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14. ABSTRACT The recent "pivot to Asia" highlights a key capability of our Joint Force that has atrophied significantly; power projection via ship to shore operations. The increased proliferation and improvement of anti-access/area denial (A2/AD) weapons challenges the foundational premise of US global power projection. The geography and infrastructure of the world dictates that ship to shore operations will be a critical component in non-permissive environment entry. Forced entry into a theater of operation is a capability the US military must modernize. Analysis of the historical usage of ship to shore operations, the difficulties for opponents to conduct a defense against these amphibious operations with anti-access/area denial weapons, and the dangers of not maintaining this capability will provide the basis for this argument. Furthermore, simply maintaining our Army watercraft and Marine amphibious craft is not sufficient for the future operating environment. New operating concepts demand improvement in the survivability, speed and range of watercraft to challenge opponents' denial efforts and provide the Joint Force Commander with more options in operational planning. The nature of the battlefield in the 21 st century demands new emphasis and investment in this critical capability for power projection in the littorals of the world. In conclusion, the Army's family of Maneuver Support Vessels (MSV), both Light and Heavy variants, must be prioritized and funded for rapid fielding via a commercially available off-the-shelf (COTS) platform adapted to the Joint Force. A Joint Force purchase					
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Newport, R.I.**

Modernize or Mothball; Ship to Shore watercraft must be modernized to remain relevant.

by:

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Major, US Army

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature:

A handwritten signature in black ink, appearing to be 'R. M. Hertlein', written over a horizontal line.

12 May 2017

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Abstract

Modernize or Mothball; Ship to Shore watercraft must be modernized to remain relevant.

The recent “pivot to Asia” highlights a key capability of our Joint Force that has atrophied significantly; power projection via ship to shore operations. The increased proliferation and improvement of anti-access/area denial (A2/AD) weapons challenges the foundational premise of US global power projection. The geography and infrastructure of the world dictates that ship to shore operations will be a critical component in non-permissive environment entry. Forced entry into a theater of operation is a capability the US military must modernize. Analysis of the historical usage of ship to shore operations, the difficulties for opponents to conduct a defense against these amphibious operations with anti-access/area denial weapons, and the dangers of not maintaining this capability will provide the basis for this argument. Furthermore, simply maintaining our Army watercraft and Marine amphibious craft is not sufficient for the future operating environment. New operating concepts demand improvement in the survivability, speed and range of watercraft to challenge opponents’ denial efforts and provide the Joint Force Commander with more options in operational planning. The nature of the battlefield in the 21st century demands new emphasis and investment in this critical capability for power projection in the littorals of the world. In conclusion, the Army’s family of Maneuver Support Vessels (MSV), both Light and Heavy variants, must be prioritized and funded for rapid fielding via a commercially available off-the-shelf (COTS) platform adapted to the Joint Force. A Joint Force purchase via COTS for the MSV will produce fiscal savings, increase inter-Service interoperability and supply chain management, and quickly bridge the gap between concept and capability.

INTRODUCTION

The Allied victory in World War II would not have been possible without the capability to project military forces from the sea to the shore. The “island hopping” campaigns of Admiral Nimitz and General MacArthur in the Pacific as well as the landings in North Africa, Sicily, Salerno, Anzio, Normandy, and Southern France were only possible due to the ability to directly move combat troops and equipment from ship to shore in austere environments. It was the flexibility that the smaller watercraft provided that enabled operational planners to select the best locations to penetrate enemy shore defenses. In the Dieppe raid, less than half of the 4,963 Canadians who embarked for Operation Jubilee returned to England, and many of those were wounded. There were 3,367 casualties, including 1,946 prisoners of war.¹ This disastrous Allied raid on French port of Dieppe in August of 1942 emphasizes the importance of being able to land where the enemy is not prepared or least expects an attack. The costs of having to relearn ship to shore operations anew will be devastating.

The modern battlefields of the 21st century will be no less costly without the ability for planners to be artists instead of scientists. The capabilities of the force available to the planner must provide options to confound opponents or run the risk of landing into the guns as at Dieppe. Current Army watercraft are obsolete relics from the past. The oldest workhorses of the both the Army and Marine fleets, the Landing Craft Mechanized or “Mike Boats,” are over 46 years old. The “new” vessels of the Army fleet, the Logistics Support Vessels, are already 23 years old and were built for a conflict of different, and much slower,

¹ *The Dieppe Raid, 1942*. Ottawa: Anciens combattants Canada, 2005. Print.

character.² None of the watercraft support vessels in inventory can exceed a speed of 12 knots, except for the Marine Corps' Landing Craft Air Cushion (LCAC) and therefore are incapable of supporting over the horizon sea-basing doctrine.³ Additionally, all watercraft are greatly restricted by the sea state while conducting operations. Anything more than sea state 2, or 3 foot waves, essentially halts operations.

Success in military operations comes from many factors which include seizing the initiative, attacking where the enemy is weak, forcing the opponent to defend everywhere and thus nowhere are all elements that make victory more achievable. Modern battlefields will encompass the littoral region; the zone where the land meets the sea. Having the capability to rapidly project a ground force onto the enemy's shore from increased standoff distance provides the Joint Force Commander options. The ability to utilize any shoreline to disembark ground forces, independent of ashore infrastructure, forces the belligerent to disperse to defend multiple options or risk leaving an avenue of approach uncovered. The current fleet of watercraft does not provide this capability except in permissive environments or environments of total force superiority across all domains.

