An alternative approach should be considered to increase shipping capacity of the current amphibious fleet. Operational integration of L-Class and commercial ships can significantly decrease lifecycle costs for the amphibious fleet, while meeting the amphibious lift capacity of two Marine Expeditionary Brigades (MEBs). Generating a larger amphibious fleet through the integration of L-Class and commercial-specification ships could save the United States Government billions of dollars. The Department of the Navy should develop an innovative ship capacity solution by integrating commercial vessels with naval warships to generate the lift required to sustain a 2.0 MEB landing force in an Anti-access – Anti-denial (A2/AD) environment.
FUTURE WAR PAPER

TITLE: A COMMERCIAL SHIP SOLUTION: FILLING THE AMPHIBIOUS SHIPPING CAPACITY GAP

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

AUTHOR: Major Richard C. Mitchell

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Mentor: Dr. Gordon Rudd
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DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE SCHOOL OF ADVANCED WARFIGHTING OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT
EXECUTIVE SUMMARY

The United States Marine Corps Commandant, General James F. Amos, reiterated a quote most often attributed to Winston Churchill by saying when you do not have any money, it is time to start and think. The United States Navy and Marine Corps should be thinking about the future. According to congressional hearings and political pundits, there are indications and warnings that point toward The Department of Defense budget will be substantially cut over the course of the coming decade. All military services will likely share budgetary cuts and experience fiscal cut backs. The U.S. Navy and Marine Corps provide the United States with an ability to project military power from the sea against potential foes on land that is unmatched by any other country. Currently, the Department of the Navy plans to build warships to replace the Navy's aging fleet of ships. The rate of Navy procurement and the prospective affordability of the Navy's shipbuilding plans have been matters of concern for congressional committees over the past several years.

An alternative approach should be considered to increase shipping capacity of the current amphibious fleet. Operational integration of commercial ships with naval L-Class vessels can significantly decrease lifecycle costs for the amphibious fleet, while meeting the amphibious lift capacity of two Marine Expeditionary Brigades (MEBs). Generating a larger amphibious fleet through the integration of L-Class and commercial-specification ships could save the United States Government billions of dollars. It could also provide flexibility to the Commander Amphibious Task Force (CATF) and Landing Force (LF) Commanders, and generate combat power ashore more quickly.
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Introduction

By maritime strategy we mean the principles which govern a war in which the sea is a substantial factor.... The paramount concern, then, of maritime strategy is to determine the mutual relations of your army and navy in a plan of war.

Julian Corbett, Some Principles of Maritime Strategy

Department of Defense strategic direction within the official document Sustaining U.S. Global Leadership: Priorities for 21st Century Defense requires the Department of the Navy to organize, train, and equip a Navy – Marine Corps Team that is built and ready for war, and to operate forward to preserve the peace. Currently, the United States military services are in a state of transition as it withdraws from a decade of war in Afghanistan and Iraq. The military services also face fiscal constraints with the Department of Defense (DoD) being asked to do more with less over the coming months, years, and potential decades. Global responsibilities drive the United States to maintain maritime power to protect its trade interests, ensure its access to natural resources, and support its treaty obligations. At some time in the future, another adversary may challenge the United States necessitating a robust, capable amphibious assault capability.

The U.S. Navy operates 30 amphibious ships, which have been designed from the keel up to support and transport forces of the U.S. Marine Corps (USMC). United States Code Title 10 has charged the Marine Corps to develop landing doctrine and equipment to support amphibious operations. In order for the United States Navy – Marine Corps Team to remain relevant and fulfill Title 10 responsibilities, this ‘team’ must enhance amphibious shipping capacity to meet the current 2.0 Marine Expeditionary Brigade (MEB) assault echelon lift requirement. The assault echelon comprises the troops and equipment needed to sustain the task force for an amphibious landing and the first 15 days of combat. Figure 1 indicates lift requirements for one MEB.
A key factor preventing the United States Navy and Marine Corps from maintaining a 2.0 MEB requirement is limited shipping capacity with the lift necessary to deploy troops and equipment. Commercial ships could increase transport volume and reduce the cost of amphibious shipping. The Department of the Navy should develop an innovative ship capacity solution by integrating commercial vessels with naval warships to achieve the lift required to sustain a 2.0 MEB landing force in an Anti-access – Anti-denial (A2/AD) environment.

