contain detailed descriptions and frank assessments of the operations as the authors experienced them. The potential for personal biases on the part of the authors is a real possibility since they are describing events in which they took part. The nature of these publications, in writing for an academic military institution, may serve to constrain the inclination of the authors to indulge in heavy overt bias.

The publications on the preparations for the campaign focus on the pre-deployment training, equipping the task force, and campaign planning efforts. They do a thorough job of describing the campaign and are useful sources for readers seeking publications that distill the campaign down to the vital events. These publications also tend to highlight problems with the campaign areas in their chosen focus areas and illustrate how these early problems impacted the subsequent operations. Some examples of the issues they highlight are problems amongst the leaders of the JTF, the selection of a desert infantry division as the landing force, the subsequent poor equipping and training decisions for the division, and poor intelligence on the Aleutian environment.

Illustrating these shortcomings are multiple early decisions the strategic and organizational leaders made for the campaign. In response to the Japanese invasions of the Aleutian Islands, the US War Department developed a JTF to plan and conduct a campaign to recapture the islands. Due to encompassing an area that straddled the US Pacific Ocean Areas Command and the US Western Defense Command, there was no unified command structure in place for the campaign.[89] Instead, the leadership structures functioned under the principle of mutual cooperation between the commanders of the service elements in the campaign.[90] A greatly simplified description of the structure is that Lieutenant General John Dewitt was in command of defending the US west coast (Commander, Western Defense Command), Vice Admiral Francis W. Rockwell followed by Rear Admiral Thomas Cassin Kinkaid was the maritime component commander (Commander, North Pacific Force), General Simon Bolivar Buckner Jr. was the commander of the air component (Alaska Defense Command and 11th Air Force),

and Major General Albert Brown as the commander of the ground component (7th Division).[91]

Against the recommendation of General Dewitt,[92] the War Department selected the 7th Infantry Division (Motorized) as the land force for the campaign due to their high state of readiness and proximity to amphibious training locations.[93] The 7th Division had previously been in the Mojave Desert, training for combat in North Africa when the War Department re-tasked them with the Aleutians Campaign. The 7th Division retrained for amphibious operations and attempted reequip themselves for Arctic operations at Fort Ord, California.[94] The 7th Division encountered difficulties in procuring adequate cold weather equipment to replace their desert and tropical equipment.[95] The deception plan for the campaign required that the 7th Division soldiers not know their true target so they completed hot weather and tropical instead of cold weather training and did not know they had cold weather clothing until after they were underway.[96]

Intelligence on the conditions present on the islands was poor. Reconnaissance from the air was the method of gathering intelligence though poor local weather limited its effectiveness.[97] Aerial reconnaissance was able to produce some imagery, but this did not translate into creating maps for the landing force.[98] Maps of the islands only extended slightly past the shorelines, so the assault force did not have a complete picture of the island terrain.[99] In one last ditch attempt to mitigate this problem, the task force landed scouts on Attu to determine possible landing sites.[100]

The works that focus on the maneuver portions of the campaign still manage to squeeze in anecdotes on sustainment matters. For example, *The Aleutian Islands Campaign: The Strengths and Weaknesses of its Planning Process and Execution* notes

that the decision to establish bases at Adak and Amchitka enabled the generation of combat power and power projection onto Attu and Kiska.[101] The major common sustainment-oriented themes in these products are the impact of establishing intermediate staging bases,[102] CWIs presenting a significant challenge, and transportation problems impacting sustainment.[103] These studies communicate the JTF's overall unpreparedness to fight in the Aleutian environment. This group of studies span 40 years of research into the Aleutian Islands Campaign and reinforce each other's analysis and conclusions.

Books

The collected books on the Aleutian Islands Campaign are a diverse assortment that captures personal accounts, collections of symposium papers, descriptions of various campaign aspects, to a non-fiction personal drama. More books on the Aleutian Campaign exist but the collected works a representative sampling of the available literature.

Alaska at War, 1941-1945: The Forgotten War Remembered provides the best collection of information on the campaign and contextual topics as it contains a collection of 70 papers in 10 categories presented at the 1993 Alaska at War Symposium. The collection of papers broadly agree with the information and assessments in government publications and reports. It provides both information and analysis on its selected topics from subject matter experts, some of whom were authors of other works in this study. The sections on the Aleutian Islands Campaign, the Alaska Highway, and Keynote Addresses are the best sections for readers interested in researching the campaign.

Stepping Stones to Nowhere: The Aleutian Islands, Alaska, and American Military Strategy, 1867-1945 provides a wealth of information on pre-war Alaska and the

campaign itself. It pulls from its own wide array of sources to provide a detailed account of the campaign, the factors that influenced events, and the author's assessments of what transpired. This book delved into more of the international considerations than many of the other publications in this study. One example of this international coverage is the difficulty the US had in convincing the British, in light of the Europe-First strategy, to support a campaign in the Aleutians.[104]

The Capture of Attu, As Told by the Men Who Fought There is a retelling of accounts from the people who fought in the campaign preceded by an overview of the battle to provide the context for what the troops experienced. These accounts are a valuable insight into what the people who actually did the fighting experienced on the sharp end of all the planning and preparation as well as telling how the Aleutian environment effected them on an individual level. An account by a Staff Sergeant Robbins conveys the struggles of trying to move 105mm artillery through Massacre Valley using tractors. His description of the tractors getting stuck in mud and muskeg no more thatn 75 meters from the beach illustrates the futility that even tracked vehicles experienced.[105]

Contemporary Official Reports

Elements of the JTF and their staffs commissioned several reports to analyze their contributions to the campaign and provide recommendations to improve for future operations. The reports cover the preparations for and execution of their respective operations by their function. While these reports do not represent the official position of the JTF or their sponsoring entities, they provide valuable insight into what officers of the time assessed as the positives and negatives of the campaign. These assessments can

serve to inform a reader's analysis of the campaign by providing a basis against which to compare their own analysis and conclusions.

Similar to the personal accounts in the academic publications, personal and institutional biases may creep in due to a possible vested interest in steering discussions on the campaign in certain directions. Being military reports, personal biases may be minimal but institutional biases can still be present. Collecting multiple reports from different institutional sources and comparing them to each other can help to detect and avoid influence from institutional bias. Overall, these documents are good analyses of the campaign and free of major bias that would impact the accuracy of the assessments.

Journal Articles

The collected journal articles represent war-time submissions by authors who participated in the campaign and one modern submission. "The Battle of the Aleutians" relays the descriptions of the campaign by personnel from an involved intelligence section and is an excellent introduction to the campaign. The authors provide readers a brief and broad overview of the campaign from just prior to the Japanese occupation through to the campaign's conclusion. "The Forgotten Battle of Attu" is the sole modern piece and much like "The Battle of the Aleutians" gives a broad overview though in this case it focuses on Operation Landcrab. It forgoes making an analysis of or drawing conclusions from the campaign and instead seeks to relay the overall events of the battle to readers. Readers interested in the Aleutian Islands Campaign should consider these articles as good starting points for any further study of the campaign.

"Operations in the Aleutians" provides a closer look at campaign from the perspective of a Quartermaster Corps officer. The article makes observations of the

effects of the Aleutian environment on operations noting that severe storms often assault the islands, and the terrain often defeats attempts to use motorized transportation.[106] It also delivers a few lessons learned from the campaign chief of which is the need for proper cold weather clothing, equipment, and training to maximize a force's effectiveness in the Aleutian environment.[107]

Official Histories and Narratives

The US Army, Navy, and Air Force (for the Army Air Force) all commissioned official written histories of their contributions to World War II. These publications cover the range of pre-war to post-war activities and have more niche publications that cover topics like global logistics, hemisphere defense, and narratives describing service experiences in the Aleutian Islands Campaign. Other government agencies and local governments also published documents on the campaign. The US National Park Service, through the Department of the Interior, runs National Historic Landmarks that commemorate the campaign, and the City of Adak published a document to commemorate their role in the campaign. All of these publications represent the views US Government at different levels. While the US Government has a vested interest in presenting a favorable picture of the campaign, the ideas contained in the assembled publications all align with those of the sources in this study's other categories.