The Maneuver Support Vessel-Light and the future Maneuver Support Vessel-Heavy proposals will give the future Joint Force Commander the option to either rapidly place ground forces onto the enemy's shore from outside land-based observation or to feint such action to create opportunity elsewhere. In either situation, the option is dependent on a capability that does not currently exist in the US military inventory. Given the procurement time for new platforms, it is unlikely the watercraft fleet will receive any new vessels in the

² Pat Plotkowski, NDIA TWV Conference. "Project Manager Transportation Systems, 26 August 2015.

³ Christopher J Pehrson. "Bare Beach Logistics Over-the-Shore: An Outdated Concept?" Master's Thesis, Air Force Institute of Technology, 2000. Accessed March 15, 2017. Appendix B, p. 52-57.

next five years to provide the Joint Force with the capabilities desired. As it stands the current fleet of watercraft is irrelevant to forced entry operations for the 21st century. The Joint Force, not just the Army, must invest in the Maneuver Support Vessel family to replace the aging watercraft fleet with relevant and flexible platforms to rapidly project ground forces from ship to shore in adverse climates while facing the modern A2/AD threat. Even more importantly the modernization is needed now to confront state adversaries that are doubting not just U.S. resolve, but U.S. capabilities. Through a leveraging of commercially available off-the-shelf platforms (COTS), the Joint Force can speed acquisition and rectify a capability gap to immediately translate concept to reality for a fraction of the cost of new development.

SHIP TO SHORE OPERATIONS IN HISTORY

Commandant of the Marine Corps, General Robert H. Barrow once said, “Ever since the days of the Phoenicians, the ability to land on defended shores has been a source of strength for those who possess it and a source of concern for those must oppose it.”⁴ The concern for those who must oppose the sea-borne invasion is borne out best by Hitler’s attempted “Atlantic Wall.” Built specifically for stopping an Allied invasion on the northern coastlines of the European continent, this was a massive defensive undertaking brought about by Allied sea and amphibious capabilities. The Allies first demonstrated their ability to project power from ship to shore, independent of ashore infrastructure, with the landings in North Africa.

Nearly 2,000 miles of fortifications were built by Germany to prevent Allied force projection into German occupied territory. The construction consumed 1.2 million tons of

⁴ Merrill L. Bartlett, *Assault from the Sea: Essays on the History of Amphibious Warfare* (Annapolis, MD: Naval Institute Press, 1983), p. xi.

steel, 17 million cubic meters of concrete, and cost \$206 billion in today's currency. Over a quarter of a million laborers worked tirelessly on these fortifications which in the end contained 5 million mines, nearly 15,000 defensive emplacements, hundreds of artillery pieces, and approximately 300,000 troops.⁵ Yet the Germans were still forced to concentrate much of these defenses around key port cities such as Cherbourg, Brest, and Antwerp which would be critical to Allied logistics operations, or so they thought. Allied planners instead employed small watercraft and mobile causeways to push combat formations and logistics directly from ship to shore. The ability of Allied forces to rapidly land and concentrate against a small portion of the "Wall" in Normandy ensured its breach and brought about the end of the Third Reich.

Discussion of the necessity of maintaining the ship to shore capability is nothing new. In 2010, then Secretary of Defense Robert M. Gates stated, "we have to take a hard look at whether it would be necessary or sensible to launch another major amphibious landing again,"⁶ after noting the A2/AD threat and deteriorating fiscal environment. Amazingly, his comments echo those of the Chairman of the Joint Chiefs in 1948, Omar Bradley, when he stated, "Large-scale amphibious operations will never occur again."⁷ The debate over the necessity of this capability is not solely an American one either. In the early 1980s, John Nott, the Secretary of State in Margret Thatcher's United Kingdom government, planned drastic reductions in the UK defense apparatus to focus on the Soviet threat at the expense of expeditionary warfare capacity. The planned reductions foresaw the sale of both Landing

⁵ Scott Addington, "The Atlantic Wall - 11 Amazing Facts About the Nazi Defences at Normandy." MilitaryHistoryNow.com, 4 June, 2014, accessed 18 April 2017, <http://militaryhistorynow.com/2014/06/04/the-atlantic-wall-11-amazing-facts-about-the-nazi-defences-at-normandy/>

⁶ Robert M. Gates, then-Secretary of Defense's remarks delivered to the Navy League Sea-Air-Space Exposition, 3 May 2010, and at George P. Shultz lecture, 12 August 2010.

⁷ Omar Bradley, quoted in Jeffrey Record, "The Marines and the Amphibious Mission," Amphibious Warfare Review. Summer 1987, p. 54.

Platform Dock amphibious ships and discussed the disbanding of the Royal Marines.⁸ These reductions would have essentially dissolved the U.K.'s ship to shore ability.

Obviously, history demonstrated that both Bradley and Nott were in error. The miracle at Inchon and the British landings at San Carlos Bay in the Falklands would not have been possible if the ship to shore capabilities of the nations had been eliminated as planned. The capability to project power from the sea is essential in a world that is by a clear majority covered with water. This is not a capability that can be generated in a surge, it must be maintained and refined to be effective. Only when ship to shore power projection is an effective threat will it deter opponents and disrupt their decision-making process. It was precisely this capability of the Marine Corps that enabled them to be a successful feint in 1990 during Desert Storm. Despite Iraqi attempts to deny access with mines and anti-ship missiles, the Marine Amphibious Force successfully threatened and distracted large numbers of Iraqi forces in Kuwait enabling General Schwarzkopf's surprise flanking attack.

