# REPORT DOCUMENTATION PAGE

*Form Approved*
*OMB No. 0704-0188*



| 1. REPORT DATE *(DD-MM-YYYY)* | 2. REPORT TYPE | 3. DATES COVERED *(From - To)* |
|---|---|---|
| 05/10/2016 | Master's Thesis | SEP 20156- MAY 2017 |

**4. TITLE AND SUBTITLE**
The Tyranny of Distance, The Cost of HWS, and an Unattained Capability: Naval Maneuver as a Naval Service Problem.

**5a. CONTRACT NUMBER**
N/A

**5b. GRANT NUMBER**
N/A

**5c. PROGRAM ELEMENT NUMBER**
N/A

**6. AUTHOR(S)**
Moore, Wilson M., Major, USMC

**5d. PROJECT NUMBER**
N/A

**5e. TASK NUMBER**
N/A

**5f. WORK UNIT NUMBER**
N/A

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
USMC Command and Staff College
Marine Corps University
2076 South Street
Quantico, VA 22134-5068

**8. PERFORMING ORGANIZATION REPORT NUMBER**
N/A

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)**

**10. SPONSOR/MONITOR'S ACRONYM(S)**

**11. SPONSOR/MONITOR'S REPORT NUMBER(S)**
N/A

**12. DISTRIBUTION/AVAILABILITY STATEMENT**
Approved for public release, distribution unlimited.

**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT**
Littoral maneuver is a naval service problem that requires a naval service solution and one in which the Marine Corps cannot and should not shoulder on its own by developing a high water speed surface assault capability. A surface maneuver capability is vital for the Navy and Marine Corps and it has been the most seemingly difficult capability to evolve compared to other functions of warfighting. This paper documents the factors that lead to the Marine Corps requirement for a HWS amphibious vehicle. It theorizes that the Corps should depart from its trajectory toward a HWS amphibian in favor of Naval Service solution to surface mobility in the form of HWS surface connectors.

**15. SUBJECT TERMS**
Naval Maneuver; Littoral Maneuver; High Water Speed; Surface Connectors.

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | USMC Command and Staff College |
| | | | | | 19b. TELEPHONE NUMBER *(Include area code)* |
| Unclass | Unclass | Unclass | UU | 34 | (703) 784-3330 (Admin Office) |

*United States Marine Corps*
*Command and Staff College*
*Marine Corps University*
*2076 South Street*
*Marine Corps Combat Development Command*
*Quantico, Virginia 22134-5068*

MASTER OF MILITARY STUDIES

---

**TITLE:**

# THE TYRANNY OF DISTANCE, THE COST OF HIGH WATER SPEED, AND AN UNATTAINED CAPABILITY: NAVAL MANEUVER AS A NAVAL SERVICE PROBLEM

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

**AUTHOR:**

Major Wilson M. Moore, United States Marine Corps

AY 16-17

---

Mentor and Oral Defense Committee Member: J.W. Borden
Approved:
Date: 5/10/17

Oral Defense Committee Member:
Approved:
Date: 5/10/17

Nathan Packard
5/10/17

## Executive Summary

**Title:** The Tyranny of Distance, the Cost of High Water Speed, and an Unattained Capability: Naval Maneuver as a Naval Service Problem.

**Author:** Major Wilson M. Moore, United States Marine Corps

**Thesis:** Littoral maneuver is a naval service problem that requires a naval service solution and one in which the Marine Corps cannot and should not shoulder on its own by developing a high water speed surface assault capability.

**Discussion:** As equal partners in the amphibious task force (ATF), the Navy and Marine Corps' synergy is intrinsic to its success through the planning, embarkation, rehearsal, movement, and action (PERMA) phases. A surface maneuver capability is vital for the Navy and Marine Corps and it has been the most seemingly difficult capability to evolve compared to other functions of warfighting. Through decades of attempts at HWS, the Corps has been unable to attain it. Size, complexity, high financial cost, and unfeasible capability trade-offs halted progress. The need for HWS has been clear and present since the end of WW II, though the reasons for the need have evolved with technology and conceptual advances.

**Conclusions:** Presently, the Marine Corps is in a heuristic environment poised for change and adaptation in order to remain relevant in future conflicts and ready to fight and win. Improving naval and littoral maneuver is an identified critical task. The Marine Corps is developing an Amphibious Combat Vehicle capable of operating quite well on land, where it will spend 70 percent of its mission. The Marine Corps should depart from its trajectory of developing of a HWS amphibian. High water speed connectors are the most viable solution for the naval service to meet its surface mobility requirement in the littorals and should be pursued by the Navy Marine Corps Team.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

## *Illustrations*



## *Tables*

## *Table of Contents*

***Page***

## *Preface*

The Marine Corps has chased a high water speed amphibious vehicle for decades. My intention in addressing this topic was to examine the Corps requirement for HWS, the decisions that lead to the Corps' self-imposed requirement, and why it should disassociate itself with a high water speed amphibian. My intent was also to research viable options for the Navy Marine Corps Team to pursue a high water speed vessel.

I convey my sincere thanks to Maj Joel Ashinhurst, USMC (ret), Col John Atkinson USMC, Col Kirk Mullins USMC, and MGySgt Don Hart for their advice and guidance. Thanks to Colonel Doug King, USMC (ret) and the Ellis Group for their research suggestions. Special thanks to my advisors, Dr. J.W. Gordon and LtCol Owen Nucci for their mentoring and wisdom. Thank you to my fellow officers of Conference Group 12 for your friendship and enlightened conversation. Sincere thanks to the Marines and Sailors of the Assault Amphibian Community, I'm honored to have served with you. Finally, I extend my heartfelt thanks and love to my family;  Kara, Davis, Leila, Wade, and Max for their support.

## Introduction and Thesis

The Marine Corps' ability to maneuver in the littorals and conduct amphibious operations at times and places of its choosing is absolutely vital to its success as a warfigting institution. This capability is critical in the present and will be paramount in the future operating environment envisioned in *The Marine Corps Operating Concept*. Access denied environments characterized by mines, long range anti-ship missiles, swarm boats, waterborne IEDs, unmanned aerial and subsurface vehicles will impose daunting challenges to the Navy and Marine Corps' ability to conduct forcible entry from the sea. The *Operating Concept* addresses littoral maneuver capability as a critical task and specifically states that we have not been successful regarding the development of surface maneuver capabilities. Acquiring a high-water speed surface assault capability has been a significant theme for the Marine Corps' ability to use the sea as maneuver space, especially in the emerging complex contested environments. The Corps has chased a high-water speed vehicle for decades to meet a self-imposed demand. Thus far, the Marine Corps has been unwilling to sacrifice the crucial capabilities required for armored mobility protection to meet the strict technical demands of a high water speed amphibian.

As equal partners in the amphibious task force (ATF), the Navy and Marine Corps' synergy is intrinsic to its success through the planning, embarkation, rehearsal, movement, and action (PERMA) phases. The forecasted threats associated with contested environments will necessitate the ATF to readdress the roles and responsibilities of the amphibious force and the landing force; especially in the movement and action phases. Movement, setting conditions for the assault, conduct of the assault, and follow on actions comprise littoral maneuver. Littoral maneuver is a naval service problem that requires a naval service solution and one in which the

Marine Corps cannot and should not shoulder on its own by developing a high water speed surface assault capability.

This paper will examine the naval concept of littoral maneuver through the *MCOC*, subordinate documents, and concepts that forecast the future operating environment and how the Navy Marine Corps plan to achieve maneuver in the littorals. It will address how the evolving character of warfare, new technology, and new capabilities drove the necessity for high water speed; and why the Marine Corps solely took on the responsibility. The paper will argue that a high water speed amphibious vehicle is neither feasible nor necessary for the naval service to counter the anti-access area denial (A2/AD) threat and offer alternatives allowing the service to fight its way closer to the littorals using combined arms and emerging technologies.

## Framing the Problem

### The Marine Corps Operational Concept

The *MCOC*, and *Expeditionary Force 21* (EF 21) which preceded it , both describe the future operating environment and how the Marine Corps intends to organize itself and operate in a future characterized by "volatility, instability, and complexity."[1] The concepts differ in significant ways in regard to their intent, context, and approach to addressing the how the Marine Corps will overcome the challenges of the future operating environment. *Expeditionary Force 21* put forth, as General Amos wrote a vision and actionable plan to shape and guide our capability and capacity decisions. There was also a deliberate emphasis on capitalizing on the expeditionary nature of the Marine Corps. As outlined in *EF 21*, the concept would be readdressed regularly.