The military published official histories provide in-depth descriptions of the events of the campaign and the context surrounding them. They are a frank, without casting major dispersions, description of the events with their successes and failures. These histories contain a vast and diverse amount of information on a variety of subjects and best serve to identify service specific considerations, challenges, and perspectives on

the campaign. Aggregating the information spread amongst the publications may be difficult for readers. Information on the campaign is in publications that focus on a variety of topics, and few make the Aleutian Islands Campaign their primary focus. Of note, *United States Army in World War II: The Western Hemisphere: The Framework of Hemisphere Defense* goes into detail on the construction of the Alaska Highway. Other publications delve into how the highway established a land route from the continental US and contributed to the building and supplying the Alaskan defense.[108]

The City of Adak's publication serves as a historical guide of Adak's contributions to US military history from 1942 to the 1990's. It identifies key sites on the islands and how they contributed to World War II and the Aleutian Islands Campaign. Readers interested in understanding how the US established the Adak base and supported the rest of the campaign from this location will find this publication useful. Military leaders will be able to use it as a starting point for determining the requirements of an effective ISB in an Arctic environment.

The National Park Service's publication *Attu, the Forgotten Battle* is the best publication on the campaign the author was able to find. Though it concentrates on Operation Landcrab, it still manages to tie the narrative in to the rest of the campaign. It spends its first three chapters setting the stage for the battle by covering the Aleutian terrain and weather, the history of the Aleutians back to the Russian period, and the World War II context of the battle. The campaign-specific material includes planning and preparation, the actions of the battle, the battle's aftermath, the subsequent events of the war, and post-war events.

Operations Orders

This study includes two operations orders for the campaign. The Eleventh Air Force Field Order 10 and the Task Force Fifty-One Operation Plan 3-43. Unfortunately, time and resource constraints limited the orders available for this study to those the author could access at the Combined Arms Research Library and only cover Operation Landcrab. These orders are not available, other than in images taken by the author, in digital form and access is available for in-person viewing. These orders are also incomplete with multiple pages missing which can constrict the conclusions one can draw from them. These orders represent the results of JTF level planning efforts and show how the planners envisioned the execution of Operation Landcrab. The following descriptions of the orders will provide a general overview of the operational plan.

Operation Plan 3-43 directs the ships of the transport group to withdraw from the immediate vicinity of Attu once they delivered the landing force and to leave a large contingent of LCMs and LCVs to support the landing force.[109] The order's sustainment paragraph, paragraph four, is a one sentence entry stating two locations for aviation gasoline.[110] The JTF commander included additional sustainment considerations in the ten page "Appendix 1 - Administrative Order No. 1 to Annex E."[111] The various primary and alternate landing plans also contained sustainment considerations to address the specifics of different landing locations.[112]

The sustainment plan directs units to carry 30 days of supply (DoS) with them on their transport ships with an additional 90 DoS on additional supply ships.[113] Additionally it refers to following an existing embarkation and debarkation plan for the force's supplies.[114] Troop shelters, field kitchens, hospital tents, and command posts consisted of

five-person pyramidal tents with heating capability.[115] Multifuel (coal or wood) fired stoves provided the source of heat for the tents with provisions for up to 45 days of fuel spread throughout the JTF. The plan also provided cots for the landing troops to keep them off the cold ground.[116] "Appendix 1" also contained an itemized individual packing list for the landing force and tasked the units and support ships to maintain 90 DoS of individual equipment to replace anticipates equipment losses (Reference Figure 8).[117]

Item No.	Description	Combat: Wear	Combat: Pack	Ruck: Sack	Total
1.	Light cotton underwear (undershirt and shorts).	1	-	1	2
2.	Heavy wool underwear (undershirt and drawers).	-	1	1	2
3.	Leather boots, 14" (high quality mocassin toe type)	1	-	-	1
4.	Basketball shoes	-	-	1	1
5.	Socks, heavy wool	1	1	1	3
6.	Socks, light wool	1	1	1	3
7.	Insoles, burlap, cone tipped	1	1	-	2
8.	Suits, working, one piece, herringbone twill.	-	-	1	1
9.	Shirts, wool, OD	1	-	1	2
10.	Trousers, wool, OD	1	-	1	2
11.	Reinsuit, hood, two piece	1	-	-	1
12.	Helmet, M-1, W/line & knit cap	1	-	-	1
13.	*Gas mask	1	-	-	1
14.	Mess gear, complete	-	-	1	1
15.	Sleeping bag, down (tied to ruck sack)	-	-	1	1
16.	Canteen, canteen cup & cover	1	-	-	1
17	Cartridge belt (for type weapon)	1	-	-	1
18.	Field Jacket, Alaska	1	-	-	1
19.	Packet, first aid	1	-	-	1
20.	Ointment, gas (tube)	1	-	-	1
21.	Belt, waist	1	-	-	1
22.	Towels	-	-	2	2
23.	Toilet articles (absolute min.)	-	-	1	1
24.	Shelter half, w/tent pins and ropes.	-	-	1	1
25.	Candles	-	-	3	3
26.	Pack	-	1	-	1
27.	Ruck sack	-	-	1	1
28.	Toilet paper, package	1	-	1	2
29.	Gloves, leather 2/knit glove lining.	1	-	-	1
30.	"K" Rations	1	1	1	3
31.	"D" Rations	-	2	2	4
32.	Ammunition (40 rifle,60 carbine)	1 lot	-	-	1

*Assault waves will not carry the gas mask on the person. It will be placed in the ruck sack to be delivered by nightfall the first night.

Figure 8. Individual Equipment List

Source: Commander, Task Force Fifty-One, *Operation Plan No. 3-43* (San Diego, CA: U.S. Pacific Fleet Task Force Fifty-One, 1943), Appendix 1 to Annex E, 5. Photo by author.

The sustainment plan also addressed distribution operations. Wheeled and tracked vehicles would have fuel and provisions to operate at -10° F in addition to its combat load.[118] The ships carrying these vehicles would also carry 180 days of maintenance and repair parts for their embarked vehicles.[119] Ships would offload supplies, in order of priority: according to tactical need, possibility of re-embarkation, and building the necessary supply stocks ashore for the landing force.[120] The appendix did not establish supply points, exchange points, traffic management, and other distribution details and instead left it to the direction of the ground force commander (GFC).[121]

Likewise, the order left casualty collection and exchange points up to the ground force commander.[122] Casualty transport was the duty of medical units using their organic capabilities, usually by foot, or by taking advantage of vehicles as they became available moving between the front line and beaches.[123] US troops were also able to use captured enemy supplies to supplement their own or store them as needed, again at the discretion of the GFC.[124]

The only available portion of the air operations order is the weather annex. This annex identifies icing as the primary weather hazard for aircraft aloft.[125] Extensive precipitation would also be present in most cases with accompanying heavy cloud cover.[126] Winds could range from 20 knots up to gale force.[127] Unfortunately, the weather annex does not provide material for insights into air force sustainment plans other than providing the ability to connect the anticipated weather effects to details in other works.

Conclusion

This literature review provided readers the basic information necessary to understand the Aleutian Islands Campaign and the various considerations surrounding it.

The existing body of knowledge contained common observations and themes which help to assuage concerns about source accuracy and bias. The extensive literature on the Aleutian Islands Campaign is effective at describing various aspects of the campaign but lacks any publications that directly focuses on sustainment. This study will seek to fill that void in knowledge and communicate any applicable lessons to modern audiences.

This literature review will provide the basis for the analytical method to answer the primary and secondary research questions. The collected sources cover more than just the sustainment aspects of the Aleutian Islands Campaign and largely focus on the maneuver aspects of the campaign. The wealth and variety of sources requires a research method up to the task of sifting the mass of information to synthesize valuable knowledge applicable to the research topic. The Principles of Sustainment[128] will provide a valuable tool for dissecting the collected literature and deriving a comprehensive analysis of the operation.

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[1] John Hailey Cloe, *Attu, the Forgotten Battle* (Washington, DC: U.S. Department of the Interior, 2017), 1, https://home.nps.gov/aleu/planyourvisit/upload/Attu-Forgotten-Battle-Optimized-508.pdf.

