Army Prepositioned System: Time for a Change

A Monograph

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14. ABSTRACT

The 2018 *National Defense Strategy* highlights North Korea, Iran, Russia, China, and violent extremist organizations as threats which challenge the world's economic and political stability. The 2015 *National Military Strategy* assessed the growing probability of an interstate war between the United States and a major power willing to challenge international norms. Given these threats, the US military must remain ready to deploy, engage, and possibly destroy US adversaries at any time. To meet this need, the United States Army maintains an Army Prepositioned-Stock Afloat (APA) program with combat configured equipment to project combat power quickly into any theater of operations. However, considering the new threat environment, the current APA composition requires updating to provide the flexibility the joint force requires.

The purpose of this monograph is to examine the composition of the APA in light of the *Field Manual* 3-0's requirements of projecting a credible force. The APA is a premier model to rapidly project forces anywhere in the world. Optimizing the force structure of the APA will minimize risk when expanding a lodgment, provide critical major end items for reconstitution after a major battle in a LSCO environment, and effectively engage the various threats highlighted in the 2018 *National Defense Strategy*.

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Abstract

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The 2018 *National Defense Strategy* highlights North Korea, Iran, Russia, China, and violent extremist organizations as threats which challenge the world's economic and political stability. The 2015 *National Military Strategy* assessed the growing probability of an interstate war between the United States and a major power willing to challenge international norms. Given these threats, the US military must remain ready to deploy, engage, and possibly destroy US adversaries at any time. To meet this need, the US Army maintains an Army Prepositioned-Stock Afloat (APA) program with combat configured equipment to project combat power quickly into any theater of operations. However, considering the new threat environment, the current APA composition requires updating to provide the flexibility the joint force requires.

The purpose of this monograph is to examine the composition of the APA in light of the *Field Manual 3-0's* requirements of projecting a credible force. The APA is a premier model to rapidly project forces anywhere in the world. Optimizing the force structure of the APA will minimize risk when expanding a lodgment, provide critical major end items for reconstitution after a major battle in a LSCO environment, and effectively engage the various threats highlighted in the 2018 *National Defense Strategy*.

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Acronyms

ABCT	Armored Brigade Combat Team
APA	Army Prepositioned-Stock Afloat
APS	Army Prepositioned Stock
ASL	Authorized Stockage List
BCT	Brigade Combat Team
CCDR	Combatant Commander
CONUS	Continental United States
FMSweb	Force Management System website
FORCES	Force and Organization Cost Estimating System
HEMTT	Heavy Expanded Mobility Tactical Truck
IBCT	Infantry Brigade Combat Team
ISB	Intermediate Staging Base
LMSR	Large Medium-Speed Roll-on/roll-off
LSCO	Large-Scale Combat Operation
MOG	Maximum on Ground
MPS	Maritime Preposition Squadrons
MTOE	Modified Table of Organization and Equipment
OPLOG	Operational Logistics (automated planner)
RSOI	Reception, Staging, Onward Movement, and Integration
SBCT	Stryker Brigade Combat Team
STON	Short Ton: 2,000 pounds
SWOT	Strength, Weakness, Opportunities, and Threats
TAMIS	Total Ammunition Management Information System
UAV	Unmanned Aerial Vehicles
USTRANSCOM	United States Transportation Command

Tables

Introduction

The 2018 *National Defense Strategy* highlights North Korea, Iran, Russia, China, and terrorist organizations as threats which challenge the world's economic and political stability.[1] The 2015 *National Military Strategy* assessed the growing probability of an interstate war between the United States and a major power willing to challenge international norms.[2] Given these threats, the US military must remain ready to deploy, engage, and possibly destroy US adversaries at any time. To meet this need, the US Army maintains an Army Prepositioned-Stock Afloat (APA) program with combat configured equipment, able to project combat power quickly into any theater of operations. However, due to budgetary constraints, and a high operational tempo, the APA's composition has not been updated considering these identified threats. The APA's current composition includes one Infantry Brigade Combat Team (IBCT), and sustainment assets to facilitate joint reception, staging, onward movement, and integration operations used to open a point of entry and enable the flow of equipment and personnel into a theater of operations.[3]

Historically, the APA has been unloaded in an uncontested environment, where an Intermediate Staging Base (ISB) was established, along with other logistical components to support the operation or campaign. However, due to increasing unconventional threats, the proliferation of unmanned aerial vehicles (UAV), and the operational reach of artillery and missiles, the current operating environment may limit the combatant commander's ability to establish an ISB in an uncontested area of operations. The complex operational environment may

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[1] James N. Mattis, *National Defense Strategy: Sharpening the American Military's Competitive Edge* (Washington, DC: Government Printing Office, 2018), 1.

[2] US Department of Defense, Joint Staff, *The National Military Strategy of the United States of America* (Washington, DC: Government Printing Office, 2015), 1-4.

[3] Emily Davis-Hoffman, Dawn Hamerlinck, and Dan Neumiller, "APS-3 Army Strategic Flotilla Rebuild Complete, Meets 2020 Strategy," ASC Public Affairs Release, September 25, 2012, accessed March 31, 2019, https://www.army.mil/article/87899/aps_3_army_strategic_flotilla_rebuild_complete_meets_2020_strategy.

require the commander to place the ISB even further from an adversary, stretching the logistic lines of communication. Placing the ISB further away limits a commander's ability to set conditions to seize the initiative.

Updating the composition of the APA can minimize risk when expanding a lodgment, provide critical major end items for reconstitution after a major battle in a Large-Scale Combat Operations (LSCO) environment, and provide multiple options to the Combatant Commander (CCDR). This study will examine the suitability of the current organization of the APA to better understand its capability as a force multiplier for the CCDR. Optimizing the force structure of the APA will allow the CCDR to expeditiously and effectively engage the various threats highlighted in the 2018 *National Defense Strategy*.

Former Chief of Staff of the Army, General Shinseki, said the Army must be able to rapidly project combat power in response to the nation's needs. Shinseki's aim was to "to put brigade-size combat forces on the ground anywhere in the world in 96 hours, a division in 120 hours, and five divisions in 30 days."[4] His vision became the Army's goals for rapid force projection in response to a contingency. To achieve his intent, the Army needed to deploy rapidly, and project a credible and tailorable force that could execute diverse missions worldwide.

The Army relies heavily on the US Transportation Command (USTRANSCOM) and its component commands, Air Mobility Command, the Military Sealift Command, and the Military Surface Deployment and Distribution Command to deploy rapidly and project a credible force.[5] Each component of this triad has played a crucial role in the projection of force. The Air Mobility Command command and control airlift assets. These assets play a critical role in providing the rapid deployment of initial entry personnel and essential equipment into a theater of operations.

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[4] Michael G. Bettez, "Army Pre-positioned Stocks. The Key to our Rapid Force Projection Strategy" (Strategy Research Project, US Army War College, Carlisle Barracks, PA, 2000), 6, accessed August 22, 2018, https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/ADA378024.xhtml.

[5] US Department of Defense, Joint Staff, *Joint Publication (JP) 3-35, Deployment and Redeployment Operations* (Washington, DC: Government Printing Office, 2018), I-7.

The sealift assets of Military Sealift Command deliver the equipment for the follow-on forces from either the continental United States (CONUS), prepositioned stock afloat, or a land based prepositioned stock to include all the equipment to conduct reception, staging, onward movement, and integration (RSOI) operations. The Department of the Army owns the Prepositioned Stock Afloat, while the Army Materiel Command maintains the APA during peacetime. In major combat operations, the Chairman of the Joint Chiefs of Staff or the Secretary of Defense would authorize releases of the APA to support the requesting joint commander.[6]

Prepositioned stocks afloat are composed of vessels pre-loaded with equipment and commodities to meet the rapid deployment requirements of a unit. The APA is strategically positioned to allow forces to quickly respond to the nation's needs. The primary purpose of the prepositioned stocks is to decrease the time it takes a unit to organize and load ships in response to a contingency. There are land based prepositioned stocks initially developed and utilized during the Cold War. At the time they were known as the Pre-positioning of Material Configured to Unit Sets and the Theater Reserves in Unit Sets/Army Readiness Packages South. These sets were located in central Germany and Italy.[7] These Pre-positioning of Material Configured to Unit Sets and Theater Reserves in Unit Sets/Army Readiness Packages South were part of a strategic plan to rapidly project combat forces to block Soviet forces moving west. The strategy was part of the Mobilization +10 essential force, which entailed the deployment of one division in ten days.[8] It was assumed there were only two ways to project such combat power. The first was to forward deploy and maintain divisions in Europe. The second was to maintain prepositioned equipment for specific units to deploy from the United States, and then fall in on the equipment

[6] US Department of the Army, *Army Regulation (AR) 710-1, Centralized Inventory Management of the Army Supply System* (Washington, DC: Government Printing Office, 2016), 59.

[7] Bettez, "Army Pre-positioned Stocks," 2.

[8] Congressional Budget Office, *Strengthening NATO: POMCUS and other Approaches* (Washington, DC: Congressional Budget Office, February 1979), xv.

pre-staged in Europe.[9] When the Cold War ended, it was no longer practical to maintain large prepositioned stocks in Europe, and the program declined.