There is much discussion about A2/AD in military circles today. However, anti-access/area denial is nothing new. The Confederate forces in the Civil War used torpedoes (mines) to block Union access to Mobile Bay. The Germans utilized submarines and mines to deny the British Royal Fleet access into the Baltic Sea and the coastal areas outside their naval bases in World War I. The Ottoman Turks used a combination of coastal artillery and mines to prevent an Allied Fleet from forcing the Dardanelles in World War I as well. And as illustrated earlier, the German forces in World War II attempted to create an anti-access

⁸ Cmnd 8288, *The United Kingdom Defence Programme; the Way Forward*, June 1981, accessed 18 April 2017. paras 29-31. <https://www.publications.parliament.uk/pa/cm199798/cmselect/cmdfence/138/13804.htm>

defense along the entire European northern coastline. Some of these attempts to deny access were successful, others were not.

While anti-ship cruise missiles are much more effective than older coastal artillery in reach and accuracy, they can still be countered. No defense is impenetrable. As Clausewitz highlights throughout his book “On War”, the defense is inherently weaker than offense. Once a defender surrenders the initiative, they must react to the opponent’s actions. The offensive allows for concentration of force at an appointed time and location. The ship to shore capability is essential for nations that do not share a land border with their opponent in order to take the offensive. Without the ship to shore capability, force projection becomes dependent on a friendly or allied nation willing to host ground forces. It is through use of the offense that commanders will overcome the enemy by operational application of strong capabilities against an opponent’s weaknesses. The discussion thus shifts to which of the capabilities to be invested in and those to be discarded.

SHIP TO SHORE OPERATIONS AND FUTURE OPERATING CONCEPTS

Army Training and Doctrine Commanding General, David Perkins, delivered an address to the US Navy War College on 3 April 2017. In his address, he highlighted the Army’s move from Air-Land Battle to a Multi-Domain Battle Concept. “In an era of air and maritime warfare that seems increasingly likely to be dominated by long-range sensors and precision strikes, ground forces [provide the Joint Force] key attributes of resilience, persistence, and sustainability.”⁹ The question then becomes how to bring the Joint Ground Force to bear. The US geostrategic position demands that US forces must project forward to confront opponents over two large oceans. The ability to cross these oceans is essential for

⁹ David G. Perkins, Army TRADOC Commanding General’s address to US Navy War College, 3 April 2017.

not only the Marines, but for the Army as well. It cannot be assumed that forces can be built up safely and fast enough via air bridges alone. Concurrently, the anti-air missile defense threat is just as robust as the anti-ship missile defense making high capital investment platforms, like the C-17 and C-5, very susceptible to interdiction. Penetration of these A2/AD zones in future conflicts will require forced entry by elements that can quickly penetrate the zone and establish a lodgment for further expansion of the ground effort at lowest cost and risk to the nation.

The Combined Arms Support Command (CASCOM) *Army 2020 and beyond Sustainment White Paper* addresses a key future requirement for “watercraft to support operational agility through the delivery and sustainment of operationally significant forces to the point of employment.”¹⁰ Even more specifically, the CASCOM white paper states that these “modernized watercraft ... be compatible with U.S. Navy platforms.”¹¹ While it could be argued that the current watercraft fleet is compatible with the Navy platforms since both services are using the same 46 year old vessels, the current inventory falls drastically short of providing operational agility for significant forces. These Army future concepts demand a capability that can bring troops to the fight at low cost and low risk; the perfect venue for a high-speed landing craft that can operate over the horizon and rapidly deploy combat troops and heavy equipment into the contested area.

The amphibious realm has long been considered a Navy/Marine domain, however the future demands a look to the past. In World War II, the largest amphibious operations were carried out by Army Soldiers, not Marines, and the Army conducted more amphibious operations in World War II than the Marine Corps. However, this is a capability that the

¹⁰ Army 2020 and Beyond Sustainment White Paper. Combined Arms Support Command, 30 August 2013. p. 30.

¹¹ Ibid. p. 20.

Army has lost over the past 70 years. The current Navy/Marine Corps concept of “sea-basing” is being embraced by the Army as the new normal. Sea basing became the dominate concept by 2005 within the Navy and Marine Corps and envisioned a five-step process of *close, assemble, employ, sustain, and reconstitute*¹² to project power from the fleet. The premise of sea-basing is to stage amphibious ground forces over the horizon, hidden from observation, and strike quickly against the enemy shore. Furthermore, Marine Headquarters for Combat Development and Integration’s Expeditionary Force 21 calls for a desired capability of “high-speed watercraft” that create “maneuver options” to quickly “reinforce success and reduce risk of exposure time.”¹³ The Navy/Marine concepts clearly demand a fast landing craft that can provide increased capability to commanders.