**Shipping Requirements and Capacity**

Amphibious flexibility is the greatest strategic asset that a sea-based power possesses. B.H. Liddell Hart, *Deterrence or Defense*

Requirements for amphibious ships are determined by the goal for amphibious lift (the ability to transport and support amphibious forces), which is determined by the size and composition of the Marine Corps units or task forces to be transported. The Marine Requirements Oversight Council (MROC) Decision Memorandum 08-2007 confirmed that the minimum USMC operational lift requirement was for a 2.0 MEB assault echelon forcible entry force. The current force planning construct of two 19 ship amphibious task forces, each tailored to lift a MEB assault echelon cannot be applied to planning and executing operations for a number of reasons. It is unlikely that all ships committed to operations in other theaters would be made available to reach the 2.0 MEB lift requirement. Furthermore, those amphibious ships already on scene or
aggregated from other forward locations will already have forces embarked. As of February 2013, the U.S. Navy had only 30 amphibious ships in service with four amphibious ships (2 X LHAs & 2 X LPDs) being built in U.S. shipyards. Figure 2 indicates AE shipping.

Despite significant demand, the total inventory of amphibious ships will likely not exceed 31 over the next five years. The effects of high usage and maintenance shortfalls will further reduce the immediately deployable (within 60 days) inventory to 15 - 21 ships annually from 2012-2018. This is simply inadequate to fulfill the amphibious shipping requirement. One MEB requires approximately nineteen amphibious warfare ships; however, given fiscal constraints, the Navy and Marine Corps have agreed to assume risk by only using fifteen ships to embark a MEB Assault Echelon (AE). Thirty sea-ready amphibious ships will not meet the requirement to
embark and move two – MEB Assault Echelons (AE) without leaving behind cargo and personnel.

**Fiscal Constraints and Ship Comparison**

In April 2012, the Office of the Chief of Naval Operations (CNO) published an *Annual Report to Congress on Long-Range Plan for Construction of Naval Vessels for FY13*. The report outlined the Department of the Navy’s (DoN’s) five-year shipbuilding plan, which included the President’s FY2013 Budget (PB2013) that conforms to the defense budget topline associated with the 2011 Budget Control Act (BCA). The spending reduction elements of the fiscal cliff are primarily contained within the Budget Control Act of 2011, which directs that both defense and non-defense discretionary spending be reduced by sequestration. The CNO’s *Annual Report to Congress on Long-Range Plan for Construction of Naval Vessels for FY13* also provided a long-range projection of new ship construction by major ship types over the next 25 year period. The Department of the Navy shipbuilding plans are based on three principles: (1) Maintain required battle force capability to meet the national defense strategy; (2) Balance needs against expected resources; and (3) Maintain an adequate shipbuilding industrial base. The plan details naval force structure requirements that are derived in response to the new set of strategic priorities and guidance contained in the released *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*. However, the strategic review focused primarily on sustaining Amphibious Ready Groups (ARGs) or Marine Expeditionary Units (MEUs) forward in the Western Pacific and Persian Gulf in a crisis response role – not the 2.0 MEB requirement.

Today, the Department of the Navy is accepting more risk by planning to maintain 31 or fewer amphibious ships through fiscal year 2022 when L-Class ship numbers peak at 32.