The program was subsequently reinvigorated under a new name during the Persian Gulf Wars in the 1980s. The Department of Defense created a Rapid Deployment Joint Task Force centered on the US Marine Corps to respond to possible contingency operations worldwide.[10] Throughout the initial phases of the implementation of the Rapid Deployment Joint Task Force, the organization relied solely on airlift assets. As the scope of the contingency plans broadened, it forced the organization to explore additional ways to quickly project forces worldwide. The Rapid Deployment Joint Task Force needed a platform that could transport equipment and commodities to sustain three Marine Amphibious Brigades for at least fifteen days. The prepositioned stock afloat concept began in order to meet this requirement. The initial prepositioned stock afloat was composed of seven ships chartered by Military Sealift Command. By 1985, there were fifteen Maritime Prepositioning Force vessels capable of equipping and sustaining three brigades of Marines worldwide.[11] The fifteen Maritime Prepositioning Force vessels were divided into three Maritime Preposition Squadrons (MPS) in support of three geographic commands: Central Command, European Command, and Pacific Command.[12]

Desert Shield and Desert Storm validated the proof of concept for the prepositioned afloat program. The MPS was activated in support of Desert Shield and Desert Storm in the late 1990s, allowing the 7th Marine Expeditionary Brigade to fall in on their equipment, and set up defensive positions within four days of arrival. This was soon followed by the arrival of the second MPS squadron. An additional Marine Expeditionary Brigade was quickly equipped with

[9] Congressional Budget Office, *Strengthening NATO*, xvi.

[10] Paul R. Mogg, "Sea Basing: Past, Present and Future" (Monograph, School of Advanced Military Studies, Fort Leavenworth, KS, 2004), 6-7.

[11] Ibid., 6.

[12] Ibid., 7.

the arrival of the last MPS squadron. The prepositioned stock afloat concept was successful because of its swift force projection and response to a major operation. The US Marines reduced their response by two weeks of transit time due to the prepositioned stocks afloat model. The successful employment of the program caused Congress to direct the Department of Defense to conduct further research on strategic mobility capabilities.[13]

The Army adopted the MPS program to their requirements, and integrated the prepositioned stock afloat to rapidly project forces anywhere in the world. Initially, there were two heavy brigades loaded in sixteen ships. These brigades were composed of two armor battalions, two mechanized battalions, and a sustainment package to conduct port opening operations. The force was provided fifteen days of supplies to account for initial sustainment demands. This APA composition was able to meet the nation's security strategy, and rapidly project combat power to two separate regions within ninety-six hours of notification.[14]

The APA played a key role during the build-up of Operation Iraqi Freedom. It was used to rapidly provide combat equipment to equip the Army's 3rd Infantry Division and logistics assets to sustain the force. During the planning process of Operation Enduring Freedom, the Army concluded that tanks and mechanized platforms were not capable of meeting the environmental constraints of Afghanistan's mountainous terrain, thus they reorganized the APA composition to one IBCT. Subsequently, in 2005 the APA received a $70 million budget reduction and the Army decided to expand their land-based prepositioned stock in Kuwait and Korea.[15]

The current APA is composed of two large medium-speed roll-on/roll-off (LMSR) vessels with one IBCT's worth of equipment augmented with engineer, chemical, military police,

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[13] Mogg, "Sea Basing," 7.

[14] William W. Curl, "The Army Preposition Afloat Program: Is it a Problem We Need?" (Strategy Research Project, US Army War College, Carlisle Barracks, PA, 1998), 7.

[15] Davis-Hoffman, Hamerlinck, and Neumiller, "APS-3 Army Strategic Flotilla Rebuild Complete, Meets 2020 Strategy."

and medical units. There are three additional LMSRs with theater opening/port opening capabilities, to set conditions for RSOI operations, and two containerships with enough commodities able to sustain the force for thirty days. The LMSRs follow the Army's equipment maintenance cycle. Every four years the LMSR enters a dry dock and undergoes all mandatory inspections, repairs, modifications, and directed upgrades.[16]

Statement of the Problem

Given the future threats and challenges highlighted in the *National Military Strategy*, the current APA's force structure should be re-examined to assess its suitability to meet the changing security environment. In recent years, the US ability to project power has occurred in relatively permissive environments. However, the emerging threat environment is one in which state and non-state actors contest US superiority in every domain.[17] To counter these threats, the US Army changed its their operational focus from counterinsurgency to large-scale combat operations in a multi-domain environment "to achieve national strategic objectives or protect national interests."[18] When other instruments of national power fail to deter an adversary, the President may employ the military option to achieve national interests. This would require the joint force commander to immediately seize the initiative by leveraging the capabilities of the joint forces to "deny enemy objectives, defeat enemy capabilities to resist, and compel desired behavior."[19] To seize the initiative, the military "generally requires force projection."[20] The APA is a premier platform to rapidly project forces anywhere in the world. With the right combination of forces in the APA, it can sustain the US military's operational tempo, extend its operational reach, and give

[16] Davis-Hoffman, Hamerlinck, and Neumiller, "APS-3 Army Strategic Flotilla Rebuild Complete, Meets 2020 Strategy."

[17] Mattis, *National Defense Strategy*, 3.

[18] US Department of the Army, *Field Manual (FM) 3-0, Operations* (Washington, DC: Government Printing Office, 2017), 5-1.

[19] Ibid.

[20] Ibid.

the supported joint commander options. However, the current APA composition, requires updating to provide the flexibility the joint force requires. It is essential to have the right force structure in the APA. The purpose of this research is to examine possible capability gaps based on *Field Manual 3-0*'s requirements of projecting a credible force to seize the initiative.

This research paper is organized into six sections. Section one, discusses the background of the research, the problem statement, definition of key terms used throughout the paper, and research questions that helped shape the research. Section two reviews the literature to define the various complex environments and the threat the APA may face. Section three covers the methodologies used to weigh its capabilities against the risks involved. Section four includes the research and analysis of the optimal force structure of the APA. Section five presents the results and findings based on the analysis conducted during section four. Finally, section six presents the conclusion and recommendations.

Definition of Terms

This section provides the definitions of key terms used throughout the paper. The definitions serve to avoid misunderstandings between the reader and the author. The Armored Brigade Combat Team (ABCT) is composed of M1A2 main battle tanks and Bradley fighting vehicles. Its role "is to close with the enemy using fire and movement to destroy or capture enemy forces, to repel enemy attacks by fire, to engage in close combat, and to counterattack to control land areas, including populations and resources."[21] The ABCT is the decisive force for the US Army.

The Army Prepositioned Stock (APS) program "is the cornerstone of the Army's ability to rapidly project power" before sea lines of communications are open from the United States to

[21] US Department of the Army, *Field Manual (FM) 3-96*, *Brigade Combat Team* (Washington, DC: Government Printing Office, 2015), 1-10.

the theater of operations.[22] Currently, there are five land-based APS and one APS afloat. The six APS are placed in six specific geographical locations to project forces promptly across the globe. APS1 is located in the United States; APS2 is divided between European and Africa Command, mostly located in Germany; APS3 is the prepositioned stock afloat; APS4 is located in Pacific Command divided between Korea and Japan; APS5 is in the Central Command region, mostly in Kuwait; APS6 is located in Southern Command between Central America, South America, and the Caribbean. The APS can support "all combatant commanders' missions, not only in contingencies but also for major exercises and humanitarian assistance support."[23]

Counterinsurgency operations are the amalgamation of actions taken by a government to defeat an insurgency. An effective counterinsurgency operation implements a whole government approach by the host nation and supported by multinational partners to weaken "the insurgents while simultaneously bolstering the government's legitimacy in the eyes of the contested population."[24]

Force projection "is central to the *National Military Strategy*" and speed is paramount to the operation.[25] Force projection is a race to deploy and builds combat ready forces before an enemy to seize the initiative. There are five continuous processes: "mobilization deployment, employment, sustainment, and redeployment."[26]

The Infantry Brigade Combat Team (IBCT), "is an expeditionary combined arms force optimized for dismounted operations in complex terrain-a geographical area consisting of an urban center or restrictive terrain."[27] The IBCT can also conduct early "entry operations by

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[22] US Department of the Army, *Army Techniques Publication (ATP) 3-35.1, Army Pre-Positioned Operations* (Washington, DC: Government Printing Office, 2015), 1-1.

[23] US Army, *ATP 3-35.1,* 1-1.

[24] US Department of Defense, Joint Staff, *Joint Publication (JP) 3-24, Counterinsurgency* (Washington, DC: Government Printing Office, 2018), I-2.

[25] US Army, *FM 3-0* (2017), 1-25.

[26] US Army, *FM 3-0* (2017), 1-25.

[27] US Army, FM 3-96 (2015), 1-1.

ground, air land, air assault or amphibious assault into austere areas of operations."[28] The IBCT is adaptable to any mode of transportation and rapidly deployable.

Large Scale Combat Operations (LSCO) are major combat operations involving echelons above brigade elements to achieve or protect national interests. The battlefields environment will include intense, complex, and lethal battles comprised of noncombatants concentrated in large cities employing conventional and asymmetric tactics "to further complicate operations."[29]

Lodgment is physical terrain that enables "the continuous landing of forces and materiel and provides space for subsequent operations," such as reception, staging, onward movement and integration (RSOI) operations.[30] Lodgment locations are usually air or seaports but are not limited to these nodes. RSOI is the process that matches personnel and their equipment in a theater of operation to deliver combat ready forces in support of the CCDR to gain and maintain the initiative.[31] Seizing the initiative is the rapid application of combat power to gain an advantage over the enemy to "delay, impede, or halt an enemy's initial aggression and deny an enemy its initial objectives."[32]

The Stryker Brigade Combat Team (SBCT), is an expeditionary force that can maneuver effectively in most terrain to "gain the initiative early, seize and retain key terrain" and provide massed fires to halt the enemy.[33] The SBCT predominantly fights as a dismounted light infantry formation and has eight-wheeled, light armored vehicles that can provide direct and indirect fires and deliver troops at high speeds.[34]

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[28] US Army, *FM 3-96* (2015), 1-1.

[29] US Army, *FM 3-0* (2017), 1-2.

[30] US Department of Defense, Joint Staff, *Joint Publication (JP) 3-35, Deployment and Redeployment Operations* (Washington, DC: Government Printing Office, 2016), I-2.

[31] US Army, *ATP 3-35*.1 (2015), 1-4.

[32] US Army, *FM 3-0* (2017), 1-13.

[33] US Army, *FM 3-96* (2015), 1-6.