The *Capstone Concept for Joint Operations 2020* (CCJO) identifies ten primary missions for which the Joint Force will sustain U.S. Global Leadership, of which number three on the list is to “Project power despite anti-access/area denial challenges.” The CCJO further identifies key implications for the future force in maneuver and mobility. Here it was recognized that “improved cost-effective strategic and operational mobility is required to be successful on the modern battlefield.”¹⁴ Cost effective measures will not be gained in the air given the fiscal costs of development, construction, and maintenance as well as load restrictions for aircraft. The Joint solution for the ship to shore link must come from watercraft. To meet the Joint Chiefs’ concept requirements, the military needs a vastly more capable platform than currently exists in the inventory, and it needs it now.

¹² United States. 2007. *Sea basing and alternatives for deploying and sustaining ground combat forces*. [Washington, D.C.]: Congress of the U.S., Congressional Budget Office, p. 3. <http://books.google.com/books?id=zeyKh4sdR5cC>.

¹³ Doug King, Col USMC (ret), Director Ellis Group presentation, “*How We Operate and Fight in the Littorals*.” ONR Focus Area Forum: “Expeditionary warfare: Littoral Maneuver.” <http://131.250.64.143/sitecore/shell/-/media/Files/Conferences/FAF-Expeditionary/4--Doug-King-How-we-Operate-Final.ashx>

¹⁴ Capstone Concept for Joint Operations: Joint Force 2020. Combined Joint Chiefs of Staff, 10 September 2012, p. 1.

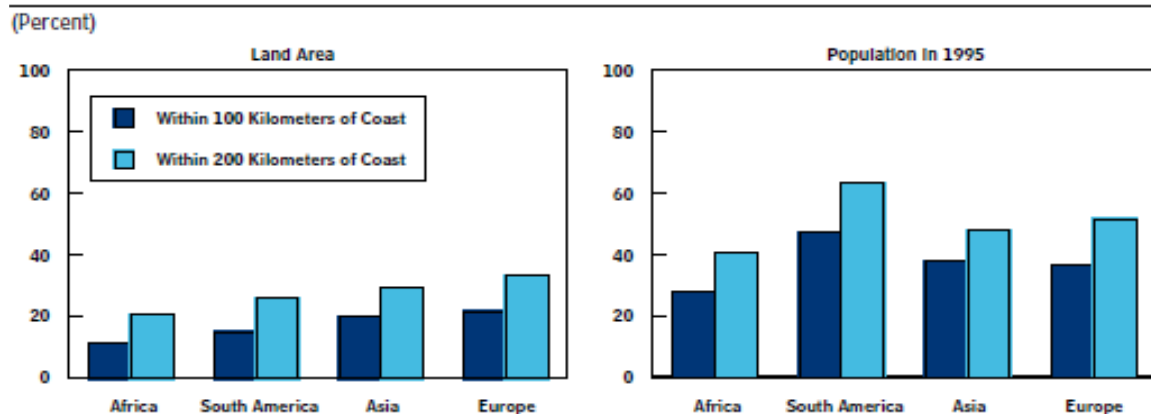
Finally, the Department of Defense codified the needs of the new Navy/Marine concept in its Joint Operational Access Concept in 2012. The JCS direct for “Joint forces to sustain themselves via sea-bases, which increases employment options by decreasing reliance on airfields and other ashore sustainment infrastructure. [Furthermore], large-scale distribution from a sea-base will require *new capabilities and capacities*. Ship-to-ship and ship-to-shore connectors will be required for the configuration and distribution of a broad variety of sustainment packages, under challenging sea states and in support of continuous sustainment demands.”¹⁵ Clearly there is a demand for a new capability to link the Joint and Services’ concepts and take them to reality.

ANALYSIS OF OPERATING ENVIRONMENT

A Congressional Budget Office (CBO) study conducted in 2007 found that “85 percent of the world’s nations are not landlocked and therefore would be accessible to sea-based power projection.”¹⁶ Additionally, “an average of about 38 percent of the global

Figure 1.

Worldwide Proximity of Land Area and Population to the Seas



Source: Congressional Budget Office based on Population, Landscape, and Climate Estimates (PLACE) data from Columbia University's Socioeconomic Data and Applications Center.

¹⁵ U.S. Department of Defense, *Joint Operational Access Concept (JOAC)* (Washington, DC: U.S. Department of Defense, January 17, 2012), p. 2.

¹⁶ United States. 2007. *Sea basing and alternatives for deploying and sustaining ground combat forces*. [Washington, D.C.]: Congress of the U.S., Congressional Budget Office, p. xiii. <http://books.google.com/books?id=zeyKh4sdR5cC>.

population in 1995 lived on the 20 percent of land within 100 km of a coast.”¹⁷ Given that wars are by nature human endeavors, the sea offers an ideal domain to reach and effect a large portion of the global population (see Figure 1).

An Army port study in 2003 evaluated 282 ports in 26 countries throughout the Central Command (CENTCOM) and Pacific Command (PACOM) Areas of Responsibility (AORs). The study determined only 71 ports, or 27 percent, can accommodate the Large Medium Speed Roll-on/Roll-off (LMSR) ships that transport much of U.S. combat vehicles.¹⁸ Clearly, simple access to ashore infrastructure is not a guarantee that the Joint Force can project ashore to reach objectives inland. When the anticipated non-permissive environment is considered in association with forced entry operations it is critical that the military maintain an ability to move combat power from ship to shore in a rapid and flexible manner. This will provide the Joint Force Commander the most options for mission accomplishment.