Published in September of 2016, the *MCOC* addresses the future security environment but also boldly states the central problem facing the Corps and outlines critical tasks that must be accomplished in order to meet solutions to the problem through an emphasis on maneuver

warfare in every dimension and combined arms in every domain.[2] The central problem being that the Marine Corps is not organized, trained, and equipped to meet the demands of a future operating environment characterized by complex terrain, technology proliferation, information warfare, the need to shift and exploit signatures, and an increasingly non-permissive maritime domain.[3] Both concepts address building upon proven concepts such as *Operational Maneuver from the Sea, Ship to Shore Objective Maneuver*, and *Sea Basing*. The *MCOC*'s efficacy is that it states clearly that the Marine Corps does not have solutions to its central problem but identifies focus areas and critical tasks to be accomplished in order meet future security challenges through maneuver warfare and combined arms.

**The A2/AD Threat**

To further understand the context it is useful to briefly examine the anti-access/area denial (A2/AD) capabilities envisioned and the functional concepts the *MCOC* refers to and how the renewed emphasis on maneuver warfare and combined arms has emerged particularly in terms littoral maneuver. There is also utility in examining the subordinate operating concepts currently under development; *Littoral Operations in a Contested Environment* and *Expeditionary Advance Base Operations*.

Anti-access/Area Denial is not a new notion. In his 2013 book on anti-access warfare, Same J. Tangredi submits that anti-access and area denial are modern terms and strategic challenges but constitute an ancient concept.[4] They are techniques of strategy used throughout military history and are historical components of grand strategy.[5] In its most simple form, an A2/AD strategy can be likened to an area defense; more specifically, defense in depth. It is defense in depth layered with sophisticated weapons systems paired with increased range capability. To illustrate this point, compare and contrast a defense in depth to the predicted anti-

access and area denial capabilities U.S. forces will encounter. Field Manual 3-90 characterizes the defense in depth in a number of ways. Forces defending in depth absorb the momentum of the enemy's attack by forcing him to attack repeatedly through mutually supporting positions in depth.[6] Depth gives the commander's fire support assets time to generate devastating effects and affords him multiple opportunities to concentrate the effects of overwhelming combat power against the attacking enemy.[7] The defense in depth allows more reaction time for a counter attack and is used when the enemy has the capability to employ large quantities of precision-guided munitions or weapons of mass destruction. The defense in depth is used when terrain does not favor a defense well forward or the AO is deep compared to its width, and the enemy has several times the combat power of the defender. Anticipated A2/AD capabilities are expected to be layered integrated defenses. Theatre ballistic missiles and submarines will provide significant threat to the ATF while deploying to the operating area. The next ring will consist of anti-ship ballistic missiles and surface combatants as anti-access threats. Area-denial threats will consist of fixed wing aircraft and advanced anti-ship cruise missiles. As the ATF moves closer to the littoral objective attack boats, surface to air missiles, rotary wing, UAV/USVs will be employed to canalize the ATF. Guided Rockets, Artillery, Mortars, and Missiles (G-RAMM) as well as naval mines will attempt to provide devastating effects where ground forces, anti-aircraft weapon systems and artillery will counter attack remaining landing forces.

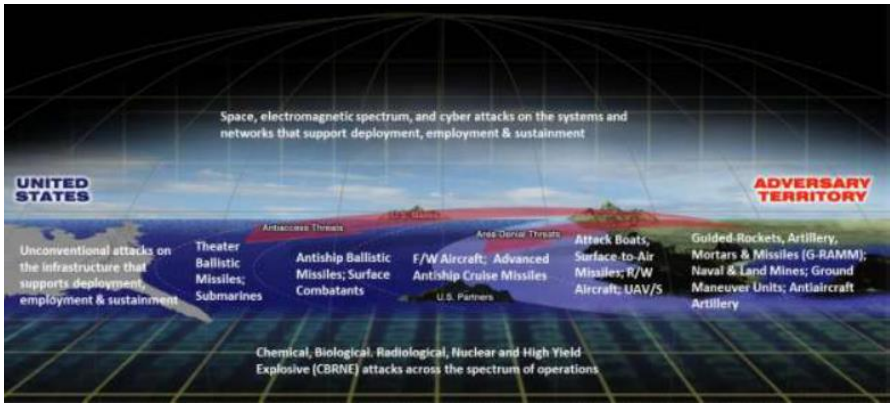

**Figure 1**

**The Joint Operational Access Concept**

However, the U. S. military conceptual foundations of A2/AD are relatively new. The *Joint Operational Access Concept* was published in January of 2012. The JOAC attributed three emerging trends in the US Military's operating environment that necessitated the priority of focus of countering the A2/AD threat.[8] They were: the dramatic improvement and proliferation of weapons and other technologies capable of denying access to or freedom of action within an operational area; the changing U. S. overseas posture; and the emergence of space and cyberspace as increasingly important and contested domains. [9] For further useful context the JOAC provided definitions for the terms *operational access, assured access, antiaccess, area-denial,* and *forcible entry* that would come to be commonly used phrases throughout the DOD. It is important not to blur *operational* and *assured access*. Operational access is the ability to project military force into and operational area with sufficient freedom of action to accomplish the mission.[10] The JOAC states operational access serves broader strategic goals, whether to ensure strategic access to commerce, demonstrate U.S. resolve by positioning forces overseas to manage crisis and prevent war, or defeat an enemy in war.[11] Per the JOAC, *anti-access* is defined as: those actions and capabilities, usually long range, designed to prevent an opposing force from entering an operational area.[12] *Area-denial* is considered those actions and capabilities usually of shorter range, designed not to keep an opposing force out, but to limit is freedom of action within an operational area.[13] Establishing operational access may require *forcible entry*, the projection of the land forces onto hostile territory in the face of armed opposition.

The *Joint Operating Environment 2010* and multiple documents since then have characterized the future operating environment by complexity, uncertainty, and rapid change

with contested environment techniques practiced by state and non-state actors with technology proliferation. What should we expect tactically and operationally from an A2/AD environment? The JOAC projected anti-access capabilities to include: a wide variety of surface, air, and submarine-launched ballistic and cruise missiles to accurately attack forward U.S. bases at ranges exceeding 1000 miles; long –range reconnaissance and surveillance systems that provide necessary targeting information, including satellites, aircraft, land and ship based radar, kinetic and non-kinetic antisatellite weapons that can disable space systems vital to force U.S. protection; submarine forces able to interdict sea lines of communications in both sovereign and international waters; cyber-attack capabilities; terrorists willing to attack U.S. or partner bases and deploying forces even at points of origin; and special operations forces capable of direct action and unconventional warfare in the approaches to the operational area.[14]

The *JOAC* provides for area-denial capabilities that are just as menacing with: air forces and air defense systems, both fixed and mobile designed to deny local U.S. air superiority; shorter-range anti-ship missiles and submarines employing advanced torpedoes to deny U.S maritime superiority in the objective area; precision guided rockets, artillery, missiles, mortars (G-RAMM) designed to attack surface targets, including landing forces, with much greater accuracy and lethality than their "dumb" predecessors; chemical and biological weapons to deny use of selected areas; computer and electronic attack capabilities to degrade, neutralize or destroy U.S. command and control in the operational area; abundant land and naval mines capable of quickly closing straits, land passes, long stretches of coastline, or airfields; armed and explosive-laden small boats and craft in cluttered and restricted coastal waters and straits; land maneuver forces; special operations capable of direct action and unconventional warfare in the objective

area; and unmanned systems, such as unmanned aircraft and unmanned underwater vehicles, which could loiter to provide intelligence collection of fires in the objective area.[15]

The *JOAC* reaffirms multiple times in the document that these anti-access and area denial capabilities will impose risk at increasingly greater ranges with the potential of being attacked while *deploying to* the operational theatre by peer, near-peer, or non-state actors. The situation has grown more ominous in the 5 years since the *JOAC's* publication. Any recent article or professional journal supports and expands on the *MOC'*s forecast for the future operating environment. Forces will face hybrid 5D adversaries with masked signatures that will be distributed in the urban littorals. The U.S. will have to become proficient at operating in a satellite and infrastructure denied or degraded environment. Information warfare will continue to evolve by global communications and social media which the U.S. have to leverage or counter. Parallel to this, each article and journal agree and articulate loudly and clearly that the U.S. will remain in an era of reduced manpower and fiscal austerity. Specifically for the Navy and Marine Corps, this means the naval service will have to rely on innovation and become even more fastidious in its selection of platforms that are affordable, suitable, and resilient with enough capacity for lift. The naval service will also be challenged by amphibious shipping and sea based fire capacities and capabilities. It will be constrained by weight, sustainment, energy, command and control, and maneuver considerations in developing new platforms and countering A2/AD environments.