[34] US Army, *FM 3-96* (2015), 1-6.

Hypotheses and Research Questions

There are four hypotheses this research seeks to confirm. First, if the United States wants to maintain its global hegemony and protect its interests, it needs to be able to rapidly project its combat power across the world. Second, if the force structure of the APA does not change, it may not have enough lethality and survivability to meet the threats listed in the *National Defense Strategy*, and the large-scale combat environment described in *FM 3-0*. Third, if UAV technology and fires continue to improve in distance and accuracy, the risk and application of APA will change by placing the ISB further away to avoid exposure to indirect fires. Fourth, in LSCO, units utilizing the APA may face unconventional forces.

The following research questions helped guide the paper. First, what are the capabilities needed to expand a lodgment during RSOI in a LSCO? Which combination of capabilities are optimal to compliment the APA? What are the different operational environments a force utilizing the APA may face?

Literature Review

Since the end of the Cold War, other than Operation Desert Storm, the United States has not been involved in a large-scale conventional conflict. However, the US military has been involved in various conflicts from Panama, to Bosnia and Kosovo. Since 2001, the US military has been fighting in relatively permissive environments against non-state actors. However, in the current operational environment, the United States is constantly challenged by near peer competitors. The Commander of US Army Training and Doctrine Command, General Townsend, predicted a near-peer enemy will employ “layered stand-off capabilities during competition and

armed conflict, with the intent to reduce the United States' strategic depth, limit our ability to project power and contest the Joint Force in all domains."[35]

This section will describe large-scale ground combat based on *FM 3-0*, *Operations*, examine the magnitude of a hypothetical peer opponent based on the Vostok 2018 annual Russian exercise, and review integration of capabilities across multiple domains during the Russo-Ukrainian war. Furthermore, the section will examine the Israel and Hezbollah War of 2006 to understand the environments and challenges the APA force may face across the conflict continuum. These events will examine critical capabilities needed in the APA to equip and sustain an expeditionary force.

Large-Scale Combat Operations

The US Army is transitioning from counterinsurgency to large-scale combat operations, which is described as "combined offensive, defensive, and stability tasks to seize, retain, and exploit the initiative in order to shape OEs [operational environments], prevent conflict, conduct large-scale ground combat, and consolidate gains."[36] The Army further describes the conditions of LSCO against a peer threat to be more complex, chaotic, violent, and highly destructive, with more uncertainty compared to the conflicts the Army faced in Afghanistan and Iraq. Army doctrine associates large-scale conflict with the battles of Sidi Bou Zid, and Kasserine Pass during World War II, where 5,000 soldiers were killed in just ten days.[37] As the war progressed, due to the lethality of large-scale combat operations, high casualties remained despite better trained, equipped, and experienced soldiers. In the Hurtgen Forest the 4th Infantry Division sustained a casualty rate of over 229 soldiers per day, for a total loss of 32,976 casualties over

[35] US Department of the Army, *Training and Doctrine Command Pamphlet (TRADOC) 525-3-1, The U.S. Army in Multi-Domain Operations 2028* (Washington, DC: Government Printing Office, 2018), foreword.

[36] US Army, *FM 3-0* (2017), 1-1.

[37] Ibid., 1-2.

144 days of sustained combat. The engagements in the Hurtgen Forest reduced the division to less than 50% personnel strength and had to be withdrawn from the frontline. The Army predicts that in the operational environment of LSCO, "enemies will employ conventional tactics, terror, criminal activities and information warfare."[38] The operational force needs to be prepared to deal with a wide range of challenges across the conflict continuum. *Army Doctrine Publication (ADP) 1-0*, emphasizes the importance of equipping and training expeditionary qualities in accordance with Department of Defense Directive 5100.01.[39] The type of peer threat the US Army is training to fight is illustrated by the size and capability Russia demonstrated during their recent military exercise.

Vostok 2018

Vostok 2018 was part of a joint annual military field exercise involving Russia's four operational strategic commands: Eastern, Caucasus, Central, and Western. The exercise consisted of two phases focused on "interstate conflict" between "two coalitions of states,"[40] and was aimed against perceived international threats "primarily the United States and its NATO Allies."[41] The first phase was the coordination and movement of troops, equipment, and supplies to their assembly areas in far East Russia, from early July to early September.[42] The second phase was a live fire exercise, using a force consisting of "300,000 personnel, more than 1,000 aircraft, 36,000

[38] US Army, *FM 3-0* (2017), 1-2.

[39] US Department of the Army, *Army Doctrine Publication (ADP) 1-0, The Army* (Washington, DC: Government Printing Office, 2017), 1-20.

[40] Dmitry Gorenburg, "5 Things to Know about Russia's Vostok-2018 Military Exercises," *The Washington Post*, September 13, 2018, accessed December 11, 2018, https://www.washingtonpost.com /news/monkey-cage/wp/2018/09/13/5-things-to-know-about-russias-vostok-2018-military-exercises/?noredirect=on&utm_term=.40f1c4df0944.

[41] Dave Johnson, "VOSTOK 2018: Ten Years of Russian Strategic Exercises and Warfare Preparation," *NATO Review*, December 20, 2018, accessed March 23, 2019, https://www.nato.int/docu /review/2018/Also-in-2018/vostok-2018-ten-years-of-russian-strategic-exercises-and-warfare-preparation-military-exercices/EN/index.htm#f5.

[42] Ibid.

pieces of equipment, 1,100 tanks, and more than 50 combat ships" from their Pacific Fleet, "making this the largest military exercise on Russian territory" since 1981.[43] The exercise served as the culminating event to validate the rapid mobilization, deployment, command and control, coordination, and integration between land, sea, and air components.[44]

Vostok 2018 was a multi-national exercise where for the first time Chinese and Mongolian forces participated on Russian territory. The Chinese armed forces were part of the 78th Army Corps and deployed approximately 3,000 soldiers, 900 armored and wheeled vehicles, and 30 aircraft.[45] During the exercise, participating countries exercised inter-operability of equipment and systems in order to synchronize their movement in a joint multi-national environment. The exercise also served as an opportunity for the Chinese military to incorporate lessons learned from Russia's previous engagements in Syria and Ukraine.[46]

Several media and military outlets expressed skepticism over the number of combat troops involved in the exercise. However, the key lesson from Vostok 2018 is to understand the breadth and scale of LSCO and rapid force projection capabilities. The ability to mobilize and deploy 300,000 troops, transport more than 37,000 pieces equipment, and move the supplies necessary to sustain such a force in approximately nine weeks is an enormous logistical undertaking. The demonstrated Russian force projection capabilities need to be considered as the US Army develops priority movement requirements nested in contingency plans.

Lieutenant General Lundy, the commander of the US Army Combined Arms Center, cautions that "large scale combat against a peer threat is more likely than at any time in recent history." He advises the Army to "prepare for the most lethal and challenging threats" by continuously making "bold changes in how we man, equip, train, and employ Army forces,

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[43] Gorenburg, "5 Things to Know about Russia's Vostok-2018 Military Exercises."

[44] Ibid.

[45] Johnson, "VOSTOK 2018."

[46] Gorenburg, "5 Things to Know about Russia's Vostok-2018 Military Exercises."

especially at echelons above brigade."[47] Rapidly projecting lethal forces is vital in enabling the "Army's four strategic roles for the joint force: shaping the security environment, preventing conflict, prevailing in large-scale ground combat, and consolidating gains to make the temporary permanent."[48] The APA is the premier platform to rapidly deploy forces and, gives the CCDR additional options to achieve the Army's four strategic goals.

Russo-Ukrainian War Lessons Learned

Russia's application of force during the Russo-Ukrainian War is important to study because it is the most recent large-scale battle integrating emerging technology in a multi-domain environment. The Russo-Ukrainian War helps the Army visualize the strengths and weaknesses of different forces, and how they adjusted their tactics, techniques, and procedures in large-scale combat operations in both open and urban environments. The war also demonstrated the intensity of the fight through the loss and damage rates of armored vehicles, ammunition consumption rates, and the increased casualty rates on the modern battlefield.[49]

In this unrestricted environment, combinations of Russian UAVs enabled the delivery of massed artillery and rocket fires producing 85% of battlefield losses and casualties. In July 2014 at Zelenopillya, Ukraine, two Ukrainian mechanized battalions were caught in the open by Russian UAVs. Within fifteen minutes, combined long range missiles and artillery fires decimated the two battalions. Throughout the war, the Russians employed over fourteen different types of drones flying at different altitudes, providing depth in the air to conduct intelligence, surveillance, and reconnaissance missions. They were also used for target identification, artillery strikes, and to conduct battle damage assessments after fire missions. During the Russo-Ukrainian

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[47] Michael D. Lundy, "Meeting the Challenge of Large-Scale Combat Operations Today and Tomorrow," *Military Review* 98, no. 5 (September-October 2018): 111, accessed December 11, 2018, https://www.armyupress.army.mil/Portals/7/military-review/Archives/English/SO-18/Lundy-LSCO.pdf.

[48] Ibid., 113.

[49] Phillip A. Karber, *Lessons Learned from the Russo-Ukrainian War* (Vienna, VA: The Potomac Foundation, 2015), 7.

War, Karber confirmed that Russian artillery units fired 300 to 400 rounds per tube, per day. Compared to the 1973 Yom Kippur War, this amount was almost twice as much ammunition expended per day.