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1 The Navy’s common amphibious force package is the ARG-MEU, consisting of an Amphibious Ready Group of three amphibious ships with an embarked Marine Expeditionary Unit (MAGTF).
Provision of equipment in peacetime for a wartime contingency will be costly. When budgets are tight, the question will always come back to money. There is a large difference with pricing and complexity between commercial and combatant vessels. Naval vessels between aircraft carriers, submarines, and other combatant ships are much more complex than commercial craft. An important ramification of warships’ complexity is that they are far more expensive to build than most commercial vessels. Differences in size, complexity, and design diminish when comparing amphibious warfare and auxiliary commercial ships (oilers, supply, and landing ships). The trend in pricing for commercial craft has been declining by 30 to 50 percent because of international competition and the increased foreign shipyard productivity that competition has motivated. Warship prices, however, have climbed as much as 10 percent per year since 2003. This cost increase is a result of new technology, more expensive weapon systems, and less competition for naval contracts. Light ship weight (LSW) provides a useful comparison between military and commercial ship cost. The U.S. Navy’s WASP class Landing Helicopter Dock (LHD) amphibious assault ship is $69,767 per LSW ton while a medium size crude oil tanker averages $6,925. That is a significant 6 to 1 ratio when comparing average cost per LSW between selected military and commercial vessels. In this case, military grade shipping is six times more expensive than the commercial counterpart.

**Proposed Commercial Solution**

Commercial shipping, purchased or leased; then modified to support amphibious operations, is a viable and cost efficient option to satisfy the current 2.0 MEB requirement and supplement the U.S. Navy’s amphibious shipping capacity. There is an historical precedence to modify

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ii Warships are typically measured in displacement tonnage – the volume of water displaced by the hull beneath the waterline, multiplied by 1 ton per 35 cubic feet, the density of sea water. Displacement tonnage may be reported in terms of light ship weight (LSW) or full load (FL), where the difference represents the weight of fuel, ordnance, crew, water, food, and other transported items.
commercial shipping. The British lacked the ability to sealift troops, logistical supplies, and aircraft to regain the Falkland Islands in 1982. They made up for their shortfall with ships taken up from trade (STUFT) to support the campaign. Merchant ships were used as troop transports, assault ships, minesweepers, aircraft ferries, and hospital ships. Approximately 50 merchant ships were used to support OPERATION CORPORATE during the retaking of the Falkland Islands by an opposed amphibious assault eight-thousand miles from England. The prime considerations used to select these commercial augments for amphibious operations were range, endurance, survivability, and suitability.

Commercial solutions can significantly reduce the cost of amphibious shipping while providing a capability to close, assemble, employ, and sustain from the sea. Shipbuilders have varying degrees of conceptual or existing amphibious shipping options available to the United States Navy. For example, the commercial conversion Afloat Forward Staging Base (AFSB) S-Class by Maersk Line Limited boasts a NAVAIR certified flight deck capable of servicing 4 X CH-53's and 14 MV-22 Ospreys. MAERSK AFSBs can be configured, via RORO and dry storage space, to support up to 144 high mobility multi-purposed wheeled vehicles (HMMWVs) or an equivalent mix of rolling stock. For example, the MAERSK AFSB can support 7-ton vehicles, M1A1 tanks, and amphibious assault vehicles (AAVs). It can steam up to 26 knots with a 15k range outfitted with 300 - 1000 surge berthing spaces. The S-Class design can be delivered in 14 months for a price of 450 million dollars. Modular construction reduces costs and speeds delivery of the completed vessel by decentralized production, and it allows the ship to be easily reconfigured for amphibious missions. Compare this ship to a similar naval vessel used for amphibious operations, the LHD 8-Makin Island. The LHD 8’s flight deck can support

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iii Roll on / Roll off (RORO) ships are vessels that are used to carry wheeled cargo. The RO-RO ship is different from a LO-LO (lift on-lift off) ship that uses a crane to load the cargo. The vehicles in the ship are loaded and unloaded by means of built-in ramps.
AV-8B Harriers along with all other type/model and series of Marine Corps / Navy helicopters, will steam up to 20 knots (6 knots slower compared to MAERSK AFSB), has 1600 berthing spaces for crew and Marines, and costs the U.S. Government approximately 3.9 billion dollars, seven times the price of the AFSB. *Figure 3 depicts the conversion of the S-Class commercial ship to the AFSB.*