As mentioned earlier, there are multiple concepts under development that will augment and be subordinate to the *MCOC*. Currently, there is little information available on *Littoral Operations in a Contested Environment* (*LOCE*) and *Expeditionary Advance Base Operations* (*EABO*). Marine Corps Combat Development Command's website offers a precept of each. The

*LOCE* precept states, "The idea is to use littoral maneuver to: gain entry as well as enable persistent operations; to provide freedom of action within the littorals; and/or to seize, secure, and maintain a lodgment. The concept will address the difference between "rolling back" an A2AD threat versus creating gaps/seams by location and/or time that can be exploited through a maneuver warfare approach."[16] The precept goes on to explain how the naval service must "experiment as a littoral maneuver force" which implies a greater capability than that provided by traditional amphibious forces alone, embracing the full power of the whole of naval, Joint, and Combined forces operating in a given littoral area. Other salient points of the precept are to use a holistic approach to protecting the naval force balancing between point/area defense and offensive action and to train with all forces in the littoral fight.[17] The precept for *EABO* is rather brief and explains how units deployed as parts of a MAGTF may find themselves employed as independent, scaled, task-organized forces for missions to seize, establish, and operate multiple, widely-dispersed expeditionary advanced bases.[18] It then provides points for areas where the Marine Corps must improve.[19]

**Naval and Littoral Maneuver as a Critical Task**

The MCOC identifies five critical tasks to guide the Marine Corps efforts in how it organizes, trains, equips, and sustains to operate, fight, and win in the 21st Century. [20] Ultimately, the tasks are calculated to improve the MAGTF's ability to project power through maneuver warfare in contested environments. Two the critical tasks, "Evolving the MAGTF" (6.2) and "Enhance Our Ability to Maneuver" (6.4) are associated directly with the means the MAGTF will use for littoral maneuver. Critical Task 6.2 predicts, "The MAGTF of the future will most likely be composed of some combination of forward-deployed forces, rapidly deployable forces, and land and maritime prepositioning forces."[21] It goes on, "The specific

combination of forces will depend upon, among other things, factors of time, distance, and strategic mobility of resources available."[22] Critical Task 6.4 calls out littoral maneuver as a critical subset of Naval maneuver, it being the ability to transition ready-to-fight combat forces from the sea to shore in order to achieve a position of advantage over the enemy.[23] As amphibious capabilities provide the means to conduct littoral maneuver, the Concept lists five subset tasks to improve littoral maneuver without expressing the requirement for a high water speed surface assault capability.[24] [25]

**The Difficulty of HWS for Naval Maneuver**

From reading the *MCOC* and from what is known of *LOCE* and *EABO* under development, at the very least it can be inferred that the Marine Corps is departing from previous notions of how through maneuver forces get ashore and the conditions that will exist in which to do it. Using a three prong approach for amphibious operations from greater ranges using the MV-22, LCAC, and an 'EFV-like' high-water speed amphibious vehicle is not feasible in the near term. The circumstance of the cancellation of the Expeditionary Fighting Vehicle (EFV) entails a lengthy and detailed explanation. Briefly though, the size, complexity, and high cost of the vehicle were far too great. More practically, the Marine Corps would have had to make sacrifices in trading a high water speed capability in a vehicle for the vehicle's land mobility, lethality, reliability, force protection attributes, fuel efficiency, and potential for growth. Both the monetary and tradable capability cost was too great.

It is true, high-water speed is still a Marine Corps priority and it is looking at ways to leverage science and technology to explore viable options. As *Warfighting* states, speed is a weapon. Speed over time is tempo and speed over distance is the ability to move rapidly, both of these forms generate combat power.[26] The Marine Corps has concluded a high water speed

amphibious vehicle is not feasible. The conclusion is valid for a number of reasons. Affordability aside, had the Corps continued pursuing EFV it would have been the sole procurement mechanism for vehicle that spends over 70 percent of its operational time on land, but would require its armored protection attributes abridged in order to attain a high-water speed capability. Secondly, the high water speed requirement surges vehicle size and weight specifications at a time when embarkation on naval shipping is a major concern. This, therefore begs the question: Why and when did the Marine Corps first opt to pursue a high water speed vehicle amphibious vehicle? Conversely, when and why did the Navy start to increase its operational distance far beyond the horizon?

## The History of the USMC' Pursuit of High Water Speed

### Speed Becomes More Important

The Naval Service as a whole should continue to explore speed in its approach to littoral maneuver. The factors of time and distance have long been critical planning considerations in the Marine Corps amphibious operations, especially so since the use of precision guided munitions and anti-ship missile capabilities have increased. The 1970s predicted the operating environments of the 1990s which required increased standoff distance for amphibious task forces. Lessons learned from the Falklands War where a British amphibious landing ship and several other vessels were damaged or sunk by Argentine aircraft and Exocet missiles emphasized the vulnerability of ships to precision guided munitions. Additionally, a high water speed amphibious assault vehicle was required to close the gap in speed differential that existed between the Landing Vehicle Tracked (LVTP-7) and helicopters. In 1973, the Potomac General Research Group (under contract) conducted an analysis with the purpose of reviewing the conceptual requirements for the Landing Vehicle, Assault (LVA) and its interface with other

surface landing means and capabilities.[27] The report also identified several operational deficiencies chief of which was, “Amphibious Assault operational concepts for the post 1980 time frame require high speed naval assault landing craft, operating from stand-off distances, to be compatible with projected requirements for stand-off vertical assault operations.” [28]The report next stated, “The development of a high speed surface assault landing vehicle, mission oriented to the landing forces requirements, appears to be a matter of priority in order to reduce the current speed differential between the vertical assault and the surface assault means of accomplishment.”[29]

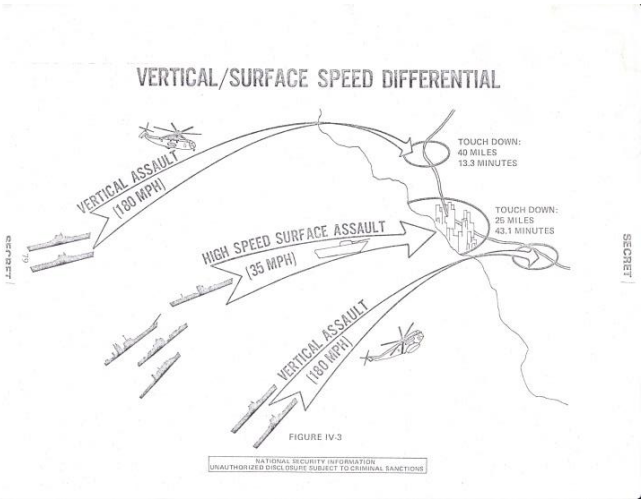


**Figure 2**

In May of 1975, Commandant of the Marine Corps General Robert E. Cushman Jr. approved the Landing Vehicle Assault (LVA) research and development program giving it the highest priority among acquisition programs at the time. [30] Months prior to this, Chief of Naval Operations Admiral James L. Holloway III, stressed to congress that the Navy and Marine Corps would require a standoff distance of about 25 miles for amphibious operations of the future. He stated that this increased distance would reduce task force vulnerability to coastal conventional weapons and missiles while providing greater flexibility for the amphibious assault force.[31]

However in this particular context, Admiral Holloway was advocating for the Landing Craft Air Cushion (LCAC) high water speed capability as being essential in support of this concept. [32] The Marine Corps realized that while the LCAC provided much needed high water speed to mitigate increased distances, the LCAC would be unfeasible for rapid build-up of combat power ashore due to the increased number of sorties, LCACs available, and amphibious ships that would be required to lift a regimental landing team.[33] Thus, the Marine Corps decided to pursue the development of a lightweight, highly mobile assault landing vehicle to replace the LVTP7.[34]

The LVA project was cancelled in 1979. The Commandant at the time, General Louis H. Wilson Jr identified three major areas of concern with respect to the LVA design in a comprehensive review of the program.[35] First, the LVA's high water speed goal required increased space to house the power plant (engine) and water propellers. The vehicle would have been over 30 feet long, 11 feet wide and 11 feet tall. This was determined to be significantly detrimental to survivability on battlefields of the 1990s. Second, the hydrodynamic design of the LVA required retracting and covering the tracks and extending flaps from the vehicle's bow, sides, and stern. This, along with the intricacy of the power plant would be an incredibly complex system and produce an unacceptable maintenance burden in amphibious environments. Finally, at a cost of 330 million in development and 1.4 billion in procurement affordability became a critical concern.[36] The Marine Corps would face the same caliber of issues again in the coming decades.