Technological advances also enabled Russian fires to become highly effective at longer ranges. The BM-30 Smerch could fire twelve 300mm rounds at a range of ninety kilometers and the addition of UAVs to the target acquisition process allowed artillery units to deliver fires faster and more accurately on the enemy. For defensive measures, the Russians deployed self-propelled electronic warfare vehicles with a targetable jammer to disrupt GPS signals, causing the UAVs to drop from the sky. These vehicles were highly effective against Ukrainian UAVs, as well as the German drones that the Organization for Security and Cooperation in Europe provided Ukrainian forces for surveillance.[50]

The proliferation of UAVs among Russian forces transformed the battlefield. Ukrainian light Infantry Fighting Vehicles, known for their rapid mobility and firepower, were shown to be extremely vulnerable against armored vehicles and artillery. However, the Infantry Fighting Vehicles posed a serious challenge to Russian mechanized forces in an urban environment. Due to the Russian technological advantages in anti-access and area denial capabilities, the proliferation of UAVs, and the increased range of fires, the Ukrainian forces dispersed into urban areas to camouflage and minimize their signature to avoid detection. The Ukrainian forces employed a defense in depth with well-developed positions that integrated mines and artillery. Once Russian mechanized forces entered urban areas, Ukrainian forces were able to better utilize anti-tank missiles to defeat them.

The battles in urban environments during the Russo-Ukrainian War were similar to the Israel-Hezbollah War of 2006. Like the Russians, Israeli armed forces were the better trained and equipped force, able to synchronize joint and combined arms operations. But the urban

[50] Karber, *Lessons learned from the Russo-Ukrainian War*, 15.

environment posed a significant challenge to their armored units. Although Hezbollah forces were mostly ill-equipped militia with little training, they implemented a decentralized method of fighting and drew Israeli tanks into the city where collateral damage would increase. Hezbollah reduced their signature by deploying squad size elements to conduct ambushes throughout the city. There were 400 Israeli tanks involved in the conflict, and based on historical data, Hezbollah fired over 500 anti-tank missiles at these tanks.[51] However, only forty-eight tanks were hit. Out of the forty-eight, there were twenty tanks with significant battle damage and only five catastrophic losses.[52] Although the battle damage and loss numbers for Israel were minimal during the conflict, the results of this war would have been different if Hezbollah had advanced weapons such as Javelin anti-tank missiles and mines. Hezbollah knew they were not able to face Israeli ground forces in a conventional war, so they utilized the city to minimize Israeli air and artillery strikes. Hezbollah also utilized underground tunnels and passageways to transport weapons and ammunition to set up ambush sites throughout the city. Hezbollah used the urban environment to close in on the tanks in order to have a clear shot and then disappeared through the tunnels.

In both wars, the Ukrainians and Hezbollah forces forced their opponents to fight in an urban environment. Although the Russian and Israeli forces had superior technology and firepower, they were not able to make their opponents capitulate due to a lack of light infantry forces. The Russian and Israeli forces were prepared for a conventional war, but did not have the right forces to engage their opponents in an urban environment.

Operations in urban environments are important to consider because the world's population is often concentrated along the coast and usually linked by an integrated transportation network allowing the rapid flow of goods through multiple sea and airports. A well-established transportation network is extremely helpful for RSOI operations because it quickly extends

[51] Anthony H. Cordesman, George Sullivan, and William D. Sullivan, *Lessons of the 2006 Israeli-Hezbollah War* (Washington, DC: Center for Strategic and International Studies, 2007), 110.

[52] Ibid.

operational reach and enables sustaining a high operational tempo. However, heavy forces may become restricted due to the density of the population in an urban environment and may encounter hostile situations. The Army does not dismiss the fact that there are criminal activities and terror groups in LSCO.[53] Violent extremist organizations and conventional forces mixed with the population may cause significant delays during the expansion of lodgment and RSOI operations.

The Russo-Ukrainian conflict provided the US Army an example of the intensity of large-scale combat operations and the effectiveness of UAV integration into the targeting process. The proliferation of UAVs at different altitudes gave Russian forces better situational awareness to find, fix, and destroy Ukrainian forces. The study also highlighted the defense in depth plan the Ukrainian forces implemented by integrating mines and artillery fires against mechanized forces. Both Ukrainian and Hezbollah forces were effective when they isolated the opponent's mechanized forces from UAVs and artillery support by drawing them into urban areas. Ukrainian forces also exploited the lack of Russian light infantry support in urban areas, deterring Russian armored forces from entering. Both examples emphasized which capabilities had the competitive advantage in different environments.

Methodology

Based on the APA's possible missions of expanding the initial lodgement, setting conditions for RSOI, or to facilitate the rapid regeneration of forces after a major battle, this research will compare and contrast the intra- and inter-theater mobility, lethality, cost, and sustainment requirements between an IBCT, SBCT, and an ABCT. The capabilities will be evaluated against a peer threat capable of conducting LSCO modeled after the size and capabilities demonstrated by the Russians during Vostok 2018. The Russo-Ukrainian War and the

[53] US Army, *FM 3-0* (2017), 1-2.

Israeli-Hezbollah War assisted in generating possible requirements to prioritize which capabilities best complement the APA based on an urban or conventional environment.

The data for this research came from various Army systems of record. The study used six systes as sources to collect data. The Modified Table of Organization and Equipment (MTOE) from the Force Management System website (FMSweb) is the Army's system of record that maintains information for personnel, weapons, equipment, and vehicle types by organization. The study used the applicable 2018 MTOEs to compare the different Brigade Combat Teams (BCTs). The following are the standard requirements code for the BCTs used: 77200K000 IBCT, 47110K000 SBCT, and 87310K000 ABCT.

The Combined Arms Support Command Operational Logistics (OPLOG) automated planner is a tool to calculate logistics estimates based on MTOE and planning factors such as terrain, climate, and operations. The logistics planner allows the user to upload a standard requirements code that reflects the MTOE and edit the quantity of equipment and personnel for more accurate estimates. OPLOG planner allows planners to forecast consumption rates and equipment losses to further refine the logistics estimate. OPLOG planner version eight was used to calculate logistics requirements for this study.

The information from the Army Force and Organization Cost Estimating System (FORCES) website calculated cost estimates to train, equip, and sustain the three different BCTs. The information is based on the 2017 to 2018 average operational and logistics costs for each BCT. Subsequently, this analysis helped compare the cost requirements between the BCTs.

The Total Ammunition Management Information System (TAMIS) is the Army's system of record to requisition, allocate, and forecast ammunition based on expenditures. TAMIS captures total requirements per weapon system by each Department of Defense Identification Code, and the Army Master Data File calculates the price for the total ammunition requirements to formulate a common denominator to compare the three BCTs. TAMIS version 3.0 was used to calculate the operational requirements and cost of ammunition for this study.

The Logistics Support Agency database provided the cost for maintenance parts based on the authorized stockage list (ASL) for each BCT. The ASL of repair parts is based on the high demand data to determine how much and what to stock in the supply warehouse. Once the ASL is finalized, the Logistics Support Agency determines the cost of the ASL. To capture inflation, this study covers the average total ASL costs of each BCT over two years.

The 2017 to 2018 Jane's Land Warfare Platform analysis provided the ground combat power analysis for the United States and Russian armies in order to assess the relative strengths and weaknesses of US ground forces against a peer competitor. Jane's provided technical information of armored fighting vehicles that allowed a further analysis of technologies and capabilities to evaluate a peer competitor and model a threat scenario.

Using Albert Humphreys' Strength, Weakness, Opportunities, and Threats (SWOT) model, this research will conduct a qualitative comparison of lethality, inter-theater, strategic mobility, and sustainment requirements; or as a reconstitution set based on the organizational structure for each of the BCTs in their most current MTOEs. The SWOT model will identify the internal and external factors for each BCT that are beneficial or detrimental to achieve the APA's possible missions. The SWOT analysis will evaluate which units or a combination of units are best suited for expanding lodgment and setting conditions for RSOI or as a force regeneration set.

The literature review helped examine the various operational environments the APA force may encounter. Based on the operational environments, this section described a research methodology used to assess the capabilities of the APA against different requirements. The purpose of the SWOT model was to determine critical capabilities required in the APA to build combat power before other forces can arrive. The research examined the effectiveness of each of the BCTs based on firepower, intra-mobility, strategic mobility, and sustainment requirements, or as a reconstitution force against a peer threat in a LSCO environment.

BCT Analysis

This section analyzes and qualitatively compares the infantry, stryker, and armored BCTs against a possible role as the combat force available in the APA. This section further assesses their strengths and weaknesses based on firepower, intra-mobility, strategic mobility, sustainment costs, and logistics requirements such as fuel, ammunition, and maintenance. The purpose of the assessment is not to determine which BCT is the most capable, but to assess the capabilities of each BCT to enable the APA's ability to set conditions for RSOI operations, or to enable a quick reconstitution of forces in large-scale combat against a peer threat. This research compares the US Army's medium and heavy capabilities against a peer competitor to determine which capabilities are best suited for the LSCO environment described in the literature review. The findings are presented using the SWOT model for each BCT, and based on the analysis, the research provided a comprehensive recommendation for the optimal composition of the APA.

The US Army is currently comprised of ten active duty divisions composed of thirty-one BCTs, including three BCTs not aligned to a division. Currently, these BCTs are composed of ten armored, seven stryker, nine infantry, to include air assault capabilities, and five airborne BCTs. As the Army shifts from a capability-based to a threat-based assessment of requirements, it is refocusing on LSCOs against near-peer adversaries. According to *Jane's Land Warfare Platforms*, the US Army holds an inventory of over "2,300 main battle tanks, 4,000 infantry fighting vehicles, and just under 1,000 self-propelled howitzers."[54] These capabilities give the US Army incredible firepower to engage an adversary in a high-intensity conflict, and the BCT structure is the building block to deploy forces forward. The APA is the premier platform to enable the rapid force projection of capabilities.

[54] Christopher F. Foss, *Jane's Land Warfare Platforms: Armoured Fighting Vehicles 2017-2018* (Coulsdon: IHS Janes, 2017), 92.