The necessity of force projection capabilities to support U.S. strategy is clear. With the pervasiveness of sea access established, the question becomes one of capability employment. The single greatest limiting factor, outside the military’s control, in conducting ship to shore operations is the sea state. Based on the Beaufort Scale, Joint Logistics Over-the-Shore (JLOTS) operations are degraded in sea state 2 and must stop in sea state 3.¹⁹ As shown in Figure 2, sea state conditions limit active JLOTS to roughly 18 of 24 hours a day. The direct effect being longer time to assemble forces ashore. This dependence on weather

¹⁷ Ibid. p. 28.

¹⁸ U.S. Department of the Army, *Quick Reaction Requirements Analysis For The Theater Support Vessel (TSV)* (Washington DC: U.S. Department of the Army, April 4, 2003), 1.

¹⁹ Peter Theade. “Joint Logistics Over the Shore – An Assessment of the Capabilities.” Logistics Management Institute, September 1995, accessed 18 April 2017. p. 2-12. www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA312510

makes landings more predictable based on the global region of operation. Opponents could thus determine the U.S. military response options with reasonable accuracy based on current capabilities and seasonal weather. Watercraft that can operate effectively in higher sea states give the Joint Force Commander back time and increase the burden on opponents to counter U.S. force projection.

Figure 2. Sea State Averages based on 1995 CINC AORs.

Region	Percent of time SS0 – SS1	Percent of time SS2	Percent of time SS3 and above
CINC 1	40	20	40
CINC 2	48	14	38
CINC 3	57	13	30
CINC 4	60	16	24
CINC 5	53	17	30

Source: JLOTS-An Assessment of Capabilities. Theade, Peter, Logistics Management Institute, September 1995.

Lastly, one of the most constraining elements of the current operating environment is fiscal concerns. However, unlike the much more expensive air operations that have been utilized to great extent in Afghanistan, sea-based operations are extremely cost effective. The same CBO study found that of multiple alternatives studied, sea-based operations from an

Figure 3.

Costs of the Alternative Systems Examined by CBO

Alternative	Cost (Billions of fiscal year 2008 dollars)		Difference Between Low and High Estimates
	Low	High	
S1: Sustainment-Only Sea Base with Existing Aircraft	10	14	Addition of two high-speed ships
S2: Sustainment-Only Sea Base with Longer-Range Aircraft	13	20	Uncertainty in cost of long-range rotorcraft and new aviation ship
S3: Sustainment by Airdrop	3.8	4.8	Cost to restart C-17 production line
S4: Sustainment by Airship	5	7	Uncertainty in cost of hybrid airship
E1: Planned Maritime Prepositioning Force (Future)	15	22	Addition of two high-speed ships; purchase of LHD aviation ship instead of transfer from existing force
E2: Sea Base with Longer-Range Aircraft	31	39	Addition of two high-speed ships; uncertainty in cost of long-range rotorcraft and new aviation ship
E3: Amphibious Task Force with Sea-Based Logistics	1.8	2.0	Potential shipbuilding cost growth
E4: Employment and Sustainment by Airship	12	18	Uncertainty in cost of hybrid airship

Source: Congressional Budget Office.

amphibious task force are the cheapest means of sustaining a ground force. When combined with the lower operational and maintenance costs for watercraft vice aircraft, the case for modernizing the Joint Force watercraft fleet becomes clear. When watercraft are analyzed against historic successes, future operating concept demands, the anticipated operating environment, and current fiscal restraints it is increasingly obvious and urgent that this capability be modernized immediately.

ANALYSIS OF LCM-8/LCU-1600s VS. MSV-L

The Landing Craft Mechanized (LCM) entered service in 1967. The LCM reached the end of its Economic Useful Life (EUL) in 1992 after multiple extensions otherwise known as service life extension programs (SLEP). Fifteen years later the “Mike Boat,” as it is known in some circles, is still a critical component to the Joint Force ship to shore power projection with over 60 vessels in inventory. The LCM is limited by environmental conditions, only able to conduct operations in sea state 2 or less. With 135 nautical mile (NM) range, a maximum speed of 9 knots when laden with a maximum load of 75 tons (less

than the weight of main battle tank), and a draft of 5 feet the LCM greatly limits the Joint Force Commander's options in an increased threat environment.²⁰

The Landing Craft Utility-1600 series (LCU) is another similar vessel to the LCM. Larger and capable of greater range and payload, the LCU is still greatly hampered in its operational capabilities by its speed. While the Army has retired all its LCU-1600s, a total of thirty-eight 1610, 1627, and 1646 class LCUs are still operated in Navy Assault Craft Units as of 2000.²¹ The LCU can carry a two main battle tanks at 11 knots. While both the LCM and the LCU have the range to operate over the horizon, as future Navy/Marine sea-basing concept would dictate, their speed renders them impractical for such operations. It would take either vessel over 2 hours to travel from over the horizon to the objective on a one-way trip, much too slow to rapidly project combat power ashore or sustain multiple lifts from the sea-base.