[2] Chairman of the Joint Chiefs of Staff (CJCS), Joint Publication (JP) 4-0, *Joint Logistics* (Washington, DC: Joint Chiefs of Staff, May 2019), X.

[3] Ibid., I-8 – I-10.

[4] Ibid., I-1 – I-3.

[5] Ibid., IV-2.

[6] Ibid., IV-2.

[7] Ibid., IV-2.

[8] Ibid., III-18 – III-19.

[9] Ibid., III-17 – III-19.

[10] Ibid., F-1.

[11] Ibid., E-2.

[12] Ibid., II-1 – II-3, III-2, III-14, E-2.

[13] Ibid., F-2, H1-H3.

[14] Ibid., F-2.

[15] Ibid., H-1.

[16] Ibid., H-1.

[17] CJCS, JP 3-02, xiii.

[18] Ibid., xxi.

[19] Ibid., I-10.

[20] Ibid., VI-11 – VI-12.

[21] Ibid., II-13.

[22] Ibid., VI-11.

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CHAPTER 3

RESEARCH METHODOLOGY

Introduction

This chapter will cover the type of qualitative method for the study, the type and method of gathering data, and the process to analyze the data. These methods will answer the following research questions: What lessons in sustainment operations can a current joint force learn and apply from the Aleutian Islands Campaign to a modern conflict in a similar environment? What challenges did the Aleutian environment present to the Joint Force? How did the Joint Force conduct sustainment operations and overcome the challenges of the Aleutian environment? Using current doctrine and strategy as a framework, what lessons from the campaign can we apply to today's force?

The literature review revealed an expanse of material concerning the Aleutian Islands Campaign, sustainment operations, and the Arctic environment. This pool of information dictates that the chosen research method provides the means to conduct a comprehensive analysis a single historical event using existing historical data from a wide array of sources. The method must facilitate the analysis and synthesis of knowledge within the time available to complete the study and directly answer the research questions.

Method

This study will make use of the historical case study method with one historical case. This method will facilitate the gathering of information from a wide variety of sources and the necessary in-depth analysis of the aggregated data. The historical case is

the Aleutian Islands Campaign and the sustainment preparations prior to the initiation of hostilities. The case study will provide a real-world example to demonstrate the sustainment challenges leaders faced during the Aleutian Islands Campaign and how they overcame those challenges. The use of a single historical case allows for the collection and analysis of relevant information for a thorough exploration of the topic within the time available for the conduct of this study.

The screening criteria for selecting a historical case was the need to focus on a battle or campaign that took place either entirely or partially within the Arctic as defined by 15 U.S.C. § 4111. The second set of criteria was that the operation had to fit the definition of LSCO contained in FM 3-0, *Operations* and included a US land forces component. These two criteria generated a list of operations that included the Allied intervention in the 1917 Russian Civil War and the operations of the Aleutian Islands Campaign. Of the two, the Aleutian Islands Campaign is more appropriate for study as being the more recent, it involved capabilities and doctrine that more closely mirrors that of modern US forces. This study includes the operations to re-take the islands of Attu and Kiska as well as pre-war preparations that directly impacted the ability of US forces in the campaign.

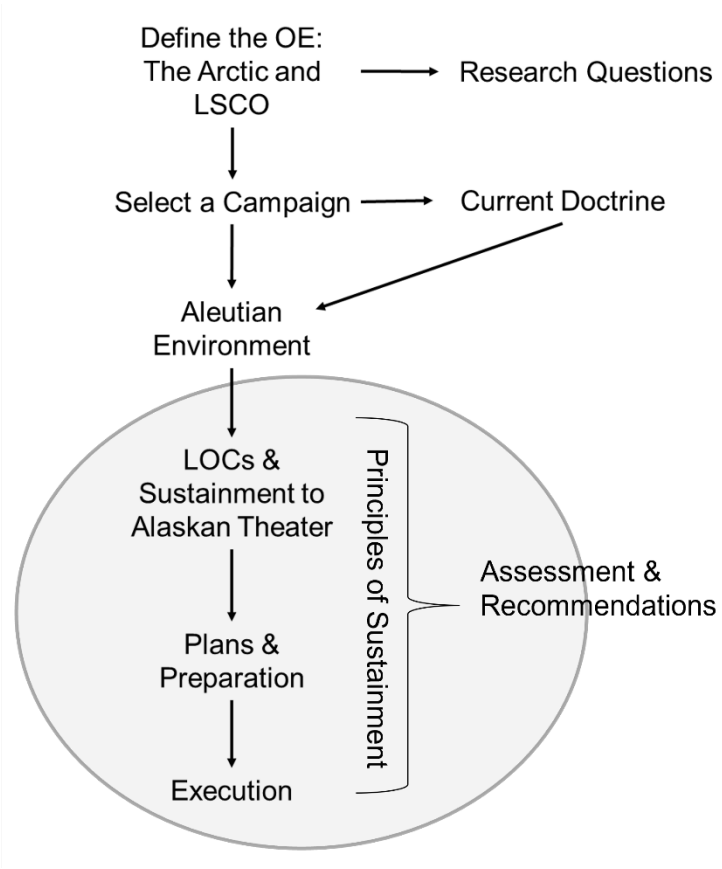

Figure 9. Conceptual Framework

Source: Created by author.

Principles of Sustainment

This study will use the Principles of Logistics as defined in JP 4-0 and FM 4-0 to assist in gathering data from a wide variety of sources and analyzing the data from the assembled literature.[1] The Principles of Logistics is the framework the US DoD uses to guide its Logisticians with crafting and assessing their logistics plans and operations.[2] Figure 10 illustrates the Principles of Sustainment. The Principles of Sustainment and the Principles of Logistics are interchangeable titles used by the US Army and Joint Services for the same set of principles and both will be used interchangeably in this study. This

framework is appropriate for this study in that it is a modern US DoD doctrinal tool focusing on sustainment of combat operations regardless of component or domain involved.

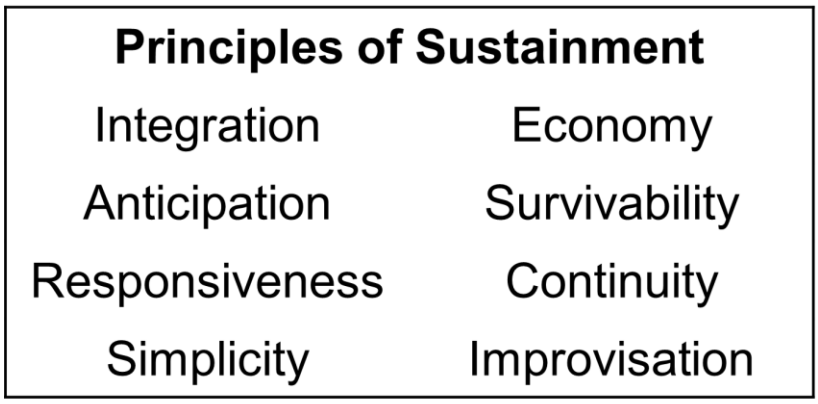

Figure 10. Principles of Sustainment

Source: Created by author with information Chairman of the Joint Chiefs of Staff, Joint Publication 4-0, *Joint Logistics* (Washington, DC: Joint Chiefs of Staff, May 2019), I-8 – I-9.

Data Collection

This study will collect data in the form of documents including first person accounts, operational plans, after action reviews, official accounts, military doctrine, scientific journals, and other academic publications located in open-source repositories. The data will cover the campaign's time frame of 03 June 1942–15 August 1943 and the preceding infrastructure investments prior to the start of World War II. The geographic bounds the data will cover includes the Aleutian Islands, Alaska, Canada, the pertinent pre-campaign training areas, and the surrounding seas. Triangulation of themes and messages in the various sources will identify the preparations, challenges, and solutions

to challenges encountered in the campaign. These themes and messages, through document analysis, will answer the research questions and fulfill the purpose of the study.

Data Analysis

The frequency of words and concepts in the collected data will identify common themes in the sustainment plans and experiences in the Aleutian Islands Campaign. After action reviews are good sets of sources that can provide starting points for identifying common themes that run throughout the campaign. These themes and the following analysis will answer the research questions. Specific actions may appear to fall outside of the major themes identified in the analysis but will relate back to a major theme in some form as a cause or result of another action that more easily falls within one of the themes. Some authors refer to the same concepts, events, or things with different words. The author used judgment and the Principles of Sustainment to assemble the literature, identify themes, and analyze the collected information.