**The Shift to Maneuver Warfare**

The question was proposed earlier as to why and when the Marine Corps opted to pursue a high water speed vehicle amphibious vehicle. More speed has been a priority since the end of World War II. In the following 40 years, warfare evolved and military practitioners knew

adaption was critical to success. By the 1970s, the Navy and Marine Corps were anticipating what the threat environment would be in the 1990s and beyond. In 1982, the war of the Falkland Islands presented the dilemma sooner than anticipated. Multiple British naval vessels were damaged or sunk in May by Argentine aircraft or land based Excocet missiles. On June 8th, Argentine aircraft bombed and sunk a British landing ship, the *RFA Sir Galahad*, as it attempted to disembark amphibious vehicles and armored personnel carriers in order reinforce the British held positions in Fitzroy.[37] Surely lessons learned from the Falklands War were a contributing factor, but the Navy and Marine Corps were forecasting increased stand-off years prior to the Argentinian invasion. As mentioned earlier, increased lethality from precision guided munitions and the need to address the speed differential between amphibious tractors and helicopters were also contributing causes.

The most significant factor, though, lies in the Marine Corps adoption of maneuver warfare as its warfighting philosophy in the 1980s. *Fleet Marine Force Manual* 1 (FMFM 1) published in March of 1989, describes maneuver warfare as, "a warfighting philosophy that seeks to shatter the enemy's cohesion through a series of rapid, violent, and unexpected actions which create a turbulent and rapidly deteriorating situation with which he cannot cope."[38] It describes maneuver through dimensions of space and time; maneuver is used in space to gain a positional advantage, it is used in time to generate faster operational tempo than the enemy to gain a temporal advantage.[39] The *FMFM 1* was Commandant General A. M. Gray's philosophy on warfighting which would become Marine Corps doctrine and the authoritative basis for how the Corps would fight and prepare to fight.[40]

An academic thesis on the history of *FMFM 1* argues that the Marine Corps' departure from attrition warfare and adoption of maneuver warfare was a decade long intellectual

transformation brought about by three mechanisms.[41] The first was theoretical and centered on articles in *The Marine Corps Gazette* to introduce and defend maneuver warfare to Marines. The second mechanism was functional and consisted of educational and training initiatives at the Amphibious Warfare School and Camp Lejeune. The final mechanism was General Gray's zeal for maneuver warfare and his institutional authority as Commandant that got *FMFM 1* published.[42] After the publication of FMFM 1 and ten years of effort, the Marine Corps stepped out smartly with maneuver warfare. "The essence of maneuver is taking action to generate and exploit some kind of advantage over the enemy as a means of accomplishing our objectives as effectively as possible."[43] This quote was taken from the FMFM 1 1997 revision which became Marine Corps Doctrinal Publication 1 (MCDP 1). The latter publication has subtle differences from the former, but both drive the point home of defeating the enemy through maneuver warfare by "rendering the enemy incapable of resisting effectively by shattering his moral, mental, and physical cohesion – his ability to fight as an effective, coordinated whole – rather than destroy him physically through the incremental attrition of each of his components, which is generally more costly and time consuming."[44] This is achieved through generating and applying combat power, achieving surprise and boldness, capitalizing centers of gravity and exploiting critical vulnerabilities, and by using speed and focus.

The concept of speed is critical to maneuver warfare. As *FMFM 1* evolved into *MCDP 1*, the significance of speed remained as a key element in generating combat power. Whether coupled with *concentration* as in *FMFM 1*, or with *focus* as in *MCDP 1*, speed is necessary to concentrate superior strength at a decisive time and place.[45] *Warfighting* terms speed as a weapon; it provides security; it's a prerequisite for maneuver and surprise.[46] *Warfighting* also states that belligerents in war cannot sustain a high rate of speed indefinitely causing a pattern of,

"fast, slow, to fast again" to emerge, and the each belligerent will generate speed when it's advantageous.[47] Marine Corps Doctrinal Publication 1-3 (Tactics) devotes an entire chapter to discussing the facets of speed militarily; defining it, using timing, relative speed, continuing speed, speed in change, and becoming faster. *Tactics* observes that speed circumvents the opponent's ability to respond in an organized manner.[48] The Marine Corps has not been able to net any advantages from speed to effect the enemy in its surface assault capability since WW II. In the absence of high water speed, the Marine Corps attributed its success in amphibious operations to the use of combined arms, surprise, and maneuver to generate combat power. The importance of speed in the naval maneuver arena has intensified as our warfighting concepts and technologies have evolved. Surface speed was needed to match the growth of aviation and the means of vertical assault from shipping, to maneuver on the sea as ship standoff distances increased over the horizon, to match the doctrinal shift to maneuver warfare, and into the era of operating in contested environments.

**Conceptual Advances Based on Maneuver Warfare**

By the mid-1990s, the Marine Corps' shift to maneuver warfare was comprehensive and was applied to Navy and Marine Corps operating concepts to prepare for the much anticipated operations in the world's littorals. Parallel to this shift, was the recent fall of the Soviet Union, end of the Cold War, and the U.S. entry to the "Expeditionary Era". The U.S. military began transitioning to an expeditionary posture vice a "global garrison posture". The garrison posture consisted of significant forces positioned overseas in close proximity to likely employment areas.[49] By contrast, the expeditionary posture would station most forces in the United States and deploy them rotationally or episodically to meet operational requirements.[50] With less physical presence around the globe, access to potential conflict areas became a challenge. Multiple White

Papers were written and ideas such as “Power Projection” were developed. These documents and theories addressed the diplomatic, geographic, and military impediments to access, and highlighted the necessity of projection capabilities to overcome this challenge.[51]

**Operational Maneuver From the Sea**

The Concept *Operational Maneuver From the Sea* (OMFTS) was published in January of 1996. It built upon the conceptual foundation of two published white papers, *From the Sea* and *Forward…From the Sea* published in 1992 and 1994 respectively. These three documents’ collective focus was a new approach to operations and U.S. Naval power projection by means of air and sea power to address what was then characterized as “chaos in the littorals”. The littoral regions, consisting of massive cities and dense coastal populations that boarder international sea trade routes became the U.S. military’s focus of attention for where conflicts were likely to occur. As its opening pages describes, *OMFTS* is a response to the danger and opportunity, as was the development of amphibious warfare in the 1930s. It states, “The danger, summarized by the phrase, “chaos in the littorals,” consists of a world characterized by the clash of the myriad of forces of national aspiration, religious intolerance, and ethnic hatred. The opportunity comes from significant enhancements in information management, battlefield mobility, and the lethality of conventional weapons.”[52] It also states that the paper is meant to begin the process of proposal, debate, and experimentation and provides the vision of what naval forces of the near future should be able to do.[53] Further into the document, *OMFTS* states its heart is the maneuver of naval forces at the operational level. Some of its core principles are using the sea as maneuver space, generating overwhelming tempo, and momentum, focusing on operational objectives, and pitting strength against weaknesses.[54]

By the mid-1990s, OMFTS came main stream into defense parlance just as maneuver warfare had successfully and completely shifted from concept into doctrine. It is also equally important to understand the operational context that was anticipated at the time, which was the likelihood that adversaries would eventually possess the ability to limit or deny operational access to areas vital to U.S. interests. Over-the-horizon operational capabilities were viewed as a means to negate these possibilities, requiring naval forces to operate from greater distances. *Operational Maneuver From the Sea* was bolstered by other concepts such as *Ship to Objective Maneuver* and *Power Projection*, the latter of which was also on its way to becoming a published concept.