The Maneuver Support Vessel-Light (MSV-L), the Army's planned replacement for the LCM, will fundamentally change the way in which the Services conduct watercraft operations. The Army's request for information (RFI) was put out to the commercial community in the spring of 2015 in recognition of the need to replace the current fleet of 44 Army LCMs. Designed to achieve greater maneuverability; the improved payload, protection, and performance characteristics of the MSV-L will deliver more combat power at double the speed and range of the current LCM. Front and rear ramps for drive-through operations will speed loading and unloading. Just as critical will be the MSV-L's ability to operate in higher sea states and shallower shores. Key attributes request for survivability in

²⁰ Request for Information (RFI) For Maneuver Support Vessel (Light) (MSV(L) As Replace for the Landing Craft Mechanized (LCM-8), U.S. Army Contracting Command, 15 April 2014, accessed 18 April 2017, p. 2. <https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=8bc7151dd2b1d1321fa848dea6924caa>

²¹ Jane's Fighting Ships, 1999-2000, 102nd ed., Ed. by Captain Richard Sharpe, OBE, RN, (Frome and London, UK: Butler & Tanner Limited, 1999), p. 828.

sea state 7 and operability in sea state 3 with an operational draft of 2-4 feet.²² The newest watercraft to the Joint Force would thus deliver more than twice the combat power ashore in the same amount of time as the LCM. The MSV-L will also complete that mission in more demanding sea conditions to a wider range beach options from a sea-base over the horizon from enemy observers. The US forces would thus be much harder to locate, will move faster, and can operate in a wider range of littoral areas. This capability will greatly complicate the tasks for the defender's anti-access/area denial operations. All these threats will force opponents to spread forces even thinner or to surrender the initiative at the shore.

The Army plans to acquire its first MSV-Ls in 2019. However, the contract has yet to be awarded. With a planned production of 36 vessels by 2025 the Army will need to look at commercial industry options that can be translated into functional platforms for the Joint Force in a rapid manner if it intends to support its stated timeline. The watercraft capabilities required by the Joint and Service concepts are achievable now. One such platform already exists and could be procured immediately to address the shortfalls of the LCM fleet and fill the Army's proposed MSV-L as currently designed. The L-CAT, built by the French company CNIM, submitted just such a proposal to the Army in 2016 to build the L-CAT as the MSV-L. The L-CAT has been in operation with the French Navy since 2011 and more recently with Egyptian Navy. At \$16 million each²³ this modern vessel can travel at 30 knots over 700 NM and operate in sea state 5 when unladen. When laden with a main battle tank (80 Tons) the L-CAT can still travel 500 NM at 18 knots and land in waters under three and

²² Ibid. p. 4-10.

²³ Michael P. D'Alessandro, M.D. "French Navy – Shape Shifting Ship." NOSI – Naval Open Source Intelligence, Defense Technology International, June 28, 2011, accessed 27 April 2017. <https://nosi.org/2011/06/28/french-navy-shape-shifting-ship/>

half feet deep in addition to being compatible with the well-deck for NATO amphibious ships.²⁴

Commercially available off-the-shelf (COTS) options like the L-CAT offer cost effective, rapid equipping options with little research and development time along with a proven track record of operability in the real world as opposed to military designed and developed platforms. For example, the final unit cost for each MV-22 Osprey is \$66 million²⁵ and the operating cost is \$11,000 per hour²⁶ to move twenty Marines, or 4 tons of cargo,²⁷ from ship to objective. Additionally, this “over-the-shore” platform took 13 years to move from design and development to testing²⁸, and another 8 years to be operationally deployed.²⁹ As the Joint Force moves forward with modernizing the watercraft fleet in support of power projection the focus should be on quick and timely equipping of forces. COTS such as the L-CAT provide options for upgrading Joint Force capability now, not two or twenty years from now. Commercial industry and COTS enable the Army and Navy to both immediately modernize the smallest vessels of the ship to shore fleet and vastly increase their capabilities for little cost when compared to the military design/procure options like the MV-22 Osprey.

Lift capacity is what makes sea transport so attractive. Currently there is not a rotary aircraft capable of moving the heavy combat equipment for ground forces to shore. Moving one main battle tank by fixed wing aircraft demands advanced ashore infrastructure and

²⁴ L-CAT: Ship to Shore Connector. CNIM Group, 2016. Accessed 18 April 2017. <https://cnim.com/en/businesses/defense-security-and-digital-intelligence/l-cat-ship-shore>

²⁵ Office of the Secretary of Defense. DOT&E FY1999 Annual Report, Navy Program, V-22 Osprey. Accessed 27 April 2016, p. IV-173. <http://www.dote.osd.mil/pub/reports/FY1999/pdf/navy/99v22.pdf>

²⁶ Michael J. Sullivan, Director Acquisition and Sourcing Management. Testimony to Committee on Oversight and Government Reform, House of Representatives. “V-22 OSPREY AIRCRAFT Assessments Needed to Address Operational and Cost Concerns to Define Future Investments.” GAO Report, June 23, 2009, accessed 27 April 2017, p. 9.

²⁷ Ibid, p. 6.