When needed for clarity or to illustrate an idea, tables or figures will depict sustainment specific data such as consumption rates, weather effects, distances between sustainment nodes, and other time-space relationships. Direct quotations and summations of aggregated data will depict challenges and solutions from the campaign to convey an overall narrative of sustainment operations for the campaign. Maps, charts, and images will help to illustrate any analysis that relates to physical locations, technologies, equipment, or other considerations that would benefit from a visual depiction.

Summary

This thesis is a historical case study examining one case to explore sustainment operations for the Aleutian Islands Campaign. The historical case study is the best method for looking at a past event and analyzing the event to inform a modern audience on the concepts and challenges involved. This study will use the aggregated information to deliver the concepts and knowledge to facilitate the necessary analysis to answer the research questions and inform the reader. The Principles of Sustainment will provide the framework to analyze the plans and actions taken in the campaign. They will also provide a method to deliver conclusions and make recommendations for modern Arctic sustainment operations.

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[1] CJCS, JP 4-0, I-8 – I-9.

[2] Ibid., I-8.

CHAPTER 4

ANALYSIS

The lead planners for the Aleutian Islands Campaign did not have the Principles of Logistics to guide them through their sustainment planning they still managed to project a Joint Task Force into the North Pacific to successfully liberate Attu and Kiska from the Japanese. The sustainment operations experienced a bevy of challenges and creative adaptations by the forces fighting on the islands. Though the planners did not have the Principles of Sustainment, readers can use the principles to analyze the efforts they made and the results of their efforts during the Aleutian Islands Campaign. This analysis will answer the first and second secondary research questions.

The literature review revealed sustainment challenges that spanned the breadth of the Aleutian Islands Campaign. Planners failed to learn from experiences in the region and did not account for the Arctic conditions of the Aleutian Islands. Disorganized loading of supply ships resulted in unnecessary sustainment delays. The poor weather and rough island terrain frustrated attempts to use motorized vehicles to distribute supplies. Troops deployed without appropriate cold and wet weather clothing, equipment, shelters, and training which caused thousands of avoidable cold weather casualties.

The campaign was not without sustainment successes. The US efforts to construct and upgrade Alaskan infrastructure provided a backbone that allowed them to move massive amounts of personnel, equipment, and supplies into the area. Without this backbone, any US attempt to recapture the Aleutian Islands would be impossible or greatly delayed at the least. The capture and buildup of Adak, and other islands, gave US forces a power projection and logistical hub from which they could support the rest of

their operations. Tactical leaders on Adak, Attu, and Kiska found ways to move their supplies inland and survive in the harsh conditions. Sustainment proved key to expelling Japanese forces from the Aleutians and demonstrated the requirements any force operating in remote Arctic areas must plan for to achieve success.

Pre-Campaign Sustainment Preparations

Pre-war preparations in the Alaska theater would prove vital in the Aleutian Islands Campaign. Newly constructed roads, railways, ports, airfields, bases, and other infrastructure provided a platform to launch the campaign and sustain the forces involved.[1] The challenges the US experienced in its efforts should have, but failed to, provide insights into the future sustainment challenges leaders would face in the occupations of Adak, Attu, and Kiska. Prior to 1939, the US had originally assessed the likelihood of war in or near Alaska as extremely low. The only US Army forces in Alaska in September 1939 were 400 soldiers in two rifle companies stationed near Skagway. US Navy forces in Alaska consisted of a small sea plane base, scattered direction-finding installations, and radio stations. The only forces in the Aleutian Islands were a US Coast Guard base and a US Navy radio station.[2]

As the likelihood of war in the Pacific increased, the US Army and Navy reassessed the need for forces and infrastructure in the region. In 1938 the US Navy began construction on naval bases at Kodiak Island and Dutch Harbor, expanded sea plane bases, and a naval air station at Dutch Harbor. These expanded facilities helped force the US Army to commit additional resources to Alaska as the Army was responsible for defending naval installations in Alaska.[3]

The US Army experienced more challenges in building defenses in Alaska than the Navy. Until the completion of the Alaska Highway in November 1942, the only direct routes from the continental US to Alaska were through air or sea routes. These routes were long and susceptible to interruption by weather, overwhelmed transportation nodes, and Japanese interdiction.[4] The poor condition of the limited rail service and lack of extensive road networks required upgrades to facilitate the Army's plan to establish a primary base near Anchorage and secondary base near Fairbanks.[5] To assist with the defense of Alaska and its military installations, the US Army in 1939 decided to establish a main air base in the Anchorage area with additional airdromes in Kodiak, Juneau-Sitka, and Dutch Harbor.[6]

The vast distances between Anchorage and the transportation nodes in Seattle, Washington translated into long transit times for troops and supplies (see figure 11 for illustration of distances). However, within Alaska itself, the distances expanded exponentially and further impacted transit times. One outstanding example is that the island of Attu lies 2400 miles from the Alaskan hub of Anchorage.[7] Once the Japanese forces seized Attu and Kiska, US military supply shipments to Alaska more than doubled. Sustainment planners had to account for the distances involved weather impacts to transportation. Often, the result was that these planners had to order shipments months in advance of when they believed they would need them. Due to these vast distances and frequent severe weather, units had to rely on US Navy surface ships for transportation.[8] It was not unusual for Army Air Force transport aircraft to only see four flying days in a month due to the bad weather.[9]

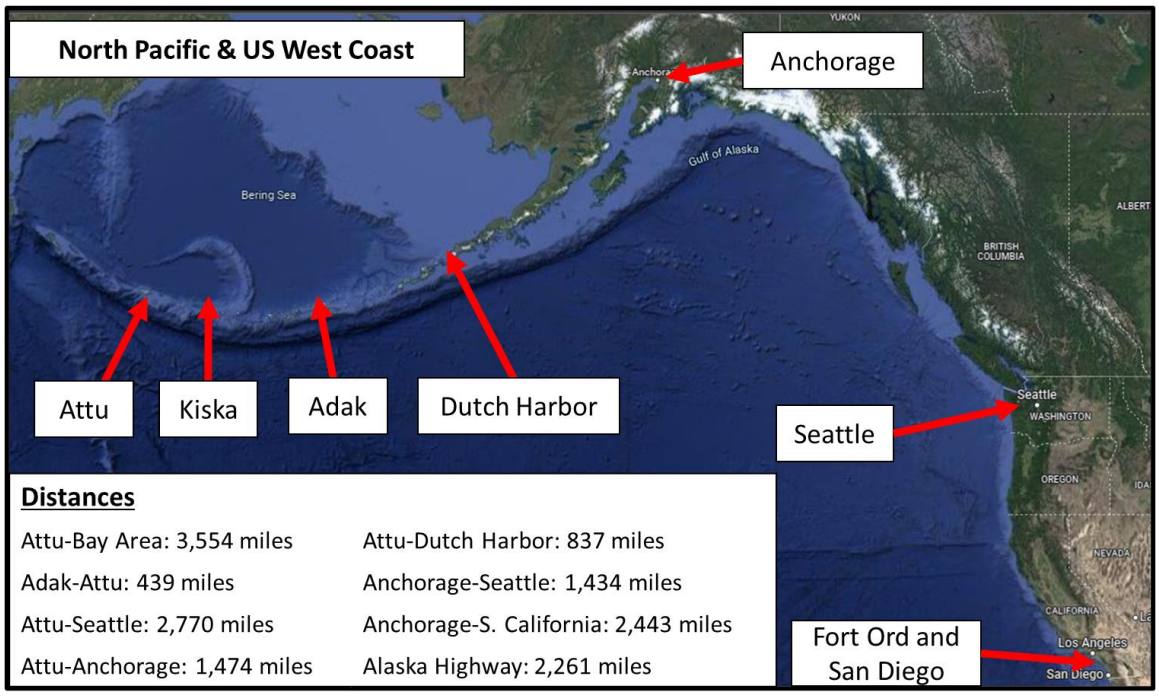

Figure 11. Map of Aleutians and North American West Coast

Source: Created by author using Google, Google Maps, accessed 16 March 2020, https://www.google.com/maps/@49.7623313,-145.5236157,3487719m/data=!3m1!1e3.