Firepower and Movement

Firepower is the application of force that can destroy the capability, and the will of the opponent to fight.[55] Fire and movement is the "concept of applying fires from all sources to suppress, neutralize, or destroy the enemy, and the tactical movement of combat forces in relation to the enemy."[56] Fire and movement are critical variables for the combat force on the APA. Firepower gives the force the lethality needed to face an unknown threat in a complex environment, while movement allows the flexibility to shift forces throughout the battlefield. The combat force may need to adapt to a wide variety of threats as it expands a lodgment and sets conditions for RSOI. The APA needs to be configured with a flexible and adaptable force that meets the requirements of the joint commander. The mobility of the force is critical to expand lodgment, provide force protection, and convoy escorts from the sea port of debarkation to the designated areas. Shown in table 1 is the overall comparison between the BCTs of weapon systems higher than a .50 caliber and the total number of vehicles internal to the organization.

Table 1. Comprehensive Weapons and Vehicle Comparison

Weapons and Vehicle Comparison	Weapon Systems	Mortars	Artillery	Vechicles
IBCT	71	26	33	292
SBCT	264	43	18	417
ABCT	397	0	42	599

Source: Created by author with information from Force Management Website, accessed August 2018, https://fmsweb.fms.army.mil/unprotected/splash/.

[55] Alan Vick, David Orletsky, Bruce Pirnie, and Seth Jones, *The Stryker Brigade Combat Team, Rethinking Strategic Responsiveness and Assessing Deployment Options* (Santa Monica, CA: RAND Corporation, 2002), 6, accessed August 22, 2018, https://www.rand.org/content/dam/rand/pubs /monograph_reports/2002/MR1606.pdf.

[56] US Army, *FM 3-96* (2015), 1-1.

Table 2. IBCT Weapons and Vehicle Analysis

Weapons and Vehicles									
IBCT	JAV	MK-19	60mm	81mm	120mm	105mm	155mm	HMMWV varient	MTV varient
HHCC/BEB	6	8		4	4			50	
CAV	15		2		2			32	3
IN BN	15		2		2			32	6
IN BN	15		2		2			32	6
IN BN	18		6					32	6
Fires		4				16	16	66	27
Total	69	12	12	4	10	16	16	244	48

Source: Created by author with information from Force Management Website, accessed August 2018, https://fmsweb.fms.army.mil/unprotected/splash/.

The IBCT is the lightest of the three brigades in relation to its equipment and weapon systems density. The internal artillery are towed systems; therefore, it needs a dedicated vehicle to move the artillery systems. The IBCT is highly adaptable to any mode of transportation and is rapidly deployable inter and intra-theater with minimal restrictions. The brigade is optimized for restricted environments, can operate with little signature, and set up a layered defense similar to the Ukrainians during the Russo-Ukrainian War. However, it lacks internal transport capabilities and relies on external assets for transportation. Although the IBCT is highly adaptable, it may lack enough firepower and mobility to support onward movement during RSOI operations in a hostile environment. Based on a LSCO environment modeled after Vostok 2018 and the Russo-Ukrainian War, an IBCT set of equipment may not meet the equipment reconstitution demands after a major battle.

Table 3. SBCT Weapons and Vehicle Analysis

Weapons and Vehicles														
SBCT	JAV	MK-19	ATGM	CV	FSV	ICV	MCV w/ 60mm and 120mm	RV	ASV	MGS	81mm	155 (T)	HMMWV varient	MTV varient
HHCC/BEB	19		9	4	5	1			6				5	10
CAV	36	18		4	3		1	13					3	3
IN BN	27	25		5	3	42	10	4		3	4		26	3
IN BN	27	25		5	3	42	10	4		3	4		26	3
IN BN	27	25		5	3	42	10	4		3	4		26	3
Fires		26		1								18	40	30
Total	136	119	9	24	17	127	31	25	6	9	12	18	126	52

Source: Created by author with information from Force Management Website, accessed August 2018, https://fmsweb.fms.army.mil/unprotected/splash/.

The SBCT has balanced capabilities for intra-theater mobility that are adaptable to various geographic environments. The stryker combat vehicle is based on a wheeled platform, which provides maximum flexibility, tactical mobility, and speed. It is more adaptive to both improved and cross-country terrain, and was designed to deliver dismounted infantry to a designated location at high speeds. It can provide direct and indirect fire support and is armed with anti-tank missiles that can delay, canalize, or ambush an enemy armored unit. However, it does not have significant firepower and survivability to conduct maneuver warfare against an armored unit. The SBCT has towed artillery systems that require a designated vehicle to move the system. However, the SBCT has mortar carrier vehicles, mounted with a 120mm mortar that can provide indirect fires. The mortar carrier vehicle is designed with 60mm mortars at the company level and 81mm mortars at the battalion level to supplement the 120mm mortar. The SBCT has a mobile gun system stryker variant that can provide direct fire support to dismounted infantry using 105mm cannons. The SBCT has the most flexible, scalable, and adaptable capabilities to support and set conditions for RSOI.

Table 4. ABCT Weapons and Vehicle Analysis

Weapons and Vehicles												
ABCT	JAV	MK-19	MK 93	M113	APC	M1A2	M2	M3	120mm (SP)	155mm (SP)	HMMWV varient	MTV varient
HHCC/BEB	3	4		3			16				28	8
CAV	18	12		7	8		4	9	6		28	8
IN BN	21	7	16	13	10	14	28	3	4		29	16
IN BN	21	7	16	13	10	14	28	3	4		29	16
IN BN	21	7	16	13	10	14	28	3	4		29	16
Fires		12								24	89	49
Total	84	49	48	49	38	42	104	18	18	24	232	113

Source: Created by author with information from Force Management Website, accessed August 2018, https://fmsweb.fms.army.mil/unprotected/splash/.

The ABCT is comprised of M1A2s, which are the main battle tank for the US Army. The ABCT has quantitative and qualitative firepower advantages over other BCTs and is currently the only element that can conduct maneuver warfare against a peer armored unit. The ABCT has howitzer self-propelled artillery systems mounted on a tracked chassis. This system gives the artillery elements increased mobility to maintain operational tempo and provide indirect fire to the supported unit. The ABCT moves itself in one lift. However, the geographic area the APA disembarks may constrain the ABCT due to its track systems. Bridges may also limit the movement of heavy armored vehicles throughout an area of operation. Furthermore, the ABCT's superior lethality may not achieve the desired effects in an urban environment.

Strategic Mobility

In June 2000, the 34th Chief of Staff of the Army, General Shinseki, introduced in Joint Vision 2020 the need to put a "combat ready brigade anywhere in the world in 96 hours, a division in 120 hours, and five divisions in 30 days," to seize the initiative, build momentum, and win decisively against an emerging threat anywhere in world.[57] USTRANSCOM plays a critical

[57] Jeff Charlston and John J. McGrath, *An Army at War: Change in the Midst of Conflict* (Fort Leavenworth, KS: Combat Studies Institute, 2005), 44.

role in meeting the power projection requirements utilizing land, sea, and air transportation assets. Strategic mobility involves having the right capabilities at the right time and place, leveraging a combination of strategic lift assets, and prepositioning necessary stocks. Time, weight, and cost are critical factors to consider when planning for deployment.

The time it takes to echelon forces into an austere environment becomes a significant risk when deploying a unit. The flow rate into theater is limited by the capacity of the aerial port of debarkation and sea port of debarkation. The assets required to load and unload, and the intra and inter-theater movement of equipment and personnel to the point of debarkation, pose a significant challenge for USTRANSCOM. In an aerial port of debarkation the maximum on ground (MOG) refers to the maximum number of aircraft an airfield can accommodate simultaneously. This is a structural limitation that can reduce the flow of personnel and equipment. The MOG is determined by the size and number of terminals, the equipment and personnel that can load and unload the aircraft, and the number of logistics elements such as fuel trucks that support the airfield. The MOG can vary from a major airport to an airfield in an austere environment. At a sea port of debarkation the number of berths and the capabilities such as cranes, fueling stations, and ramps to download equipment play an important role in the timely discharge of equipment and personnel. Moreover, the depth of the port may restrict the LMSR vessels used by USTRANSCOM to dock and disembark. If the seaport is too shallow, the CCDR may need to establish a Joint Logistics Over The Shore site to facilitate the unloading of ships offshore, or find a different seaport. Off-loading at sea may extend the operational timeline, ultimately affecting the timely build-up of combat power.

Weight is another factor that restricts strategic lift assets. All lift assets are limited to a maximum weight or maximum cubic load capacity. The lift requirements are determined by the total weight and size of the goods, which drives the type of lift asset and the number of assets required to meet the movement timeline. In a study conducted by the RAND Corporation in 2009, it took 7.4 days to airlift an SBCT from the aerial port of embarkation at Fort Lewis, Washington

to the aerial port of debarkation in Skopje, Republic of Macedonia. The analysis was based on a MOG of three and required 270 C-17 flights. The ABCT took thirteen days utilizing 477 aircraft under the same conditions. The SBCT deployed 45% faster compared to an ABCT. The IBCT was the only one to meet the ninety-six hour timeline presented in Joint Vision 2020, still requiring ninety-four C-17 aircraft. The SBCT needed 96% of the Fiscal Year 2009 (FY09) strategic airlift assets, and a working MOG of seven to meet the ninety-six hour requirement. Alternatively, a combination of seventy C-17s, and thirty C-5s resulted in a 46% commitment of the FY09 strategic lift assets to lift an SBCT. However, "typically, C-5s will not be flown into contingency APOD's [aerial port of debarkation's]."[58] Although both the ABCT and SBCT can deploy into a theater of operations using C-5 and C-17 aircraft, it is not feasible without causing significant interruptions in other strategic mobility operations. The Army can mitigate this risk by carefully balancing the flow of key assets using airlift, and leveraging the APA to globally deploy and respond to a threat. This capability gives the CCDR incredible flexibility and multiple options to meet operational challenges.