²⁸ Office of the Secretary of Defense. DOT&E FY1999 Annual Report, Navy Program, V-22 Osprey. Accessed 27 April 2016, p. IV-175. <http://www.dote.osd.mil/pub/reports/FY1999/pdf/navy/99v22.pdf>

²⁹ Christian Lowe. “Osprey to Deploy to Iraq.” Military.com, 16 April 2007. Accessed 27 April 2017. <http://www.military.com/NewsContent/0,13319,132181,00.html>

exponential cost, while watercraft can move multiple tanks rapidly to any shore of sufficient gradient. The second half of the Maneuver Support Vessel family requirement addresses the combat power quantity shortfall. The MSV-Heavy variant is intended to replace the Army Logistics Support Vessel (LSV) and the Army Landing Craft Utility-2000, but the MSV-H RFI has not yet been forwarded to industry. The current heavy support vessels can move between 5 (LCU-2000) and 24 (LSV) main battle tanks from ship to shore, but again too slowly to support the sea-basing concept.³⁰ If MSV-H procurement matches MSV-L then the Army watercraft fleet will not be seeing any new heavy landing craft variants until 2021 at the earliest, unless the Joint Force departs from the current time-consuming acquisition process. With the MSV-H Analysis of Alternatives (AoA) not even scheduled until 2019, the Army LCU fleet will be over 30 years old with the LSVs just 5 years behind that.³¹ The MSV-H is the critical next step in modernizing the ship to shore connectors so that commanders can mass overwhelming combat power on the shore quickly and exploit the flexibility and speed advantages that sea-basing provides. Both platforms are required now to provide the Joint Force the ability to control the balance of combat power in contested environments. Through COTS, the Joint Force can quickly fulfill requirements that will change the characteristic of ship to shore operations in the future.

CONCLUSION

The ability to send forces around the globe to enforce US policy is a critical part of the Nation's survivability and essential to the protection of its interests. The necessity of those forces to move over water is dictated by the financial burden of maintaining a global

³⁰ Christopher J. Pehrson. "Bare Beach Logistics Over-the-Shore: An Outdated Concept?" Master's Thesis, Air Force Institute of Technology, 2000. Accessed March 15, 2017. Appendix B. <http://www.dtic.mil/dtic/tr/fulltext/u2/a430857.pdf>

³¹ Pat Plotkowski, NDIA TWV Conference. "Project Manager Transportation Systems, 26 August 2015.

presence. No one will argue that a boat can move as fast as a plane, but the costs are orders of magnitude greater in the sky while the capacity is orders of magnitude smaller. It is through the usage of the global commons, the sea, that America will project power into the future and at a lower cost. The US must not only maintain its ship to shore capabilities, but modernize them to be a threat to our opponents in the future. With long-range, fast watercraft capable of conducting ship to shore operations America can ensure that the decision on land will be decided in its favor.

In this uncertain and fiscally constrained environment the military cannot have all the capabilities in all the quantities desired. By prioritizing those capabilities that are key to supporting national strategy the US military will be best prepared to confront future challenges. The modernization of the Joint Force watercraft through the Maneuver Support Vessel is just such a program to allocate resources towards. At low cost, both the Army and the Navy/Marine forces will gain force enabling platforms that increase their ability to achieve effects on the battlefield. By ensuring that this modernization is a Joint Force endeavor the DOD will simplify acquisition, smooth supply chain management for maintenance, and increase platform familiarity across the Services.

The military must, “go to war with the Army you have... not the Army you might want or wish to have at a later time.”³² Secretary Rumsfeld may have received criticism from the media for this “insensitive” response to the Soldier’s question, however he was, and is, absolutely correct. Military troops take time to train, equipment takes even longer to develop, test, and field in sufficient quantities. No operational factors should ever be wasted, time most of all. Making it even more essential that the US military invest in capabilities like the

³² Donald H. Rumsfeld, then Secretary of Defense’s town hall meeting with Soldiers at Camp Buehring in Kuwait, Dec. 8, 2004.

MSV-L and H now. Deferring development and acquisition of key systems will only further reduce our competitive advantage over our opponents. The US military's greatest deterrent ability comes from its capabilities that stop opponents before they act. As U.S. capabilities deteriorate its enemies will become emboldened. If the US plans to maintain its position as a global hegemon then it must invest in capabilities such as the Maneuver Support Vessel that will enable the military to come to grips with the enemy wherever he is.

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APPENDIX A – Watercraft

Information contained in this appendix is compiled from multiple sources including; Joint Pub 4-01.6, the U.S. Army Watercraft Master Plan, Pat Plotkowski, NDIA TWV Conference. “Project Manager Transportation Systems, Pehrson, Christopher J. “Bare Beach Logistics Over-the-Shore: An Outdated Concept?” Master’s Thesis, and CNIM.com.

Landing Craft, Mechanized (LCM-8)



Mission: Transport cargo, troops, and vehicles from ship to shore in areas that cannot be reached by ocean-going vessels. Also, used as a lighter in harbor and inland waterways.

Owning Service:	Army and Navy
Number Possessed:	Army – 36 (9 AC/9 RC/18 APS); Navy - 26
Transportability:	Deck loaded on commercial ship or float-on/float-off ship
Cruising Range:	270 nautical miles loaded
Length:	74 feet
Beam:	21 feet
Draft (Full Load):	4 feet forward, 5 feet aft
Speed (Full Load):	9 knots
Crew:	5
Cargo Capacity:	60 short tons with 620 square feet of deck area (75 tons overload capacity)
Typical Loads:	1 light tracked vehicle, or 1 wheeled vehicle, or 1 twenty-foot container

Landing Craft, Utility (LCU-1600)



Mission: Transport cargo, troops, and vehicles from ship to shore in areas that cannot be reached by ocean-going vessels. Also, used for lighterage and utility work in harbors and inland waterways.