Planning and Preparation for the Campaign

The US Army and Navy decided the first action in expelling the Japanese from the Aleutian Islands would be to seize Adak Island which, with its natural harbor and space for an airfield, would become the major logistical base and power projection platform for the campaign.[10] The seizure of Adak on 30 August 1942, while unopposed, presented serious sustainment challenges that exposed deficiencies in allied plans. Due to a lack of specialized winter clothing, the initial landing forces wore standard issue clothing and equipment that did not provide protection against the weather in the Aleutians. These troops only had unheated pup tents for shelter from the 70 mile per hour

(mph) wind, rain, and 30° F weather.[11] The challenges troops encountered should have informed future operational planning but as will be evident, it did not.

The US Navy delivered supplies to the Adak beaches where soldiers, as they would later repeat on Attu and Kiska, ferried the supplies inland on their backs. As the US continued to deliver supplies via surface ships and aircraft to Adak, the forces there improved the infrastructure to support themselves and follow-on operations. soldiers and Navy Seabees constructed defensive positions, an airfield, harbor facilities, shelters, roads, and other infrastructure that would prove vital in the bombardments and seizures of Attu and Kiska.[12] Figure 11 provides an overhead view of Adak facilities.

Figure 12. Aerial View of Air and Naval Facilities on Adak

Source: City of Adak Alaska, "ADAK Historical Guide," accessed March 30, 2022), 1, https://www.adak-ak.gov/sites/default/files/fileattachments/community/page/2269/hguide10.pdf.

On Adak, the US Army Air Corps noted a sharp increase in maintenance and need for repair parts. The cause was the increased combat air patrols due to the 14 hours or more of daylight during the Arctic summer. This increase in required maintenance stressed the long supply system and the maintenance facilities at Elmendorf Air Base.[13]

With Adak firmly in US hands, a joint Army-Navy staff formed in San Diego to plan the US recapture of Attu and Kiska. The initial land force was to be the reinforced 7th Motorized Infantry Division, a unit that had trained for desert combat in North Africa. The soldiers of the division largely hailed from California, Oregon, and Washington.[14] The makeup of the 7th Division and its desert training were a far cry from the conditions endemic in the Aleutians.[15] The 7th Division retrained for their Aleutian amphibious operations at Fort Ord, California. This is where planners made the mistake of outfitting the division with clothing and equipment that was inappropriate for the weather conditions they would encounter. This equipment deficiency combined with poor training for Arctic conditions ultimately resulted in 2,100 nonbattle casualties, most of which resulted from exposure and trench foot.[16]

The planners also had the handicap of incomplete maps of Attu that lacked terrain features after passing one thousand yards from the shoreline and a poor understanding the effects Aleutian weather and terrain would have on maneuver and sustainment operations. Later intelligence did little to change their understanding of the operational environment towards which they were heading.[17]

Execution Phase Challenges and Solutions

Planners loaded transport ships with all the supplies they believed they would need for the initial amphibious operations. The Navy's sustainment operation and support

to ground troops ran into problems before the cargo left the transport ships. Inefficient packing of goods, constructions materials, and overloaded transports caused confusion and delays in the sustainment operation.[18] The US Navy sustained the land forces who landed on Attu by using the Landing Craft, Vehicle, Personnel (LCVP) and the Landing Craft Mechanized (LCM) to ferry troops and supplies to the landing beaches. The LCVP, also known as the Higgins Boat, could transport and deliver 30 combat equipped soldiers, four tons of cargo, or other forms of heavy equipment to a landing site. The LCM could carry 100 troops, 27 tons, and heavy equipment.[19] Figure 13 provides an example of the operation on Attu.

Figure 13. LCVPs and LCMs Offloading Personnel and Cargo onto the Beach at Attu

Source: John Hailey Cloe, *Attu, the Forgotten Battle* (Washington, DC: U.s. Department of the Interior, 2017), 70, https://home.nps.gov/aleu/planyourvisit/upload/Attu-Forgotten-Battle-Optimized-508.pdf.

The Aleutian terrain proved to be a major factor in disrupting sustainment operations. Once the Navy delivered supplies to the landing beaches, vehicles, wheeled and tracked, had difficulty moving the supplies inland to the fighting forces. The Aleutian Islands are volcanic in origin and the soil is finely ground ash. Muskeg, wet soil covered in vegetation that creates a sponge-like surface, covered the lowland areas of the islands. Pools of water could form below the muskeg and volcanic ash, forming bogs that could cause troops and equipment to disappear.[20] The lack of roads and the rough terrain meant that these vehicles could not advance very far before having to unload their equipment.

Tactical leaders on the ground produced an effective, if inefficient and time-consuming solution to their distribution woes: move the supplies on soldiers' backs (see figure 14 for an example). Units used vehicles to move equipment off the beaches and as far inland as they could without becoming mired and establish exchange points. At the exchange point, they would offload supplies to other soldiers and return to the beaches for more. Units designated personnel to receive supplies at the exchange points and move them inland. These soldiers used sleds or their field packs, filled to the brim, to move and distribute the incoming supplies. This human-powered solution extended to the movement of their howitzers, with up to eight soldiers dragging them through the muskeg with attached ropes.[21]

Figure 14. Troops Hauling Supplies forward to Units Fighting the Japanese in the Chichagof Area, May 1943

Source: George L. MacGarrigle, *The U.S. Army Campaigns of World War II: Aleutian Islands*, (Washington, DC: U.S. Army Center for Military History, 1992), 16, https://history.army.mil/html/books/072/72-6/CMH_Pub_72-6.pdf. DA photograph.

Integration

While planning for the retaking of Kiska and Attu the joint planning staff failed to integrate the sustainment plan with the operational plan. The staff failed to consider the lessons from the pre-war and pre-campaign operations in the Alaska Theater into their planning.[22] The decision to prioritize the deception plan over sustainment led to the land force departing their SPOD without winter clothing or training.[23]

The maneuver forces required the capability to move quickly across the islands with Operation Landcrab planned for three days length in total.[24] The initial sustainment planning relied on transportation from wheeled land vehicles, with some tracked, to distribute supplies inland from the landing beaches.[25] The sustainment planners had

access to intelligence sections and experts on Alaska but still made decisions that did not do a sufficient job of accounting for the Aleutian environment.[26]

Anticipation

The pre-war efforts to improve theater infrastructure exemplifies the best example of anticipation in the events surrounding the campaign. Without the infrastructure improvements, the Joint Task Force may not have been able to sustain its operations without having to overly rely on the extended LOCs to the continental US. The US was able to preposition stocks of supplies, transportation platforms, and facilities throughout the theater to facilitate the defense of Alaska from a foreign threat.[27] The JTF was then able to leverage these assets to support offensive operations in the Aleutians.

Planners though failed to anticipate requirements on several occasions. They did not anticipate the need for non-wheeled transportation methods to traverse the volcanic terrain and muskeg that covered the Aleutian Islands.[28] A thorough examination of the environment's impact transportation and distribution could have alerted the planning staff of the need to seek alternative means of transportation to replace their wheeled vehicles earlier in the process. They could have also adjusted their maneuver plan to account for slower movement if they chose to rely on foot distribution methods.

The Army transferred their cold weather clothing and equipment to units heading to fight in the Italian campaign.[29] This meant that the 7th Division had to scramble[30] to acquire what they needed for the Aleutians and that they would need to seek large amounts of commercially available clothing rather than harder to find Arctic specific equipment.[31] The clothing and equipment the soldiers of the Alaskan Command used would have been the appropriate choice[32] but proved impossible to acquire in enough

numbers to outfit a division in the available time.[33] Compounding this problem, the act of delaying the issue of the substandard winter clothing to the landing force limited their ability to train with it and find useable workarounds to make their equipment more useable.