The conversion of the S-Class ship is reversible; DoD would have the option of acquiring S-Class AFSBs on a five year operating contract basis, with the choice of taking ownership of the ships at the end of the contract term or returning them back to MAERSK. National monetary risk reduction with this process is built-in by the Navy’s ability to return the vessels back to commercial service. The purchase or lease of commercial ships such as the AFSB could greatly improve the Navy – Marine Corps ability to project power and respond to major regional contingencies. This ship has the range and task suitability that could augment L-Class naval vessels to meet the 2.0 MEB requirement. Further, commercial ships similar to the MAERSK AFSB could be made available within 14 months and would increase naval shipping capacity while being more fiscally responsible.
Another type of commercial ship, the Container Roll-on (ConRo) vessel, could be used to provide the commander utility during amphibious operations. The ConRo is a hybrid container and a roll-on/roll-off ship, with a below decks area for vehicle storage and space to stack containerized freight on the top decks. As a specialized commercial ship, it can carry a combination of 1,900 twenty-foot equivalent units of containers as well as oversized cargo on three decks, and up to 2,000 automobiles on five decks.\textsuperscript{13} Front container space above decks could be restructured and reinforced to support helicopter operations while afloat. (See figure 4) Considering task suitability, it is capable of carrying rolling stock (wheeled and tracked) to an area to support regional assurance by augmenting an ARG/MEU. Some ConRo's can sustain speeds up to 22 knots, making it capable of traveling with L-Class naval ships. The price of a large ConRo ship is 90 – 100 million dollars. In contrast, a San Antonio class LPD price ranges from 2.2 – 2.7 billion dollars.\textsuperscript{14} If ConRo's are purchased, this would save the government approximately two billion dollars per ship. Commercial ConRo ships can provide responsive
value for the amphibious force, and increase shipping capacity to assist meeting the 2.0 MEB requirement.

Semi-submersible commercial ships could have high relative value during amphibious operations. These semi-submersible vessels can provide transfer and selective offload for amphibious landing craft. Dockwise, the commercial seagoing heavy transport ship company has developed the ship-model Vanguard, which is a semi-submersible heavy transport vessel (SSHTV) with a bow-less design, an overall length of 275m, and deck space of 275 x 70m. (Figure 5)\(^\text{15}\) In comparison to the Navy’s mobile landing platform (MLP), that is approximately 75m more deck space at half the cost – $240m versus the MLP $500m.\(^\text{16}\) The loading deck of the Vanguard extends the full length of the ship. Once the Vanguard completes sea trials, it will become the world’s largest heavy lift vessel.\(^\text{17}\) Not only does Dockwise have the Vanguard, but this company also has twenty other semi-submersible ships that could be used to load and deploy a large number of amphibious connectors from the United States or pre-staged in theater. These connectors, moved by semi-submersible commercial ships, could be integral by transporting large number of Marines and gear from amphibious vessels to build rapid combat power ashore.
The lease or purchase of large semi-submersible commercial ships could augment the naval L-Class ships in transporting the considerable amount of connectors needed to support a 2.0 MEB assault echelon.

**Recommended Implementation**

The commercial augmentation of L-Class vessels can provide a more robust capability for Theater Security Cooperation (TSC) and Humanitarian Assistance and Disaster Relief (HA/DR); it could reinforce the current three-ship ARG/MEU construct, and generate more ship capacity to meet the 2.0 MEB shipping requirement. An integrated amphibious training plan would need to be implemented to prepare amphibious forces to use commercial shipping. Planning and training with the commercial and amphibious vessels and their crews could take place during exercises such as Dawn Blitz and Bold Alligator, and during standard MEU deployment preparation phases. This would allow the force to remain interoperable and relevant during MEU deployments, respond to crisis, and conduct potential MEB forcible entry operations.

A commercial concept to augment the ARG/MEU from a standard three-ship configuration to a four-ship design during training and deployment of the force would provide additional shipping capacity and a more robust amphibious capability. These ships could work together as an integrated four ship ARG responding to greater HA/DR missions and other contingencies.

Contemporary ARG/MEUs are challenged to increase their current capabilities for future global requirements and threats. A maritime element of a four-ship configuration enhanced by an S-class MAERSK AFSB could effectively address the challenges of sustainability and presence. These challenges include partnering with U.S. allies during Theater Security

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*Amphibious Ready Group (ARG) - The group of amphibious warfare ships, not including escorts that can land and support a United States Marine Corps Marine Expeditionary Unit (MEU), a ground, aviation, and logistics combat element.*
Cooperation exercises would be resident in the force embarked. Further, the proposed four-ship ARG design provides the combatant commanders with heightened combat power, which in turn lessens the risk to the force, and bolsters the ARG/MEU’s ability to conduct mission essential tasks.