**Ship to Objective Maneuver**

*Ship to Objective Maneuver* was published in July of 1997. Lieutenant General Van Riper's foreword pronounced the document as a procedural part of applying maneuver warfare to amphibious operations that began with *Operational Maneuver from the Sea*. He noted its purpose was to generate additional ideas for specific requirements and leverage the advantages of emerging technologies to develop greater capabilities for amphibious operations. The document succeeded in advancing the Marine Corps' conceptions of applying maneuver warfare to littoral maneuver, forcible entry, and power projection by leaps and bounds coming into the 21st century. As a concept, *STOM*'s efficacy is evident as it has endured and helped shape the Corps' operating concepts to the present day. However, the Marine Corps has not been able to leverage all of the emerging technologies it referred to in order to generate greater amphibious capability. Specifically, the Marine Corps has not been able to deliver a surface maneuver force the flexibility and speed to assault multiple penetration points, and certainly not from the greater stand-off distances that are now required. The Advanced Amphibious Assault Vehicle (AAAV),

referenced multiple times in *STOM*, was a significant part of an "emerging mobility" system and "advanced technology" that would replace the "ponderous ship to shore *movement* of current amphibious movement with true amphibious *maneuver*."[55]

**Developing a HWS Capability; the AAAV and EFV**

The momentum generated by ideas and concepts such as maneuver warfare, future operating environments, Ship-to-Shore Maneuver, *OMFTS,* and later *STOM* created an inexorable tide in Marine Corps thought and priorities for requirements to meet envisioned capabilities. A triad of required capabilities, the MV-22, LCAC, and AAAV emerged to meet the demand and benefitted from this tide. Archived reports from the early to mid- 90's illustrate how much stock the Marine Corps placed in the AAAV and invested in its future. The AAAV was touted as a program that "supports the fundamental shift toward power projection and the employment of Naval Expeditionary Forces in the littorals. It will provide Marine Corps units with the mandatory, inherent water and land mobility, firepower, survivability, and lift to fully execute these operational concepts."[56]

The vehicle was billed as a, "high priority program and an extremely cost effective, relatively inexpensive, versatile weapons system for the DON, the Marine Corps, and the American taxpayer.[57] It was said the AAAV would provide dramatic overall increase in the naval force's operational speed that will be the sum of more rapid decisions of command, faster methods of control, quicker execution, high object velocities of landing vehicles and aircraft coupled with ever diminishing friction in the transition from maneuver at sea to maneuver ashore.[58] The AAAV, MV-22, and LCAC would enable the tactical advantages and the reduction of threat to naval forces by conducting littoral/amphibious warfare operations staged no less than

20-25 miles at sea.[59] The AAAV, at the time, was the only Acquisition Category (ACAT) 1 program unilaterally sponsored by the Marine Corps.

Development of the AAAV continued throughout the 1990s, and evolved into the Expeditionary Fighting Vehicle (EFV) before being cancelled in January of 2011 after being determined to be unaffordable by then Commandant General James Amos and former Secretary of Defense Robert Gates. As with the LVA mentioned earlier, the Marine Corps faced insurmountable hurdles in fielding the EFV against financial cost, tradable capability cost, size, and complexity. The financial cost notwithstanding, in order for the Corps to attain the EFV it would have to cut significant capabilities in its land mobility, lethality, reliability, force protection, fuel efficiency, and growth potential. To attain high water speed and meet the demands of littoral maneuver the Marine Corps placed on itself 20 years earlier, it would have to give up these dynamic capabilities. The science is just not there to create an affordable high water speed vehicle.

The Marine Corps has had to learn a hard lesson since the early 1990s by putting the cart before the horse. In terms of developing a new surface assault capability to meet its warfighting needs, the Corps didn't do itself any favors by investing in a capability to meet the prolific warfighting concepts without the technology to deliver. The problem is compounded in the present day as the current operational environment is much more unforgiving and formidable than envisioned back then.

As the Department of the Navy wanted to improve littoral maneuver, why did the Marine Corps shoulder the burden of a high water speed surface capability all on its own for two decades? There are multiple long explanations of why and many viable points one could argue.

Essentially though, a new amphibious tractor could have been the answer to multiple persistent challenges confronting the Marine Corp in the 1990s and early 2000s.

Chiefly, the vehicle would deliver the coveted speed required to close the speed differential, to apply maneuver warfare to amphibious operations, and enable the Marine Corps with a capability to meet the *OMFTS* and *STOM* concepts from over the horizon. Second, a new vehicle could have replaced the aging AAV fleet; a problem which had been on the Corps' radar since the early 1990s. A 1990 AAVP7A1 hull study indicated the structural integrity of AAV hulls would begin to decline by 2000 with a finite probability of stress fractures occurring increasingly incurring costly repairs and maintenance requirements.[60] Third, the new vehicle would significantly improve land operations with cross country mobility and land speed equal to that of the M-1 Abrams tank. It would have vastly improved lethality to equal or greater than the Bradley Fighting Vehicle with the ability to defeat light armored vehicles from 1500 meters, and twice the armor protection of the AAVP7A1.[61] Finally, the Marine Corps had to consider the implications of not pursuing the AAAV. The ability for the Navy and Marine Corps to conduct their operational concepts would be limited to what it was at the present time. The rate of combat power build-up ashore would be less than it was at the present time because of the retirement of LSTs and dependence on the LCAC.[62] The means of accomplishing surface power projection and forcible entry against any level of defended littoral would be significantly limited.[63]

**The Amphibious Combat Vehicle**

In the years that have passed since the cancellation of the EFV, the Marine Corps is again in the midst of a period of conceptual development and adaption to shape the force for future engagements. Speed and rapidity of action in warfare is as important now as it ever was. But

currently, a high water speed amphibious vehicle is simply not feasible. The Corps has pursued and will receive another viable option; the Amphibious Combat Vehicle (ACV).

The Marine Corps still retains high water speed as an important capability. The Corps' position on the issue is that it is, "working through the Warfighting Lab and Office of Naval Research to pursue a technology that may enable this capability without unacceptable tradeoffs. ACV 2.0 serves as a conceptual placeholder (a planning construct) for a future decision around 2025. At that time, with knowledge gained from the fielding and deployment of ACV 1.1 and 1.2, the state of naval connector strategy and research and deployment work in support of a HWS capability will aid in an informed decision regarding this capability."[64] Its approach is to examine three technology lanes. The first lane, will be enhancements to low speed platforms that enable them to achieve improved high water speed. The second lane, will research future connectors to transport low water speed platforms at higher speeds. The third lane is exploration of naval platform concepts for HWS amphibians. The decision made along the first or second lanes will lead to a program of record described as ACV 1.3 which will be a low water speed ship-to-shore swimmer with a range of 3 to 12 nautical miles. A decision informed through the third technology lane will lead to an ACV 2.0 program which will field a high water speed vehicle with over-the-horizon range in fielded between 2028 and 2035.

This approach is sound based on the fiscal environment and the Marine Corps' Ground Combat and Tactical Vehicle Strategy. To summarize the strategy, it considers an appropriate mix of vehicles that will provide the performance, protection, and payload transportability to: enable rapid transitions between distributed operations and the aggregation of combat power, support strategic deployment concepts, and provide capacity to meet and sustain support to the geographic combatant commanders. Decision inputs for vehicles take into account austere

environments, embarkation drivers, and the need to lighten the force. Operating environments will consist of little to no infrastructure, unimproved trails, and narrow streets requiring increased soft soil mobility. As vehicle size and weight increases the number of vehicles that can embarked on shipping decreases, so does the MAGTF's capability to conduct various missions across the ROMO.

Water and ground mobility was also a key consideration in the Marine Corps' decision to pursue the ACV and marks the Corps' departure from its reliance on a tracked amphibious vehicle. The shift from tracked to wheeled platforms rested on significant technological advances in wheeled vehicle performance in the commercial industry.[65] Wheeled vehicles have significantly reduced cost, nearer-term availability, less technological risk, greater mobility in littoral terrain, reduced fuel consumption, increased IED protection, reduced maintenance requirements, reduced signatures, smaller profiles, and design margins for various configurations.[66] In terms of water mobility, the initial version the vehicle, ACV 1.1, will be amphibious and capable of using the sea as maneuver space inside the littoral region with a shore-to-shore capability. It will complement the ship-to-shore capability of the AAVP7A1. The subsequent versions of the ACV mentioned in previous paragraphs are planned to have a ship-to-shore swim capability and multiple variants.