To prioritize force flow, the cost and time of movement are important factors planners continuously balance to meet the commanders' intent. The following example will examine the differences in cost and time to transport the different BCTs. The common points of origin chosen for the analysis are the sea and air ports in Norfolk, Virginia, while the common destinations were the seaport and airport in Riga, Latvia. In addition, this analysis examined the differences in cost and time to travel from the Port of Virginia, as compared from Diego Garcia where the APA is currently located. This analysis used the weight and equipment estimate of each BCT calculated by RAND, and the cost estimates from the Army FORCES website. The total weight of each

[58] FY 09 strategic airlift data was used because the information was from a study conducted by RAND Corporation. For more information see, Eric Peltz, John Halliday, and Aimee Bower, *Speed and Power: Toward an Expeditionary Army* (Santa Monica, CA: RAND Corporation, 2003), 28-29, accessed December 11, 2018, https://www.rand.org /pubs/monograph_reports/MR1755.html.

BCT were the following: 4,000 short tons (STONs) for an IBCT, 14,000 STONs for a SBCT and 25,000 STONs for an ABCT.[59]

To calculate the time it takes from the designated SPOE to the sea port of debarkation, this analysis standardized the surface speed of the ships to twenty-four knots.[60] The cost comparisons were based solely on the total weight of the equipment and did not consider the cost of movement for personnel and supplies needed to sustain each BCT. Based on the stated criteria, the total cost to transport each BCT was calculated by multiplying the total weight of each BCT by the cost per STON provided on the Army FORCES website.

The airlift cost comparisons were based on the fixed cost rate of $ 3,490.45 per STON, and the total weight estimates provided by RAND Corporation. These two estimates were then multiplied to determine the estimated cost to deploy a BCT by air.

Table 5. Sea and Air time and distance estimates

Sea Ports	Distance/ Time		IBCT	SBCT	ABCT
CONUS (Norfolf, VA) to Riga, Latvia	4308 nm	8 days	$ 87,791.60	$ 141,243.98	$ 216,984.70
Diego Garcia to Latvia (APA)	8017 nm	14 days	$ 27,385.80	$ 43,451.78	$ 66,933.41
Aerial Ports	Distance		IBCT	SBCT	ABCT
CONUS (Norfolk, VA) to Riga, Latvia	3647 nm		$13,961,800.00	$48,866,300.00	$87,261,250.00

Source: Created by the author from information from Eric Peltz, John Halliday, and Aimee Bower, *Speed and Power: Toward an Expeditionary Army* (Santa Monica, CA: RAND Corporation, 2003); US Army, Force and Organization Cost Estimating System, accessed August 2018, https://www.osmisweb.army.mil/; Sea Distance.org, "Sea Voyage Calculator," accessed March 14, 2019, http://sea-distances.org/.

In this scenario, the deployment of the APA from Diego Garcia to Riga, Latvia took six days longer compared to the deployment time from Norfolk, Virginia. However, the movement from Norfolk, Virginia to Riga, Latvia did not consider the mobilization timeline to include the administrative tasks required from home station. It also did not take into consideration the time it would take to load and unload the equipment onto railroad-cars, the transit time, and the time it

[59] Peltz, Halliday, and Bower, *Speed and Power*, 28-29.

[60] Sea Distance.org, "Sea Voyage Calculator," accessed March 14, 2019, http://sea-distances.org/.

would take to load them on ships. Contingent on the location of home station, this process may take two weeks to a month. ABCTs rely on land-based prepositioned stocks at strategic locations throughout the globe for rapid force projection. However, if the equipment cannot be transported by land from prepositioned locations, a ship needs to be allocated to move forces in response to a contingency. There are no SBCT sets as part of a prepositioned stock, hence its only option is to deploy from home station. Surprisingly, even though it takes six days shorter from Norfolk, Virginia to Riga, Latvia, it costs three times more compared to the movement from Diego Garcia to Latvia. Although the Army FORCES website does not give the breakdown of the cost, it could be for a variety of reasons. An assumption may be the cost of labor and fuel in Diego Garcia, compared to the port of Norfolk, Virginia.

Operational Cost and Sustainment Requirements

Other variables examined were the cost and sustainment estimates to determine the most cost-effective BCT once disembarked from the APA for both force protection and reconstitution missions. *Army Doctrine Publication (ADP) 1-0, The Army*, emphasizes maintaining credible expeditionary capabilities ready to assist allies, and protect United States interests.[61] Historically, expeditionary forces are deployed in an austere environment lacking logistics infrastructure. Therefore, initially it is important to be self-sustaining, with minimal logistical requirements. Initially, essential to assess the most efficient force relative to the effective accomplishment of the APAs' mission.

The Army FORCES website helped determine the operational and sustainment costs for each BCT. OPLOG planner estimated the daily fuel and ammunition requirements for each BCT. The logistics consumption comparison helps to visualize the logistics requirements to support the

[61] US Army, *ADP 1-0* (2017), 1-5 – 1-8.

combat force supporting the APA's mission. The analysis does not include the consumption and requirements from all the enablers in the APA.

Equipment Cost

The chart below is the total initial cost to equip the different BCTs based on MTOEs, and cost analysis from the FORCES website (table 5). These calculations do not include the annual operating cost to train and maintain the different BCTs.

Table 6. BCT Equipment Cost Estimates

BCT Equipment Cost	
Major Unit	**Equip Cost**
10 MT DIV(L) 2ND IBCT	$700,383,721.00
2 ID (M) 2ND SBCT	$1,959,643,868.00
1 CAV DIV 3RD ABCT	$2,771,834,639.00

Source: Created by the author with information from the US Army, Force and Organization Cost Estimating System, accessed August 2018, https://www.osmisweb.army.mil/.

The initial cost of each BCT directly correlates to the density of equipment in each brigade. The mean cost between the three values was $1,810,620,743, and the SBCT is within 1% of the mean. The ABCT costs almost four times more than an IBCT. These differences in the cost between equipment from an IBCT and an ABCT are due to the contrast between survivability, mobility, and quantity of equipment. Conversely, the benefits of robust capabilities generate additional logistical requirements which increases the forces' footprint and may hinder the APA from its mission. To capitalize on the cost differences, the Army would have to evaluate the utility of the APA to capitalize in a force package to either support RSOI operations, or be used as a reconstitution force for major end items in a theater of operation.

Operational Petroleum, Oils and Lubricants Requirements

Based on the average fuel consumption estimate compared to the SBCT, the ABCT required more fuel by 214.37% (table 7). The ABCT also required more than double (263.14%) the amount of fuel the IBCT required. To sustain the daily consumption of fuel, the ABCT required twenty-three Heavy Expanded Mobility Tactical Truck (HEMTT) (2.5K) fuel trucks a

day based on the average rate of consumption estimate. During a high operational tempo, the ABCT required thirty-two HEMTT fuel tankers a day. The M1A2 in an ABCT can travel 260 miles on one tank of fuel, and required fuel resupply every eight to ten hours.[62]

Table 7. BCT Daily Fuel Requirements

Daily Fuel Consumption Data (GAL)						
	IBCT		SBCT		ABCT	
	MAX. Fuel consumption	AVG. Fuel consumption	MAX. Fuel consumption	AVG. Fuel consumption	MAX. Fuel consumption	AVG. Fuel consumption
RECON			3,570	2,118	4,070	2,107
MNVR BN	2,833	1,957	4,896	3,191	18,652	12,873
MNVR BN	2,833	1,957	4,896	3,191	18,652	12,873
MNVR BN	2,833	1,957	4,896	3,191	18,652	12,873
FIRES			3,653	3,653	4,293	4,293
BSB			9,459	5,988	29,201	20,496
Total	30,700	21,281	36,253	26,122	78,489	55,999

Source: Created by author with information from Combined Arms Support Command Operational Logistics Automated Planner, Version 8.

This equates to three logistical convoys per day to sustain an armor unit. In an austere environment, the high consumption rates of an ABCT may hinder the logistical elements to set conditions for RSOI. Depending on the capabilities at the point of debarkation, the logistical elements may not be set up to resupply the ABCT within eight to ten hours. The stryker platforms can travel over 300 miles on one tank of gas, and consume 54% less fuel compared to an ABCT. The SBCT requires eleven HEMTT fuel tankers based on an average daily consumption and fifteen HEMTT fuel tankers during a high operational tempo. The IBCT required nine HEMTT fuel tankers based on an average daily consumption, and thirteen HEMTT fuel tankers during a high operational tempo. The high mobility multipurpose wheeled vehicle (HMMWV) and light medium tactical vehicle (LMTV) troop carrying variants are also able to travel over 300 miles on one tank of fuel. The total miles per one tank of fuel for the different vehicle variants within the

[62] Foss, *Jane's Land Warfare Platforms*, 220.

IBCT and SBCT depend on the supplementary armor added on the vehicles. Based on results of the fuel consumption analysis, the SBCT would be the optimal force. The SBCT required two additional HEMTT fuel tankers compared to the IBCT, however the SBCT provided full organic lift capabilities in addition to superior lethality.

Ammunition Requirements

Ammunition requirements were based on standard operational combat loads calculated using the Army TAMIS. This section covers the ammunition requirements by weight generated from OPLOG planner, and the transportation requirements to move the daily ammunition. The section also covers the ammunition cost calculated using the TAMIS and Army Master Data File. The analysis did not take into consideration the compatibility and transportation restrictions between types of ammunitions.

Table 8. BCT Daily Ammunition Requirements

		CL V	
SRC	**Division**	STON (daily)	OP Cost (daily)
77200K000	INFANTRY BRIGADE COMBAT TEAM (IBCT)	29.32	$388,613.07
47110K000	STRYKER BRIGADE COMBAT TEAM (SBCT)	57.55	$777,164.79
87310K000	ARMORED BRIGADE COMBAT TEAM (ABCT)	60.98	$921,660.95

Source: Created by the author with information from Combined Arms Support Command Operational Logistics Automated Planner, Version 8; US Army, Force and Organization Cost Estimating System, accessed August 2018, https://www.osmisweb.army.mil/.