ConRo commercial ships can discharge cargo either pier side or while anchored offshore using lighterage.\(^7\) Deploying and employing commercial ConRo vessels to support the 2.0 MEB lift capacity would be task suitable based on ConRo ship capability. These vessels would enhance the Marine Corps capability to operate in both developed and undeveloped ports.

The sea basing concept is evolving as new technologies improve the capabilities of the maritime prepositioning force. Commercial semi-submersible ships can act as a floating base to be used as a transport point between large ships and landing craft during amphibious operations. Vessel designs and other innovative ideas can enhance force closure capability that could provide for at-sea arrival and assembly of commercial vessels. Commercial shipping may be reconfigured to support the embarkation of a 2.0 MEB from CONUS in order to deploy and merge with naval vessels during at-sea arrival, and employ the force during major regional contingencies.

**Counter-Argument**

Integration of commercial vessels is a viable option to fill an amphibious shipping capacity gap, but there are some risks that would inherently be coupled with change. Risk in the area of survivability could be incurred by substituting commercial vessels for amphibious shipping. Survival of a ship can be expressed by three key measures: susceptibility, vulnerability, and recoverability. These measurements are used to predict probabilities of a ship avoiding or

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\(^7\) Lighterage is used to load or unload ships using lighters (barges) that can form an ad-hoc ramp or shuttle from ships at anchor; it is often used when a port’s dockside is too shallow for the ship, or dockside berths are unavailable.
defeating an attack by a threat, meeting selected levels of mission performance after sustaining a hit, and required time to stop the spread of damage and return to optimum capability after a hit. Analyzing these factors supports the survivability requirements of the ship, its systems, and development of a more survivable ship design.

Commercial ships typically do not meet the same L-Class specifications for susceptibility reduction. A major vulnerability of commercial vessels is that they are constructed primarily to commercial standards, particularly the use of aluminum and non-standard traditional hull forms. Commercial ships’ damage tolerance to shock, fragmentation, fire, and flooding are low compared to naval warships. This tolerance can be mitigated through a system of systems approach to enhance commercial ship survivability by making these ships less vulnerable, less susceptible, and more recoverable.

Vulnerability of commercial ships can be abated by placing a priority on hull resistance to underwater explosions and reinforcing the skin of the ship with lightweight shielding materials for ballistic threats. Strengthening the ships with additional radar systems to detect threats, adding gun and missile systems to improve force protection, and applying electronic counter measures could decrease susceptibility. Damage control procedures that combine sensors, cameras, and automated fire suppression systems could lead to a more recoverable vessel. Additionally, the layered defense of the U.S. Navy’s sea shield concept should preserve commercial shipping while it supports and transits with naval vessels. Mitigating survivability risks through a systematic approach by hardening commercial ship systems could permit commercial vessels to close the amphibious shipping capacity deficiency.
Conclusion

For the Navy to field a relevant force in an increasingly stringent budget environment, innovative commercial solutions that increase shipping capacity should be considered. The United States' next crisis cannot be foretold, but a reflection of history predicts that the United States will need to have the ability to execute amphibious operations. Perhaps the British precedence during their Falklands experience should be further studied to support a campaign by the employment of commercial vessels in order to avoid the same problems. The Department of the Navy can prepare for such a crisis through inventive solutions for future problems. The purchase and subsequent integration of commercial ships must be further explored to achieve the 2.0 MEB lift requirement and become a more efficient and effective amphibious force.
Appendix A: Semi-submersible Commercial Ship – Transshelf (empty and loaded)
Appendix B: Current U.S. Naval L-Class Ships

Amphibious Warships

LHA 6
LHD
LPD
LSD
Appendix C: Commercial Shipping Augmenting OPERATION CORPORATE

SS Atlantic Conveyor during Falklands Campaign

Royal Fleet Auxiliary (RFA) Reliant following Falklands Campaign
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