The ACV fielding will be coupled with the AAV Survivability Upgrade which will enhance the AAV's armored protection and extend the service life of the vehicle beyond the year 2030. The Marine Corps has worked diligently to find a suitable expeditionary vehicle to fit its operational and technical requirements. The ACV will have improved mobility, fuel economy, protection, and lethality. Getting it to the objective from ships at 12 to 25+ nautical miles out in a contested environment – with or without HWS - remains a challenge. But, it is not one the

Marine Corps should face alone. How should the Navy and Marine Corps overcome this challenge?

## Ship to Shore Connectors

### Near-Term Solutions

The most obvious answer to this question is: together. The Naval Surface must continue work together to develop a viable high water speed surface mobility to move the ground combat element to the shore from naval shipping. The most feasible answer to this question, and the one the Navy and Marine Corps is aiming towards, is the connector.

Obviously, the notion of Navy and Marine Corps partnership to develop capabilities is not a novel idea. *Amphibious Operations in the 21st Century* was published in March of 2009 and well outlines the central idea of how the naval service will address future amphibious operations and it objectives for materiel initiatives. This document is another illustration of the great conceptual impact that OMFTS had on the Marine Corps. It harkens back to *OMFTS* repeating its cautionary statement, "There is no single answer to the many challenges that will present themselves in the future, naval forces will have to adapt as they have done throughout history to changing circumstances. For that reason, it is important that naval forces avoid a narrow definition of their capabilities."[67] High water speed surface connectors are where the Navy and Marine Corps should expand their capabilities and invest resources.

Near-term solutions focus on connectors such as the Expeditionary Fast Transport (EFP, formerly the Joint High Speed Vessel), Ship to Shore Connector (SSC, the LCAC replacement), and a replacement for the Landing Craft Utility (LCU). These capabilities currently exist and coincide with sea basing concepts. In fact, transportability on sea connectors is a key performance parameter for the ACV. The rationale is that this attribute ensures rapid deployment

ashore from shipping when port facilities are not accessible. Applicable Sea Connectors include the LCU, LCAC/SSC, the EFP, and the Improved Navy Lighterage System.[68] The ACV is also required to be compatible with the Expeditionary Transport Dock (ESD) and the Roll On/Roll Off Discharge Facility (RRDF).

The ability to launch from, and equally important, recover to these platforms is under testing and review with ramp enhancements that would allow for in-stream launch and recovery of AAV and ACVs. Currently, the LCAC and JHSV cannot deploy amphibious vehicles in a non-permissive environment. In theory, the ramp enhancements on these connectors would allow the AAV and ACV to be launched within a 12 nautical-mile threat envelope after transiting at HWS from shipping or sea-base well beyond the horizon. An unavoidable problem with connectors is the space they require on amphibious shipping and the amount of sorties required to transport them. To counter this, another option under consideration is the use of heavy lift barge carriers already in strategic sealift inventory as "LCAC mother ships". This would enable LCAC/SSC to rendezvous with ACVs transported on naval or MPF ships at the sea base. The near-term solutions the Marine Corps is exploring may prove to be the most practical in the long run. Improvements made on existing platforms working with emerging technologies in the space and cyber space domains, and manned/unmanned teaming techniques will be the Navy and Marine Corps best option for exploiting gaps in a contested environment.

**The Landing Craft Utility – Folding**

In the mid to far-term, the Navy and Marine Corps should look for a capability to compliment the SSC and LCU replacement. Another high-speed connector deployable on naval or MPF shipping could offer utility to the ATF across the ROMO and reduce the number of LCAC sorties required to lift the GCE. Though still just a concept, the Landing Craft Utility –

Folding (LCU-F) would offer the ATF a high-speed vessel with larger payload capacity and greater fuel efficiency. The Navy and Marine Corps was introduced to the concept as late as 2014, was discussed at March 2014 Connector Summit aboard Marine Corps Base Quantico, and was mentioned in Lieutenant General Glueck's Amphibious Combat Vehicle article in the September 2014 edition of the *Gazette*.

The LCU-F concept was developed by a small boat design company, Bolger and Friends, of Gloucester, Massachusetts. It offers a unique design that consists of a folding bow and stern allowing it to fit neatly into the well decks of the Navy's existing amphibious ships. The LSD-41 class ships, the *Whidbey Island Class*, could accommodate up to six LCU-F vessels. The concept proposes pre-loading the GCE's equipment from a shore-base or a mobile landing platform through the vessel's stern gate. Once vehicles are secured, the LCU-F is capable of powering itself onto shipping. Preloading ACVs or tanks will free up valuable cargo space in the well decks. One LCU-F is capable of stowing 3 to 4 ACVs.[69]

During ship-to-shore movement, once the LCU-F clears the ship's stern gate, the design a includes gyro-controlled sponsons to be deployed. This allows for the vessels beam and stability to be increased. Next, the stern section and each of the half-bow sections are lowered and the vessel reaches its full operational length of 270 feet.[70] Once the bow and stern sections are lowered, the sponsons retract, and two twin-propeller drives are lowered. The diesel engines can propel the full combat load at 19 knots for a range of approximately 1,500 nautical miles.[71]

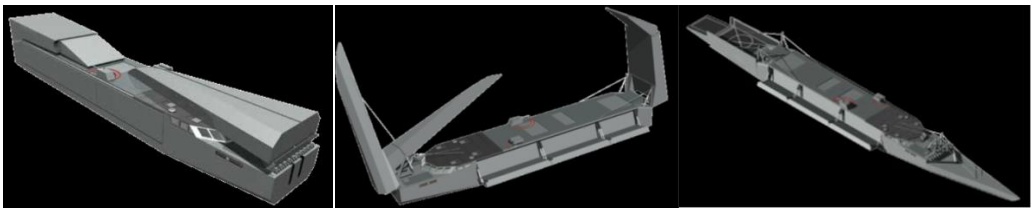

**Figure 3**

The LCU-F design does not utilize the typical bow ramp of a normal LCU. Because of its unusual design, it requires an unconventional landing. On its approach to the beach, over the horizon, the vehicle would be required to turn its stern toward the beach in order for the vehicles to deploy from its stern. At this point, the vessel would retract its twin propeller-drives and use its 360-degree main and stern thrusters at a speed of 10 knots at a draft of 4.5 feet. Admittedly, it is unclear how long this transition time would take. Once ashore, the stern gate is dropped allowing vehicles to deploy. The vessel then departs the beach in the same manner until the water's depth allow for the prop-drives to be employed.[72] Upon returning to naval shipping, it recovers stern first into the well deck to load another wave of vehicles and equipment.

Despite the transition time that would be required for its landing configuration, the vessel's design offers attractive benefits in its armament, lift, and utility. The design proposes carrying an Avenger 2x4-Stinger antiaircraft mount and one AH-1 attack-helo Vulcan cannon 20/30-mm turret system that are bolt-on and roof mounted.[73] Conceivably, an amphibious ready group comprised of an LHD class ship and two LSD class ships loaded with three LCAC/SSCs and 12 LCU-Fs respectively, could deploy forces to 15 littoral penetration points. This would allow for a MEU's entire GCE with tanks, ACVs, and troops to be employed in a single lift. The LCU-F concept also offers much utility. The operational range of the LCU-F offers a much larger assault radius, enabling ships to maintain up to 200 nautical miles from shore. The design offers solutions for combat loaded rotary wing assets at greater distances. To save fuel, AH and UH helicopters could land on the LCU-F stabilized stern deck until much closer to shore.[74] When not used for transporting the GCE, the LCU-F could be used for 55,000 gallon capacity refueling platforms or a HIMARs fire-support platform. The LCU-F could also have SOF support and HADR applications.

With its many applications, the LCU-F could provide the Navy and Marine Corps with a feasible solution for a high water speed surface mobility. Paired with the LCAC/SSC, the LCU-F can provide the lift, speed, range, and mobility to operate within the threat envelope without having to give up armored protection, or give in to the complexity and cost of a high water speed amphibious vehicle.