The IBCT required slightly less than half of the ammunition compared to both the SBCT and ABCT; however, it has significantly less firepower. Based on weight requirements, the IBCT only required two HEMTT load handling systems, that can each transport twenty-two-ton payloads to meet their daily ammunition requirements. The ABCT and SBCT's ammunition requirement by STON are within 10% of each other, and on weight requirements both BCTs required three load-handling systems to transport their daily requirements. The SBCT has quantitatively more indirect fire weapon systems and a wider range of firepower compared to an

ABCT (See tables 3 and 4). The various weapon systems in an SBCT provided operational flexibility and scalability to engage threats while minimizing collateral damage in an urban environment. However, the ABCT can deliver the most lethal firepower per cost of ammunition and transportation requirements, making the ABCT the most cost-efficient force for ammunition. The ABCT would be the most effective force in a LSCO environment.

Average Annual Maintenance Cost

As the Army shifts its focus to LSCO, it needs to consider the most likely increase in maintenance costs due to employing equipment at a higher operational tempo. The maintenance requirements to sustain each BCT is an important planning factor to decide which is best suited to complement the APA. The quantity of maintenance parts and equipment needed to support each BCT is also an important factor due to the limited cubic area of storage space available in the APA. The overall maintenance cost for each BCT is from Headquarters, Department of the Army G-4.[63] Table 9 captures the maintenance cost over the last two years.

Table 9. BCT Maintenance Cost Comparison

		AVG Maint	
SRC	**Division**	FY 17 Cost	FY 18 Cost
77200K000	INFANTRY BRIGADE COMBAT TEAM (IBCT)	$ 18.6 mil	$ 19 mil
47110K000	STRYKER BRIGADE COMBAT TEAM (SBCT)	$ 41.7 mil	$ 42.5 mil
87310K000	ARMORED BRIGADE COMBAT TEAM (ABCT)	$ 69.9 mil	$ 71.3 mil

Source: Created by the author with information from CW4 Jason T. Gozikowski, Army G-4, Email correspondence with author, August 3, 2018.

This analysis highlights the drastic maintenance cost differences between BCTs. The ABCT's maintenance cost is more than 41% higher compared to the SBCT, and more than 74% higher compared to an IBCT. Based on the ratio between vehicles (table 1), and the cost of maintenance (table 9), the IBCT is the most cost-effective due to the least equipment. The

[63] CW4 Jason T. Gozikowski, Army G-4, Email correspondence with author, August 3, 2018.

analysis concludes that although the ABCT has a higher maintenance cost among BCTs, based on the ratio between equipment quantity and maintenance cost, both the ABCT and the SBCT come very close to each other. The maintenance cost was an important factor to consider when assessing each BCT, especially when comparing the cost relative to capabilities.

Russian Armor Capability Comparison

The *TRADOC Pamphlet 525-3-1, The US Army in Multi-Domain Operations 2028*, highlighted the role of the US Army in a multi-domain LSCO environment to deter and defeat Chinese and Russian aggression.[64] For this analysis Russian armor and stryker force capabilities were selected to compare against US Army equivalent capabilities. The combat power comparison helped to illustrate the capabilities of a peer competitor in order to determine the optimal combat power required to conduct the reconstitution of major end items after a battle. The information is from *Jane's Land Warfare Platforms: Armoured Fighting Vehicles, 2017-2018*.

[64] US Department of the Army, *Training and Doctrine Command Pamphlet (TRADOC) 525-3-1, The U.S. Army in Multi-Domain Operations 2028* (Washington, DC: Government Printing Office, 2018), vi.

Table 10. U.S. and Russian Wheeled Armored Personnel Carrier Comparison

Armoured Personnel Carrier (wheeled)		
	US (stryker)	**Russian K-17**
Crew:	2+10	3+8
Weight:	24948 kg	25000 kg
Mobility	8x8	8x8
Speed: Max:	100 km/h	100 km/h
Water:	N/A	10 km/h
Amphib:	No	Yes
Firepower:	Variation	Variation
Armament: (variants)	25/30 mm (ICV)	30 mm cannon
	12.7 mm (.50)	7.62/12.7 mm
	2x ATGM	4x ATGM
	120 mm mortar	120 mm mortar
	105 mm (MGS)	N/A
Ammunition		
in weapon O/H:	160	500
Missiles O/H:	10	4
7.62 O/H:	N/A	2,000
120mm mortar:	56	N/A
Armour hull/body:	Steel + applique	Steel + applique

Source: Created by author from information from Christopher F. Foss, *Jane's Land Warfare Platforms: Armoured Fighting Vehicles 2017-2018* (Coulsdon: IHS Janes, 2017).

The US stryker (8x8 wheel) vehicle, and the Russian stryker variant are similar to each other. The one major advantage the Russian Stryker vehicle has is its fording capability. This capability may become important depending on the terrain and environment. One of the major strengths for the US Stryker vehicle is the number of infantry soldiers the stryker system can rapidly move over the battlefield. In a SBCT there are 127 infantry carrier vehicles, which can transport up to 1,270 soldiers. The Russian equivalent could only transport 1,016 soldiers. The SBCT can transport 254 more soldiers compared to the Russian equivalent. This is an important capability for an APA force in order to facilitate the onward movement of soldiers during RSOI operations. The SBCT has ten different stryker variants, to include the Mobile Gun System configured with a 105mm cannon. The SBCT is composed of a wide variety of capabilities tailorable to the diverse environments the APA may face. Based on the comparison between the US Stryker platform and the Russian K-17, the US Stryker is more lethal with tailorable capabilities.

Table 11. U.S. and Russian Tracked Armored Personnel Carrier Comparison

Armoured Personnel Carrier (Tracked)			
	US M2A3	**Russian T-15**	**Russian BMP-3**
Crew:	3+7	3+9	3+8
Weight:	32,659 kg	50,000 kg	21,000 kg
Fording:	1.2 m		Cmphib
Speed:			
Max:	61 km/h	75 km/h	70 km/h
Fuel:	400 km	500 km	
Firepower:	Variation	Variation	
Armament:	25/30 mm	30 mm cannon	100 mm
	7.62 mm	7.62 mm	7.62 mm
	2x ATGM	2x ATGM	30 mm
Main total:	900	500	40
Missile:	7	4	8
7.62:	4400	2,000	6000
Cannon:	N/A	N/A	500
Armour hull/body:	Aluminium + applique	Steel + ADV+ reactive armour	Steel

Source: Created by author from information from Christopher F. Foss, *Jane's Land Warfare Platforms: Armoured Fighting Vehicles 2017-2018* (Coulsdon: IHS Janes, 2017).

The armored personnel carrier is the main armored tracked vehicle that transports troops in an ABCT. The US M2A3 Bradley has three major disadvantages compared to the Russian T-15 and BMP-3 (table 11). The ABCT has 104 Bradley's with a maximum troop-carrying capacity of 728 personnel. Based on 104 vehicles, the Russian T-15s have a greater troop-carrying capacity of 936, and the BMP-3s can transport up to 832 soldiers. The Russian T-15 can carry up to 208 more soldiers, and the BMP-3 can carry 104 more soldiers compared to the same quantity of M2A3. Second, the lethality of the Russian BMP is significantly higher compared to the US M2A3. The Bradley is outfitted with a 25mm or 30mm cannon, however, the newest BMP-3 has a 100mm main gun; and is amphibious. Third, the Russian armored vehicles have a new reactive armor called Malachite that covers the engine, and "the electronic countermine system to prevent antitank mines from detonating."[65] The vehicles also have the "Afganit active protection system,

[65] Brian Want, "Russia Armata Tank Will Outmarch the Abrams in Active Armored and Triple Range Missiles," NextBigFuture.com, October 14, 2017, accessed February 16, 2019, https://www.nextbigfuture.com/2017/06/russia-armata-tank-will-outmatch-the-abrams-in-active-armor-and-triple-range-missiles.html.

which uses a combination of sensor and kinetic energy projectiles to knock down incoming rocket-propelled grenades, antitank missiles, and sub-caliber projectiles."[66] The Russian vehicles have a composite armor shell integrating a new steel alloy made by melting electrolag. This is lighter than steel, making Russian armor vehicles thousands of kilograms lighter than US vehicles. The US M2A3 is currently undergoing testing on various active protection systems such as the Iron Fist, and the Israeli Trophy system, however, the Army Requirements Oversight Council has not decided on a specific system.[67] Russian armored personnel carriers are more effective in troop transport capacity, lethality, and survivability, which makes the Russian armored carriers the optimal force in combat operations.

Table 12. U.S. and Russian Main Battle Tank Comparison

Main Battle Tank		
	US M1A2	**Russian T-90S**
Crew:	4	3
Weight:	63,086 kg	46,500 kg
Mobility	Tracked	Tracked
Speed:		
Max:	67.6 km/h	65 km/h
XC:	48328 km/h	
Fording:	1.2-1.98 m	1.8-5 m
Range:	426 km	550 km
Dirt Road:	N/A	450km
Firepower:	120 mm	125 mm
	7.62 mm	7.62 mm
	12.7 mm (.50)	12.7 mm
Main total:	40	42
7.62:	12400	2,000
12.7 mm (.50)	1000	300
Armour hull/body:	Steel + AV	Steel + ADV+ reactive armour

Source: Created by author from information from Christopher F. Foss, *Jane's Land Warfare Platforms: Armoured Fighting Vehicles 2017-2018* (Coulsdon: IHS Janes, 2017).

[66] Want, "Russia Armata Tank Will Outmarch the Abrams in Active Armored and Triple Range Missiles."

[67] Sydney J. Freedberg Jr, "Army Rejects Iron Curtain APS for Stryker, Launches New Programs," *Breaking Defense*, August 24, 2018, accessed March 31, 2019, https://breakingdefense.com /2018/08/army-rejects-iron-curtain-aps-for-stryker-launches-new-programs/.