Responsiveness

The vast distances from the continental US and mainland Alaska created challenges in responsiveness. The bases, airfields, ports, and roads the US developed in the North Pacific provided vital sustainment infrastructure that shortened travel times for aircraft and naval vessels operating in the area.[34] The US seizure of Adak, other islands, and the subsequent construction of bases there brought a more robust sustainment capability to the islands to support the landings and other efforts against the Japanese occupation forces.[35] The evolution of Adak led it to becoming the center of all operations in the Aleutians by the end of April 1942.[36] The ships of the task force would serve as the local logistical hub for the ground force and offered protection of the supplies from interdiction by the Japanese.

Sustainment planners also loaded the ships of the amphibious force full of the supplies and equipment they would need for the operation.[37] In the grand scheme, these ships did increase responsiveness in comparison to transporting supplies from Adak or Amchitka as needed. However, incorrectly and overloaded vessels lowered the overall time savings from this effort.[38] Airlift could shorten the response time; however, sustainers had to compete for access to aircraft and the limited number of flying days available.[39] On Attu, the time required to move the needed supplies from the ships offshore to the beach and further to the receiving unit limited responsiveness. Ground

movement speed crept at the speed of an overloaded soldier traversing restrictive and highly restrictive terrain.[40]

Simplicity

The staff also failed to develop and execute an effective load plan for the naval vessels in the amphibious task force.[41] Overloaded transport ships caused delays in offloading supplies onto the landing beaches.[42] Further, for Operation Landcrab, the Task Force's transport group contained destroyers and troop ships, not dedicated cargo transports.[43] The JTF did include the use of one cargo transport for Operation Cottage.[44] This forced the ship to divide its available space between combat, troop transport, and cargo carrying tasks which caused further friction in the sustainment operations.

The distribution procedure became complex when the island terrain proved unsuitable for vehicle traffic and leaders chose to use dismounted personnel to take the place of the vehicles. This created beaches full of critical supplies waiting for dismounted personnel from the ground force to move them inland. Wheeled vehicles performed what they could when they encountered the few unimproved roads on the islands but could not effectively travel offroad. The distribution process also relied on multiple transfers of equipment from one means of transportation to another. Supplies had to offload from a ship onto a landing craft, from the landing craft to the beach, from the beach to a ground vehicle, and from the vehicle to sleds or field packs[45]. Air dropping supplies to forces by fixed wing aviation was the only method to deliver supplies directly to the end users, but this would not be enough to sustain a division in combat.[46]

The unsuitability of the terrain for wheeled vehicle traffic should not have been a surprise for the Joint Task Force. The US had established a base on Adak nine months

before their landings on Attu and should have learned from the experience of creating a forward base in the Aleutians. Many parts of Alaska also held terrain similar to that found in the Aleutians.[47] On Adak and other locations in Alaska, personnel remarked on the difficulties that wheeled vehicles experienced when attempting to traverse muskeg or volcanic soil.[48] Tracked vehicles were superior in traversing this kind of terrain and was an asset the sustainment planners could have had access to had they included the requirement for that capability in their initial plans.[49] The inclusion of tracked vehicles may not have completely preempted the need for dismounted personnel to ferry equipment but could have moved the transfer points further inland to speed up the distribution process.

Economy

Economy may be appropriate for building up stockpiles and transporting materiel into the theater, but once a force moves to assault an objective economy should take a back seat to other considerations. The campaign planners valued economy much too highly in their planning effort. Their overpacking of ships to maximize the amount of supplies they could carry for the landing force proved a detriment to the sustainment effort by causing delays in offloading and transporting of supplies to the landing force.[50]

On the other hand, planners achieved large scale economy in building new infrastructure and massing forces for the Alaskan Theater. The early efforts to build the Alaska Highway provided a possible alternate route to forces in Alaska, facilitated improving Alaskan infrastructure, and connected the territory to the CONUS.[51] Even with land and air routes to Alaska, the sea lines of communication (SLOCs) between CONUS and Alaskan ports were the primary method of moving personnel and supplies into

Alaska though the campaign's JTF had to compete for resources against other Pacific operations and often lost.[52]

Concurrent to the Aleutian Campaign, the US was conducting major operations in the south pacific against the Japanese. At one point, the US diverted shipping assets from the Aleutian Campaign to the other efforts in the pacific. To mitigate the impact of the reduced shipping assets, Admiral Nimitz approved Kinkaid's recommendation to divert the Kiska attack and target Attu first.[53] This change was an example of how the JTF made its plan fit a transportation constraint, an approach they should have adopted in respect to challenges with land transportation.

Survivability

The US held local air and naval superiority over the Japanese in the Alaskan Theater during the recapture of the occupied islands and the Japanese were unable to disrupt US LOCs or sustainment operations.[54] Weather contributed the largest impediments towards survivability. Flying conditions in the Aleutian Island Chain limited the windows of time for the use of airlift to transport supplies and personnel.[55] Pilots that braved the inclement weather risked losing their aircraft and cargo to the thick fog, high winds, icing, and extreme cold.[56] These aircraft relied on airfields on Adak, Anchorage, and other areas of Alaska to provide safe havens amongst the thousands of miles of frozen wilderness and open ocean.[57] Maintenance teams at each airfield were vital to keeping the airlift fleet functioning in the extreme cold weather in addition to regular transport aircraft maintenance.[58]

The uncertainty of the weather Aleutians was an impediment to rapid air transportation, so planners prioritized the use of sealift to move assets into the island

chain. Moreso than the sea, the Aleutians themselves presented challenges to naval vessels. Limited anchorages, submerged natural hazards, and jagged coastlines threatened any vessels that attempted to navigate the Aleutian Islands chain.[59] Major storms, severe wind, persistent fog, and blinding precipitation were the biggest weather threats to shipping.[60] These threats made themselves manifest when the attack transport USS Middleton ran aground at Amchitka, causing delays in unloading supplies and removing the ship from use for more than one month.[61]

Continuity

The JTF benefitted from the far-reaching foresight of the strategic leaders who made the concerted effort to improve the transportation infrastructure and basing in the Alaskan Theater. These long-term preparation efforts allowed the JTF to position sustainment assets and capabilities closer to the contested islands in addition to the sustainment capabilities they brought in with the ships of their amphibious task force. Despite all this preparation, the challenges in moving supplies inland from the beaches interrupted the continuity of supplies for the landing force.[62] The disruptions led to units on Attu going for stretched without resupply.[63] Leaders hastily assembled carrying parties of mixed troops which had to struggle through the terrain to overcome the inability of mechanized transportation inland.[64]

Improvisation

The myriad of natural and self-imposed challenges forced sustainment and maneuver leaders to make quick improvisations to ensure the ground forces received the supplies they needed. The improvisation largely took place at the tactical level with

ground force commanders committing their own combat troops to conduct distribution operations in the place of the planned vehicle distribution method.[65] The dismounted distribution method, while inefficient, proved to be more effective than wheeled transport at moving supplies off the crowded beaches and into the hands of the receiving units on the battlefield. Through the creation of carrying parties, commanders were able to continue operations, if at a reduced pace.

The carrying parties devised ingenious methods of moving heavy equipment and vehicles inland for employment at the front lines. They developed cable and pulley systems to haul artillery pieces and jeeps through mountains while hauling smaller loads on their backs.[66] When possible, carrying parties would use a vehicle to move supplies as far inland as they could before unloading the supplies to ferry on their backs.[67] Duty in these carrying parties imparted a heavy physical toll on its members. Five-hour treks up a mountain to ferry supplies would leave troops exhausted and ill prepared to physically contribute to combat operations.[68]

Conclusion

The strategic, operational, and tactical level leaders of the Aleutian Islands Campaign made many good and bad decisions that influenced the campaign. This analysis showed where leaders at the different levels, and throughout different point in time, encountered and overcame various problems. Using the Principles of Sustainment to examine the Aleutian Islands Campaign revealed many points from which one can derive lessons for modern Arctic operations. These points are a starting point for reaching overall conclusions from the campaign and formulating recommendations for today's joint force.

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CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Global climate change is increasing access to previously closed sea lanes and land masses to exploitation by interested countries.[1] Increasing challenges in the Arctic from countries like the Russian Federation[2] and People's Republic of China[3] threaten stability and access in the Arctic. The US commitment to presenting a credible military deterrence in the Arctic demands an Arctic capable force that can operate in a variety of Arctic conditions, including Arctic islands.[4] The Aleutian Islands Campaign as a case study, can provide examples, lessons, and insights into executing modern Arctic operations.