A Tale of Two LCUs

| *LCU 1610*-class (per USN fact-file) | | LCU-F | |
|---|---|---|---|
| Length | 135' | Length, unfolded | 270' |
| | | Length, folded | 143' |
| Beam | 30' | Beam | 22' |
| | | Height, Folded in Dry Well Deck | 20'6" |
| Full Load Hull Draft | 7' | Full Load Draft w/ Flush Thrusters | 4'6" |
| Full Load Maneuvering Draft in Beach and Estuary Shallows | 9' | Full Load Draft, Prop-Drives Extended | 11' |
| | | Full Load Maneuvering Draft in Beach and Estuary Shallows | 6'6" |
| Full Load Displacement | 375 tons | Full Load Displacement | 420 tons |
| Cargo Capacity | 160-180 tons | Cargo Capacity | 200 tons |
| Cargo Deck Area | 2,185 sq ft | Cargo Bay Area, With Deck | 2,217 sq ft |
| Power | 2x 680 hp | Power | 2x 1200 hp |
| Speed | 11 kts | Speed at 420/300 Tons Displacement | 19 kts-20 kts |
| Range | 1200 nm | Range Full Load | 1,500 nm |

**Figure 4**

## Conclusion

Presently, the Marine Corps is in a heuristic environment poised for change and adaptation in order to remain relevant in future conflicts and ready to fight and win. The Corps is now at an epoch reminiscent to the era of change it experienced in the shift from attrition to maneuver warfare. The Corps has staked its institutional success on applying and building upon the warfighting philosophies that emerged in 1990s. Maneuver warfare, *Operational Maneuver From the Sea*, *Power Projection*, and *Ship To Objective Maneuver,* and *Expeditionary Force 21* are proven concepts and a foundational basis for the *MCOC*. The *MCOC* is the handrail that guides the Corps in this endeavor. It establishes naval and littoral maneuver as a critical subtask in its approach to capability and capacity development.

A surface maneuver capability is critical for the Navy and Marine Corps and it has been the most seemingly difficult capability to evolve compared to other functions of warfighting. While proven extremely capable across decades, the AAV has been a workhorse of the Marine Corps providing mechanized support and utility to the infantry and supporting HADR missions. The AAV doesn't owe the Marine Corps anything. It's a seasoned platform that doesn't transition well into today's threat environment. The development of precision guided munitions and growth of A2AD capabilities have caused the Navy and Marine Corps to increase stand-off distances from shore. The Navy Marine Corps Team as a whole has responded to this increased distance by striving to use the sea as maneuver space and developing capabilities like the LCAC and concepts like *OMFTS, STOM,* and Sea Basing. As adversary capabilities advance, so does the distance required to protect naval shipping and increase as time passes. Speed in a surface mobility has been the one capability consistently sought to counter this tyranny of distance. High water speed may not have been absolutely necessary in the past; the Corps may have gotten by with a combined arms approach. The days where a high speed surface capability is just a nice-to-have and a not necessity, if not gone already, are rapidly approaching.

This paper has documented the rhetoric applied and the decisions the Marine Corps has made it its pursuit of a high water speed capability. Its decisions were pillared on necessities and concepts that were ahead of technology and the financial and tradable capability cost calculations required to attain it. The Navy and Marine Corps must partner in its development of a high water speed surface capability. The Marine Corps will deliver a capable amphibious ACV to the operating forces that will provide the mobility and survivability to meet its mission requirement. A high-water speed amphibian, nor the money and time required to develop it is necessary, provided the Navy delivers a capable connector.

[1] Headquarters US Marine Corps, *Expeditionary Force 21.* (Washington, DC: Headquarters of the Marine Corps, March 4, 2014), 8. http://www.mccdc.marines.mil/Portals/172/Docs/MCCDC/EF21/EF21_Capstone_Concept.pdf EF21
[2] Headquarters US Marine Corps, *Marine Corps Operating Concept Op Concept: How an Expeditionary Force Operates in the 21st Century*. (Washington, DC: Headquarters of the Marine Corps, September, 2016) pg. 8
[3] *Ibid*.
[4] Sam J. Tangredi. *Anti Access Warfare: Countering A2/AD Strategies*. ( Annapolis: Naval Institute Press, 2013), 1.
[5] *Ibid*.
[6] Headquarters US Army. *Tactics*. Field Manual, 3-90 (Washington, DC: Headquarters US Army, July,2001), 9-9 http://www.bits.de/NRANEU/others/amd-us-archive/fm3-90(01).pdf
[7] *Ibid*.
[8] US Department of Defense. *Joint Operational Access Concept*. (Washington, DC: Department of Defense, January 17, 2012), ii. https://www.defense.gov/Portals/1/Documents/pubs/JOAC_Jan%202012_Signed.pdf
[9] *Ibid.*
[10] *Ibid*, 1.
[11] *Ibid*.
[12] *Ibid*, 6.
[13] *Ibid*.
[14] *Ibid*, 9.
[15] *Ibid*, 10.
[16]*Littoral Operations in a Contested Environment*. www.mccdc.marines.mil/Portals/172/Docs/MCCDC/young/MCCDC-YH/document/naval-5.pdf?ver=2016-08-22-104553-733
[17] *Ibid*.
[18] *Expeditionary Advanced Base (EAB) Operations.* www.mccdc.marines.mil/portals/172/Docs/MCCDC/young/MCCDC-YH/document/naval-6.pdf?ver=2016-08-22-104600-140
[19] The EABO states the Marine Corps must improve its ability to: employ EABs for offensive actions in support of sea control; reinforce EABs with manned and unmanned long-range strike, anti-ship, anti-air, and C2 extending systems to transform the site into a sea-denial outpost; serve as hugs supporting the integrated naval logistics network, providing temporary forward and intermediate staging areas for MAGTF follow-on echelons and sustainment operations; leverage the NECC, Naval Beach Groups, and Joint capabilities to complement the MAGTF.
[20] Headquarters US Marine Corps. *Marine Corps Operating Concept Op Concept: How an Expeditionary Force Operates in the 21st Century*. (Washington, DC: Headquarters of the Marine Corps, September, 2016), 10.
[21] *Ibid*, 13.
[22] *Ibid.*
[23] *Ibid*, 20.
[24] *Ibid*, 20.
[25] The 6.4 subset tasks are: 1) Expand the capability for littoral maneuver beyond existing connectors, amphibious vehicles, and assault support aviation by examining manned and unmanned systems that reduce our signatures, allow us to overcome obstacles, extend our reach with boats and surface connectors that operate throughout the depth (rivers, estuaries, bays, extended coastlines) and breadth of the littorals, and increase options for sustained operations in the littorals. 2) Collaborate with Navy counterparts to establish, austere, scalable, and eligible EABs. 3) Provide active protection systems for platforms and ensure amphibious warfare ships are employed within Naval and Joint architectures. 4) Develop alternative employment methods and augment amphibious warfare ships by modifying other vessels for sea-based littoral operations. 5) Refine existing Maritime Prepositioning Force (MPF) capabilities to support afloat forces and a range of crisis operations.
[26] Headquarters US Marine Corps. *Warfighting*, MCDP 1. (Washington, DC: Headquarters US Marine Corps, June 20, 1997), 40.