Owning Service:	Navy
Number Possessed:	Navy - 38
Transportability:	Amphibious ships, deck loaded on commercial ships, heavy lift, or float-on/float-off ships
Cruising Range:	1,200 nautical miles
Length:	135 feet
Beam:	29 feet
Draft (Full Load):	3 feet forward, 6.5 feet aft
Speed (Full Load):	11 knots
Crew:	12
Cargo Capacity:	170 short tons with 1,800 square feet of deck area
Typical Loads:	2 M1A1 main battle tanks, or 4 wheeled vehicles, or 3 forty-foot containers (single stacked) 4 twenty-foot containers (single stacked)
NOTE:	Containers can be stacked two high in intracoastal transport role, thus doubling the number carried

Landing Craft, Air Cushioned (LCAC)



Mission: Rapid transport of cargo, troops, and vehicles directly onto the shore in amphibious operations.

Owning Service:	Navy
Number Possessed:	89
Transportability:	Navy amphibious ship or commercial barge ship
Cruising Range:	110 nautical miles loaded
Length:	88 feet
Beam:	47 feet
Draft (Full Load):	N/A (LCAC is a hovercraft that drives directly onto beach)
Speed (Full Load):	40 knots
Crew:	5
Cargo Capacity:	65 short tons with 1,900 square feet of deck area
Typical Loads:	1 M1A1 tank and 3 HMMWV, or 4 trucks and 3 HMMWV, or 9 HMMWV

Landing Craft, Utility (LCU-2000)



Mission: Transport cargo from strategic sealift ship to shore in areas that cannot be reached by ocean-going vessels. Also operates in coastal and inland waterways.

Owning Service:	Army
Number Possessed:	34
Transportability:	Self-deploy; however, preferred method is heavy lift or float on/float-off ship
Cruising Range:	4,500 nautical miles
Length:	175 feet
Beam:	42 feet
Draft (Full Load):	5 feet forward, 9 feet aft
Speed (Full Load):	11 knots
Crew:	12
Cargo Capacity:	350 short tons with 2,500 square feet of deck area
Typical Loads:	5 M1A1 main battle tanks, or 13 wheeled vehicles, or 2 forty-foot containers (single stacked) 7 twenty-foot containers (single stacked)
NOTE:	Containers can be stacked two high in intracoastal transport role, thus doubling the number carried.

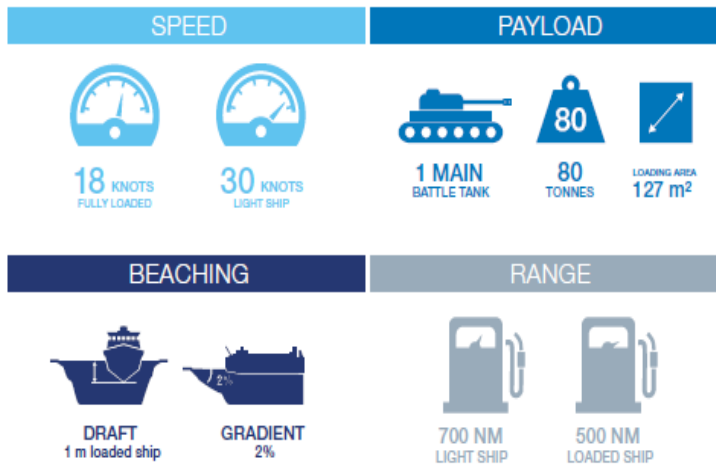
Logistics Support Vessel (LSV)



Mission: Transport cargo in ocean, coastal, and inland waterways

Owning Service:	Army
Number Possessed:	6
Transportability:	Self-deploy
Cruising Range:	8,200 nautical miles empty; 5,500 nautical miles loaded
Length:	273 feet
Beam:	60 feet
Draft (Full Load):	12 feet forward, 16 feet aft
Speed (Full Load):	12 knots
Crew:	29
Cargo Capacity:	2,000 short tons with 10,500 square feet of deck area
Typical Loads:	24 M1A1 main battle tanks, or 50 wheeled vehicles, or 15 forty-foot containers (single stacked) 25 twenty-foot containers (single stacked)
NOTE:	Containers can be stacked two high in intracoastal transport role, thus doubling the number carried.

L-CAT (French Navy built by CNIM)



MAIN DIMENSIONS

Designer / Contractor.....CNIM
 Length overall.....30 m / 98 ft
 Beam overall.....12.60 m / 41.3 ft
 Depth (to main deck).....4 m / 13 ft

DRAFTS

Lightship catamaran.....1.8 m / 5.9 ft
 Lightship landing.....0.8 m / 2.5 ft
 Fully loaded catamaran.....2.4 m / 7.9 ft
 Fully loaded landing.....1 m / 3.37 ft

PROPULSION

4 x High Speed Diesel Engines
 4 x Waterjets

CAPACITIES

Fuel.....22 m³
 Crew.....4 - 8 pers
 Trained personnel.....40 pers
 Container loading.....4 KC20'

CLASS & SERVICE NOTATIONS

- Certified by Bureau Veritas
- HULL
- MACH

Special Service
 Unrestricted navigation: Operating area notation: Significant wave < 4 m (Sea State 5 Nato)
 • ALM