The Principles of Sustainment provided a framework for analyzing the campaign and it will also provide a framework for presenting recommendations for the execution of operations in conditions similar to the Aleutian Islands Campaign. Some of the challenges the JTF experienced in the 1940's and the methods they used to overcome them will not be applicable in every case to modern planners. Likewise, some modern technologies may eliminate some of their challenges out of hand. These recommendations will only address the Principles of Sustainment for which the author identified specific things to recommend or recommend areas of future study to further develop the body of knowledge on Arctic operations. See figure 15 for a brief summary of the conclusions and recommendations of the study.

Conclusions:

1. All sustainment planning should use the Principles of Sustainment as a guide and measuring tool.

2. Your tools matter. They can solve or create problems so choose wisely.
   - Aircraft>feet>tracks>wheels.

3. Not understanding the environmental challenges of the Aleutians forced tactical leaders to innovate on the fly.

Recommendations:

1. Develop experts in Arctic sustainment and retain them in operational level headquarters and sustainment commands.

2. Prioritize the fielding of specialized Arctic vehicles to replace current vehicle fleets.

3. Overcome extended LOCs - turn your fight into a **local** fight.

Figure 15. Summary of Conclusions and Recommendations

Source: Created by author.

Recommendations

The pre-war preparations of the Alaskan theater were instrumental in enabling force projection into Alaska and the sustainment of the Aleutian Islands Campaign. While it may not always be possible to replicate the infrastructure expansion of the 1930's, modern planners can adopt other means to achieve similar effects for an Arctic force. Changes and evolutions in a variety of domains over the past 90 years provide modern planners with a wide array of options that were not available to the World War II era planners. This study will frame recommendations in the Principles of Sustainment. Many of these recommendations may seem like they are common sense but the original

planners still made mistakes in these areas so readers should not assume that others will think of these recommendations when planning sustainment themselves.

Integration

Sustainment planners must be part of all planning efforts to ensure everyone else's plans realistically make considerations for sustainment. If necessary, sustainment leaders must take a stand and ensure other leaders understand their sustainment capabilities and limitations so that maneuver planners are not depending on unfeasible vehicle distribution through highly restricted terrain. Also, sustainment planners must ensure that their own plans reflect the Principles of Sustainment and will adequately support the maneuver plan. This integration extends to collaborating with joint partners. The joint services must all understand how they integrate into each other's sustainment plans and how a supported service may rely on minute portions of the supporting service's operations.

Unity of Command, joint planning staffs, liaison officers, fusion cells, and other methods help facilitate integration. Units should take care not to overlook using these or other appropriate methods at echelon to develop and synchronize their plans. In Arctic operations, units should acquire and integrate into their planning efforts experts in the specific Arctic environment in which a unit expects to operate. Choosing the wrong experts may result in inappropriate advice for the operational environment.

Anticipation

Arctic experts can help immensely with anticipation. Arctic units should establish regular working relationships with these experts and non-Arctic units who may find

themselves in that environment should establish those relationships as early as possible. These experts should be able to describe climate, terrain, infrastructure, and other considerations to a force. Their expertise would help planners choose the right clothing, equipment, food, distribution methods, and other necessities for sustaining an Arctic force. Units can seek expert advice from the US Army's Northern Warfare Training Center, Indigenous peoples, units stationed in the Arctic, allied Arctic nations, and civilian Arctic experts.

Commanders and strategic leaders should arrange for reconnaissance of Arctic environments they anticipate may pay host to combat operations. The objective would be to assess the year-round weather, terrain, infrastructure, and other factors that differentiate Arctic regions from each other. This reconnaissance will assist Combatant Commanders and subordinate planners to tailor their stocks and capability requirements to the conditions unique to their particular portion of the Arctic. This reconnaissance is an enduring requirement due to global climate change transforming the Arctic at a more dramatic rate than other areas of the world.

Planners should account for limited support and transportation infrastructure along with their subsequent impact on transit times and resource consumption. Improving transportation infrastructure ahead of conflict in Arctic regions might not be a feasible course of action given the high cost associated with constructing and maintaining low use infrastructure in the Arctic. The following measures will enhance the ability of US planners to properly forecast sustainment requirements

Combatant Commanders can leverage pre-positioned stocks to supplement their force capabilities. The Joint Force must examine its prepositioned stocks to determine if

their current inventory is sufficient to aid in projecting force into an Arctic environment. The Joint Force should also examine the possibility of creating supplemental stockpiles of equipment near Arctic locations within the US or allied countries.

Responsiveness

The preparations detailed under "Anticipation" will contribute to the responsiveness of sustainment operations. Modern air transportation assets can allow Commanders to reach back to the national industrial base and expect quick results for high priority requirements. Commanders should be prepared to leverage the ability for modern fixed wing transport aircraft to land on unimproved surfaces for quick long range transportation needs. Rotary wing aircraft, a capability not available in 1943, can facilitate short or medium range transportation requirements.

Road and rail networks, where they exist, can connect sustainment nodes but might not be extensive enough to provide the vehicle capacity necessary to sustain an expeditionary force. Extensive off-road travel may be necessary to achieve the commander's desired level responsiveness from their sustainment systems. Dedicated supply ships, packed correctly, with the capability to travel through Arctic waters will be necessary for any Arctic amphibious operation. The inability to reliably transit Arctic waters in all sea conditions would result in unacceptable delays in sustainment and the initiation of combat operations.

Units needing to use foot transportation should take a page from Operation Landcrab and establish coherent carrying parties from troops in the same formations. These carrying parties would need sleds, footwear, and tools to negotiate Arctic terrain. If the sustainment plan calls for the use of carrying parties, units should form them and

conduct rehearsals well in advance of operations. This distribution method will necessitate accounting for its low speed in the sustainment and maneuver plans.

Due to the expanse and sparse infrastructure of many Arctic areas, Sustainment planners will likely need to establish logistical nodes in an amount greater than they would need for operations in other environments like Africa or southeast Asia. This gap in infrastructure will be more severe depending on where in the Arctic a force plans to operate. The aforementioned cargo ships could fit into the node network by providing de facto sustainment nodes where no other might exist. Supply ships might not be able to provide for all of a force's sustainment requirements depending on the size of the operation. Instead, forces may have to progressively build sustainment nodes towards their operational area like the Aleutian JTF did with Adak and Amchitka.

Simplicity

The largest contribution to simplicity is a good plan. A plan that accounts for terrain, weather, enemy, and integrates the Principles of Sustainment can delay a simple plan from becoming complex. Planners should not confuse simplicity for a lack of detail. Details are vital for synchronizing operations. The sustainment plans must be thorough and accurate to ensure simplicity. Omitting vital details from a plan creates complexity and forces subordinate units to improvise unnecessarily.

Transportation and delivery of sustainment must include as few transfer points between vehicles as possible. If possible, transportation assets must be able to traverse all the terrain from the point of debarkation or beach to the end recipient. Under an umbrella of air superiority rotary wing aircraft can conquer difficult terrain and transit from ship to end users with little difficulty though dedicating a significant amount of a commander's

rotary wing force to sustainment tasks takes away combat power from other operations. The US still has the capability to conduct sustainment operations from ships to a beachhead using landing craft in the form of the Landing Craft Mechanized-8 (LCM-8), the Maneuver Support Vessel (Light), Landing Craft Air Cushion, Ship-to-Shore Connector, and other vessels. Moving supplies from these vessels inland to maneuver forces is still largely dependent on wheeled vehicles which will force multiple transfers similar to the experience in the Aleutians. Tracked sustainment vehicles will be necessary to minimize transfers and eliminate the need to use dismounted troops to ferry supplies in all but the most severe terrain.

Economy

In military operations, and especially in combat, economy may be subordinate to the other Principles of Sustainment and overall mission accomplishment. Seeking economy at the expense of other considerations can result in a situation similar to Operation Landcrab where overpacked ships caused delays in offloading supplies to the landing force. Prioritizing economy over other considerations can also result in having too few of a resource when a force attempts to minimize the cost instead of prioritizing a mission requirement.