[27] *Analysis of Amphibious Assault Documentation to support the Landing Vehicle Assault (LVA) Project,* 1975, Headquarters, United States Marine Corps, Studies and Reports Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA, 1.
[28] *Ibid*, 2.
[29] *Ibid*, 3.
[30] LtCol D.C. Bieger, "The LVA is Another in the Corps' Long Line of Ambitious Amphibious Developments," *Marine Corps Gazette* 61, no. 3 (1977): 34-38. http://search.proquest.com/docview/206334470?accountid=14746.
[31] *Ibid*.
[32] *Ibid*.
[33] *Ibid*.
[34] *Ibid*.
[35] K. T. Brunsvold. "What the Future Holds for Assault Amphibians." Marine Corps Gazette (Pre-1994) 64, no. 3 (03, 1980): 59-63. http://search.proquest.com/docview/206342274?accountid=14746.
[36] *Ibid*.
[37] Anonymous, "US Marines to Abandon EFV Program," *Defense & Foreign Affairs Strategic Policy* 35, no.2 (2007) 3, http://search.proquest.com.lomc.idm.oclc.org/docview/197595729?OpenUrlRefId=info:xri/sid:wcdiscovery&accountid=14746
[38] Headquarters US Marine Corps, *Warfighting.* FMFM 1 (Washington, DC: Headquarters US Marine Corps, March 6, 1989), 59.
[39] *Ibid*.
[40] *Ibid*, forward.
[41] Fideleon Damian, "The Road to FMFM 1: The United State Marine Corps and Maneuver Warfare Doctrine, 1979-1989." (master's thesis, Kansas State University,2008), 1, http://krex.k-state.edu/dspace/bitstream/handle/2097/555/FideleonDamian2008.pdf?sequence=1&isAllowed=y .
[42] *Ibid.*
[43] Headquarters US Marine Corps. *Warfighting*, MCDP 1. (Washington, DC: Headquarters US Marine Corps, June 20, 1997), 72.
[44] *Ibid*, 73.
[45] *Ibid, 41.*
[46] *Ibid*.
[47] *Ibid*.
[48] Headquarters US Marine Corps. *Tactics*, MCDP 1-3. (Washington, DC: Headquarters US Marine Corps, July 30, 1997), 59.
[49] Headquarters US Marine Corps. *Marine Corps Operating Concept 1-5, Power Projection.* Marine Corps Operating Concepts, Ch 6. (Quantico, VA: Marine Corps Combat Development and Integration, June, 2010), 89.
[50] *Ibid*.
[51] *Ibid.*
[52] Headquarters US Marine Corps, *Operational Maneuver From the Sea.* (Washington, DC: Headquarters US Marine Corps, January 4, 1996), 1.
[53] *Ibid*, 2.
[54] *Ibid, 10,11.*
[55] Marine Corps Combat Development Command, *Ship-To-Objective Maneuver*. (Quantico, VA: Marine Corps Combat Development Command, July, 25, 1997), II-6.
[56] Excerpt from an archived draft and final copy of a Requirements Division Information Paper published by Marine Corps Combat Development Command. *Why the United States Marine Corps Needs the AAAV,* 8 August 1994, Unites States Marine Corps Combat Development Command, Studies and Reports Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA, Coll. A-6-J-4-1
[57] *Ibid*.
[58] *Ibid*.
[59] *Ibid*.
[60] *Ibid*.

[61] *Ibid*.
[62] *Ibid*.
[63] *Ibid*.
[64] Headquarters Marine Corps. Office of US Marine Corps Communication. *Marine Corps Communication Playbook.* January, 2017. (Washington, DC: Headquarters US Marine Corps), ACV.
[65] Lieutenant General Kenneth J. Glueck, Jr., "The Amphibious Combat Vehicle", *The Marine Corps Gazette*, September, 2014, 26.
[66] Headquarters Marine Corps. Office of US Marine Corps Communication. Marine Corps Communication Playbook. January, 2017. (Washington, DC: Headquarters US Marine Corps), ACV.
[67] Marine Corps Combat Development Command, *Amphibious Operations in the 21st Century*, (Quantico, Va: Marine Corps Combat Development Command, March 18, 2009), 22.
[68] Joel Ashinhurst, ACV and Seabasing (PM Advanced Amphibious Assault, Marine Corps Systems Command, Quantico, Va) PowerPoint Presentation
[69] Lieutenant General Kenneth J. Glueck, Jr., "The Amphibious Combat Vehicle", *The Marine Corps Gazette*, September, 2014, 30.
[70] Susan Altenburger, Commander Michael Bosworth USN (retired), Captain Michael Junge USN, "A Landing Craft For the 21st Century", *Proceedings*, July, 2013, 62.
[71] *Ibid*.
[72] *Ibid*,63.
[73] *Ibid*, 62.
[74] *Ibid*, 63.

## ***Bibliography***


Altenburger, Susan. Bosworth, Commander Michael USN (ret). Junge, Captain Michael USN. "A Landing Craft For the 21st Century", *Proceedings*, July, 2013, 62. https://www.usni.org/magazines/proceedings/2013-07/landing-craft-21st-century

Anonymous, "US Marines to Abandon EFV Program," *Defense & Foreign Affairs Strategic Policy* 35, no.2 (2007) 3, http://search.proquest.com.lomc.idm.oclc.org/docview/197595729?OpenUrlRefId=info:xri/sid:wcdiscovery&accountid=14746

Ashinhurst, Joel. *ACV and Sea Basing*. PowerPoint Presentation. PM Advanced Amphibious Assault, Marine Corps Systems Command, Quantico, Va, November, 2016.

Bieger, LtCol D.C. "The LVA is Another in the Corps' Long Line of Ambitious Amphibious Developments." Marine Corps Gazette, Vol 61, No. 3,1977. http://search.proquest.com/docview/206334470?accountid=14746.

Brunsvold, K. T. "What the Future Holds for Assault Amphibians." *The Marine Corps Gazette*, 1980. http://search.proquest.com/docview/206342274?accountid=14746

Commandant of the Marine Corps. *Expeditionary Force 21*. Headquarters Marine Corps, 2014. http://www.mccdc.marines.mil/Portals/172/Docs/MCCDC/EF21/EF21_Capstone_Concept.pdf

Commandant of the Marine Corps. *Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century*. Headquarters of the Marine Corps, September, 2016.

Damian, Fideleon. "The Road to FMFM 1: The United State Marine Corps and Maneuver Warfare Doctrine, 1979-1989." Master's thesis, Kansas State University, 2008. http://krex.kstate.edu/dspace/bitstream/handle/2097/555/FideleonDamian2008.pdf?sequence=1&isAllowed=y

Glueck, Lieutenant General Kenneth J. "The Amphibious Combat Vehicle", *The Marine Corps Gazette*, September, 2014.

Headquarters US Army. *Tactics*. Field Manual, 3-90. Washington, DC: Headquarters US Army, July, 2001. http://www.bits.de/NRANEU/others/amd-us-archive/fm3-90(01).pdf

Headquarters, United States Marine Corps. *Analysis of Amphibious Assault Documentation to Support the Landing Vehicle Assault (LVA) Project.* Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA.

Headquarters US Marine Corps. *Marine Corps Operating Concept 1-5, Power Projection.* Marine Corps Operating Concepts, Quantico, VA: Marine Corps Combat Development and Integration, June, 2010. https://marinecorpsconceptsandprograms.com/concepts/mcoc-1-5-power-projection-0

Headquarters Marine Corps. Office of US Marine Corps Communication. *Marine Corps Communication Playbook.* January, 2017. Washington, DC: Headquarters US Marine Corps.

Headquarters US Marine Corps, *Operational Maneuver From the Sea.* Washington, DC: Headquarters US Marine Corps, January 4, 1996.

Headquarters US Marine Corps. *Tactics*, MCDP 1-3. Washington, DC: Headquarters US Marine Corps, July 30, 1997

Headquarters US Marine Corps, *Warfighting.* FMFM 1. Washington, DC: Headquarters US Marine Corps, March 6, 1989.

Headquarters US Marine Corps. *Warfighting*, MCDP 1. Washington, DC: Headquarters US Marine Corps, June 20, 1997.

Headquarters, United States Marine Corps. *Why the United States Marine Corps Needs the AAAV*, United States Marine Corps Combat Development Command, Studies and Reports Collection, Archives and Special Collections Branch, Library of the Marine Corps, Quantico, VA, Coll. A-6-J-4-1

Marine Corps Combat Development Command, *Amphibious Operations in the 21st Century*, Quantico, Va: Marine Corps Combat Development Command, March 18, 2009. http://www.dtic.mil/dtic/tr/fulltext/u2/a499599.pdf

Marine Corps Combat Development Command. *Expeditionary Advanced Base (EAB) Operations.* www.mccdc.marines.mil/portals/172/Docs/MCCDC/young/MCCDC-YH/document/naval-6.pdf?ver=2016-08-22-104600-140

Marine Corps Combat Development Command. *Littoral Operations in a Contested Environment*. www.mccdc.marines.mil/Portals/172/Docs/MCCDC/young/MCCDC-YH/document/naval-5.pdf?ver=2016-08-22-104553-733

Marine Corps Combat Development Command, *Ship-To-Objective Maneuver*. Quantico, VA: Marine Corps Combat Development Command, July, 25, 1997.

US Department of Defense. *Joint Operational Access Concept*. Washington, DC: Department of Defense, January 17, 2012. https://www.defense.gov/Portals/1/Documents/pubs/JOAC_Jan%202012_Signed.pdf

Tangredi, Sam J. *Anti Access Warfare: Countering A2/AD Strategies*. Annapolis: Naval Institute Press, 2013.