The M1A2 is the US Army main battle tank, and has similar capabilities to the Russian T-90S. However, the Russian tank has the advantage in lower total weight, fording capability, and total miles per fuel tank. The Russian tank is 16,586 kg lighter than the M1A2, which equates to 18.2 ST. The weight difference becomes a critical factor when crossing a bridge with limited load capacity. The load capacity on a bridge can halt the tempo of an operation, and force armored forces to conduct a gap crossing. The weight of the US M1A2 main battle tank can further deteriorate poorly constructed roads common in an austere environment, hindering the movement of logistics vehicles behind the front lines of troops. Russian T-90S main battle tanks have a fording capability of 1.8 meters without system preparation, and up to five meters with twenty minutes of preparations.[68] The Russian T-90S can travel seventy-seven miles further in one tank of fuel compared to the US M1A2. These capabilities give the Russian tanks greater flexibility to maintain operational tempo without additional assets such as bridging support or frequent logistics resupplies. Ultimately, Russian tanks have a competitive advantage over the US main battle tank in an austere environment with limited logistics infrastructure where the APA may be employed.

Findings

This section examines the effectiveness of the three different BCTs as a force suitable to expand a lodgment in support of RSOI operations. This section also compares US ground combat power against a peer threat to assess the optimal force that could complement the APA in support of reconstitution operations in a LSCO environment. The greatest constraints of the APA are the limited ships and space available, hence it is crucial for planners to carefully weigh different characteristics such as firepower, inter-theater and strategic mobility, logistics requirements, and

[68] Army Recognition, "T-90 MBT Main Battle Tank Technical Data Pictures Video," January 6, 2019, accessed Marched 31, 2019, https://www.armyrecognition.com/russia_russian_army_tank_heavy_armoured_vehicles_u/t-90_mbt_main_battle_tank_technical_data_sheet_specifications_information_description_pictures.html.

costs to compose an optimal force to accomplish the APA's missions. Based on the results of the case study, table 13 presents how the BCTs were rated according to the variables. In table 13 a lower number was given to the BCT with the greatest advantage for that variable, and ascended sequentially to the BCT with the least advantage.

Table 13. Comprehensive BCT Comparison

BCT Comparison	Firepower	Inter-Mobility	Strategic Mobility	EQUIP Cost	CLVII Reconstitution	Total
IBCT	3	3	1	1	3	11
SBCT	2	1	2	2	2	9
ABCT	1	2	3	3	1	10

Source: Created by the author.

Based on these results, all three BCT have advantages that could be leveraged for various operations. However, advantages and disadvantages need to be weighed against the mission of the APA, which is to project forces and set conditions for RSOI, or be used to reconstitute equipment after a large-scale combat engagement. The results are further assessed using the SWOT model.

Stryker Brigade Combat Team

Compared to the other BCTs, the SBCT has the optimal combination of intra-theater lift capabilities and personnel to facilitate the onward movement of personnel and equipment while providing force protection. In the US Army, a mechanized infantry company consists of two Bradleys in the HQs and twelve Bradleys combined in the three platoons. These are a total of 117 soldiers, to include thirty-six soldiers operating the vehicles, giving the mechanized infantry company only eighty-one dismounted soldiers. In a stryker company there are two HQ vehicles, twelve Strykers, and 132 soldiers to include twenty-four vehicle operators, giving the stryker company 108 dismounted soldiers. That is six more than a light infantry company, and twenty-

seven more than a Bradley company.[69] These capabilities give the SBCT incredible flexibility to conduct force protection operations at critical logistics nodes, provide convoy security, and quickly move troops. Compared to the Russian Stryker variant, the US Stryker vehicle has the advantage in troop carrying capacity and lethality. However, on the battlefield, an SBCT may not be matched against other like units. If an armor unit engaged a stryker unit, it may bring the same catastrophic results as demonstrated in the Russo-Ukrainian War. One of the greatest strengths of the SBCT is its flexibility in strategic mobility. The stryker vehicle can be transported on a C-130 aircraft with minimal preparation requirements, and be operational within minutes of landing. The SBCT may be the optimal force if the APA's sole role was to expand a lodgment and set conditions for RSOI operations. Based on the analysis, the SBCT is the most efficient force for this mission due to having the right mixture of capabilities versus the daily logistical requirements. SBCTs are also well suited to respond to contingencies in benign environments.

While the SBCT meets the requirements for force protection and facilitating movement of personnel, it lacks the direct fire assets to close with and destroy enemy armor capabilities. Like the ABCT, the SBCT's firepower and mobility capabilities come with a cost that the Army needs to consider. Both the SBCT and ABCT have significant logistical requirements that planners need to understand, whether considering the movement of BCTs via strategic lift, or the daily consumptions of supplies and transportation requirements to sustain each unit once on the ground. The greatest opportunity is to leverage the flexibility of the Stryker platform to adapt to multiple modes of transportation and to quickly project forces forward without being loaded on the APA. However, there are no SBCT sets currently available for the APA and the Army would need to spend $1,959,643,868.00 for a new SBCT set.

[69] Mark J. Reardon and Jeffery A. Charlston, *From Transformation to Combat: The First Stryker Brigade at War* (Washington, DC: Center of Military History, 2006), 8.

Armored Brigade Combat Team

The ABCT is the only combat force that can conduct contested maneuver in a large-scale combat environment against a peer threat, making the ABCT the decisive land force for the US Army. The ABCT has a superior quantitative and qualitative firepower advantage compared to the other BCTs. If the APA is used to facilitate the reconstitution of equipment after large-scale combat operations, the ABCT is the ideal choice to have preloaded in the APA due to its advantage in firepower and survivability. The Russian T-90S holds the qualitative advantage over the US M1A2 main battle tank. Based on estimated loss rates, US armored forces could sustain significant battle damage and vehicle losses during a decisive fight. Although there are many ways to shape the battlefield to gain the force ratio advantage through fires and air strikes, this analysis was based on qualitative comparisons of similar vehicle types.

Inter- and Intra-theater mobility and force protection capabilities play critical roles in the APA's mission to expand a lodgment and support RSOI operations. The ABCT may not be the optimal force to expand a lodgment due to restricted maneuverability in a populated urban environment and the high logistics requirements once the unit is employed. The ABCT required over 22,000 gallons of fuel every eleven hours. The higher logistical requirements may hinder the logistics element of the APA from building up combat power and developing the infrastructure in theater. Lastly, the ABCT lacks strategic flexibility compared to the other BCTs. If the ABCT needed to respond to a contingency overseas, the only practical mode of transportation is through sealift.

The ABCT's limited strategic flexibility increased the argument to have the ABCT already loaded on the APA. Also, if the APA was used for major end item replacements, it would be critical to have armored vehicles on the APA in order to prevent culmination, sustain operational tempo, and extend the operational reach of the CCDR.

Conclusion and Recommendations

The flexibility of the APA allows the US Army to quickly project forces and respond to a threat. The APA has the logistical capabilities to expand a lodgment and set conditions for RSOI operations in an austere environment. However, the combat forces aligned with the APA may not be suitable to meet the new challenges defined in *FM 3-0*, LSCO.

This research examined lessons learned from the Vostok 2018 exercise, Russo-Ukrainian War, and the Israeli-Hezbollah War to understand the scale and intensity of a modern large-scale war to help determine which capabilities are essential in different operational environments. The research also compared each BCT according to their firepower, inter- and intra-theater mobility, cost, and logistics requirements to examine which capabilities were best suited to achieve the two probable missions of the APA; setting conditions for RSOI operations and force reconstitution after a major battle. The requirements for both missions are different and the Army needs to consider the compositions of the APA holistically to satisfy capability requirements in a resource constrained environment. Having the SBCT loaded on the APA would meet both the force protection and onward movement requirements; however, the SBCT would not meet the reconstitution requirements after a major engagement against a near-peer threat. Having an ABCT on the APA may meet force reconstitution requirements; however, the ABCT may be limited by the urban environment and restricted as a force protection platform in support of RSOI operations. The question becomes, what is the optimal combination of forces to satisfy both requirements with the assets available.

Based on the analysis, it would be optimal to have one ABCT and an SBCT loaded on the APA for operational flexibility in response to LSCO. However, due to financial restraints, it would be most expedient to have an ABCT loaded on the APA due to their restricted strategic mobility to quickly deploy the most credible land force in response to a threat. Having the ABCT loaded on the APA would significantly reduce the cost and preparation time compared to deploying from home station (table 5). Having an ABCT pre-loaded on the APA would also

facilitate the reconstitution of armor forces after a decisive land engagement to maintain operational tempo and enable operational reach.

Due to the cost of a new SBCT set, it would only be possible to load the logistics assets and supplies required to support an SBCT on the APA and leverage the strategic flexibility of the Stryker platform to deploy them into a theater when needed. Prepositioning the SBCT's logistics assets and supplies in the APA would significantly reduce the strategic airlift requirements. As noted in the RAND study, solely prepositioning logistics equipment and supplies would "reduce airlift requirements by about 60 percent," allowing the airlift of the rest of the SBCT in four days from a CONUS location.[70] To achieve the four-day deployment timeline, it would require 22% of the FY09 strategic airlift capabilities, however, if a 7.4 day deployment timeline was acceptable, it would only require 13% of the strategic lift assets.[71] The strategic flexibility of the stryker platform is an incredible capability that can be leveraged to provide force protection in an austere environment and set conditions to receive the APA and conduct RSOI operations. These recommendations would increase the current ship allocations of the APA; however, the recommended composition is the optimal force for the APA to achieve its possible missions in response to the challenges associated with *FM 3-0*, LSCO.

[70] Peltz, Halliday, and Bower, *Speed and Power*, 28-29.

[71] Ibid.

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