The vast distances and poor infrastructure in the Arctic increase the need for sustainment bases in the Arctic so operational commanders can better support their forces and shorten their LOCs. Large stocks of supplies lying unused in warehouses may not be economical in comparison to shipping supplies from elsewhere, but other considerations must take priority when positioning forces for combat. Operational Contract Support may be one way of achieving mass economy, especially when looking to operate sustainment

bases or improve Arctic infrastructure. The Department of Defense should examine the need for additional sustainment bases or nodes in the Arctic to support forces in the event a force requires additional support to execute Arctic operations.

Survivability

Given the capabilities of modern A2AD and other weapon systems, establishing air and sea superiority in an operational area is imperative to ensuring the survivability of any sustainment effort. Friendly countermeasures to these threats have also evolved since World War II and may mitigate some of the threat. Failure to gain superiority or eliminate long range weapon systems could result in unacceptable attrition to an amphibious force and the accompanying shipboard sustainment resources. Enemy air defense fires would also pose a greater threat to threat to rotary or fixed wing aircraft than World War II era air defense systems. An effective enemy air defense could eliminate the use of aircraft in sustainment operations entirely or limit movement to uncontested areas. Friendly suppression of enemy air defenses, an activity the US may be out of practice on executing, will be vital to granting aerial freedom of maneuver.

Antishipping missiles, able to launch from a variety of platforms, could also grant an adversary the ability to threaten an amphibious force. These missiles could threaten any offshore ships serving as sustainment nodes or medical treatment facilities for a landing force. The presence of a relatively small number of missiles surviving a preparatory strike could threaten the viability and endurance of any landing force. The ability to divert or intercept missile attacks from critical targets will be vital to ensuring the ability to sustain the landing force.

Most modern distribution operations leverage a variety of wheeled vehicles ranging from light utility type vehicles to heavy 18-wheel varieties. These vehicles will struggle to maneuver both on and offroad across Arctic terrain. Reliance on wheeled transport would limit the route selection options for a commander, risking predictable route selections and leaving vehicles with their cargo mired in deep muskeg. Many of these vehicles are not armored types and likely would not need to be in an operation similar to the Aleutian Campaign, however this would need revisiting in other Arctic environments where an insurgency or unsecure rear area is a greater possibility. The US military should speed the procurement of tracked Arctic vehicles like the Cold-Weather All-Terrain Vehicle to replace the current wheeled vehicle inventory in Arctic forces.

Proper cold weather clothing and training contribute to personnel survivability. The large number of CWIs the 7th Division suffered in the Aleutian Islands Campaign illustrate this to great effect. The Army's Extended Cold Weather Clothing System (ECWCS) may not be sufficient to ensure a soldier's ability to operate in the Arctic. Current Arctic units supplement their issue ECWCS items with commercial off the shelf options to overcome perceived deficiencies in the ECWCS. Arctic forces should conduct additional research into improving the ECWCS to determine the requirements, shortfalls, and solutions to the issue.

Continuity

The US is one of the few nations in the world to have demonstrated its ability to project large combat forces across the globe in the last 20 years. USTRANSCOM can leverage a massive array of lift assets and global transportation hubs to support the combatant commanders and project force globally.[5] Unfortunately, the sparse availability

of quality transportation infrastructure in the Arctic may challenge USTRANSCOM's ability to rapidly project forces. The Department of Defense should examine the requirement and necessary capabilities for USTRANSCOM to deploy forces into an immature Arctic environment. It should also work with other US and partner nation government agencies to maintain the Arctic infrastructure that would be necessary to project Arctic forces from their home bases or to defend the Arctic territory of the US and her allies. The US would also have to secure its LOCs from enemy interdiction and interference from non-state actors.

Operational and tactical continuity will depend on the quality of the sustainment plan, the capability of current mechanized distribution platforms to operate in Arctic conditions, the survivability of cargo ships and troop transports, and the availability of sustainment nodes in the area of operations to stockpile supplies. This study addressed these considerations in other portions of chapter 5. In addition to these considerations, US land forces will have to contend with possible interference from enemy forces and non-state actors, considerations which the land forces had much practice during the Global War on Terror. The extent of challenges from non-state actors will depend on the level of development in the Arctic area where the land force will operate.

Improvisation

Improvisation can be vital to any operation. Leaders should identify effective and appropriate improvisations from subordinates, higher echelons, and peer organizations to learn from and adapt to their own operations. Leaders should be aware that they have the opportunity to improvise, to include during planning, at multiple phases in an operation.

Leaders should also allow room for their subordinates to improvise when necessary and support them in developing innovative methods of enhancing their unit sustainment.

Areas for Future Research

This study leaves room for further exploration into the Aleutian Islands Campaign and Arctic operations in general. Possible areas for other researchers to study and expand the body of knowledge are:

1. How does sustainment in the North American Arctic compared to the Eurasian Arctic?
2. How does a Joint Force sustain Arctic operations in a contested air and sea environment?
3. What are the requirements for Arctic capable shipping or transportation assets to sustain operations in terms of numbers and capability?
4. How did the Japanese fail to sustain their forces on the Aleutian Islands?
5. How does the performance of mechanized force compare to a light force in Arctic operations?
6. Are modern US Arctic forces capable of succeeding in a campaign against a peer enemy in conditions similar to the Aleutian Islands Campaign?
7. How do developments in the space and cyber domains impact modern Arctic operations?
8. What improvements if any should the Army make to the Extended Cold Weather Clothing System?
9. Does the DoD need large sustainment bases or nodes in the Arctic to support forces in Arctic operations?

10. Should the Army create an ASI to identify experts on specific environments (Arctic)?

Conclusion

The Aleutian Islands Campaign and Principles of Sustainment provide a source of knowledge to prepare modern forces for Arctic large scale combat operations. Through the case study, the principles revealed appropriate and applicable lessons, recommendations, and additional questions for modern Arctic forces to ponder. Leaders cannot assume that the past 20 years of combat adequately prepared them for Arctic LSCO. They should approach Arctic operations open to additional learning to become the military's new Arctic experts so they can avoid the problems and improve upon the solutions their military forebears had in the Aleutian Islands Campaign.

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GLOSSARY

Anticipation. The ability to forecast operational requirements and initiate necessary actions that most appropriately satisfy a response without waiting for OPORDs or fragmentary orders.[1]

Arctic. All US and foreign territory north of the Arctic Circle and all US territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas; and the Aleutian Islands chain.[2]

Arctic Capable Unit. Units that are enabled by doctrine, trained at echelon, with the right equipment, and staffed by personnel with the appropriate knowledge, skills, and abilities to successfully operate in the Arctic.[3]

Continuity. The uninterrupted provision of sustainment across all levels of war.[4]

Economy. Providing sustainment resources in an efficient manner that enables the commander to employ all assets to the greatest effect possible.[5]

Improvisation. The ability to adapt sustainment operations to unexpected situations or circumstances affecting a mission.[6]

Integration. Combining all of the sustainment elements within operations assuring unity of command and effort.[7]

Joint Force. A force composed of elements, assigned or attached, of two or more Military Departments operating under a single joint force commander.[8]

Large-Scale Combat Operations. The form of major operations and campaigns aimed at defeating an enemy's armed forces and military capabilities in support of national objectives.[9]

Muskeg. A type of bog or wetland found in poorly drained areas underlain with permafrost.[10]

Permafrost. Permanently frozen ground that occurs when the ground temperature is 32° F (0° C) or colder for two or more years.[11]

Principles of Logistics/Sustainment. The independent and interrelated principles of integration, anticipation, responsiveness, simplicity, economy, survivability, continuity, and improvisation which are essential to maintaining combat power, enabling strategic and operational reach, and providing Army forces with endurance.[12]

Responsiveness. The ability to react to changing requirements and respond to meet the needs to maintain operational reach, freedom of action, and prolonged endurance.[13]

Simplicity. Minimizing the complexity of sustainment.[14]

Survivability. All aspects of protecting personnel, weapons, and supplies while simultaneously deceiving the enemy.[15]

Sustainment. The provision of logistics, financial management, personnel services, and health service support necessary to maintain operations until successful mission completion.[16]

Tundra. An area where tree growth is hindered due to low temperatures and a short growing season.[17]

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