THE CONNECTOR CARRIER: USMC USE OF YACHT FERRIES TO AUGMENT AMPHIBIOUS OPERATIONS

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The Navy and Marine Corps are at a critical juncture where a solution needs to be selected for amphibious operations if the forcible entry capability of a Marine Expeditionary Brigade (MEB) is to remain a standing requirement. Creative solutions using commercial ferrying capabilities to transport equipment in amphibious operations may be required would be significantly less expensive than building new ships to fill the void. An active effort begun now will ensure that our nation is able to retain its forcible entry capability as fiscal austerity squeezes its L-Class amphibious shipping lift. The Department of the Navy should buy, lease, or charter commercial yacht ferries with a float-on/float-off (FLO/FLO) capability to transport combat loaded connectors and landing craft to mitigate the existing amphibious forcible entry shortfalls in our L-Class amphibious shipping. These yacht ferries could solve the problem of carrying numerous combat loaded connectors for use in an amphibious operation significantly reducing the amount of time it would take to offload.

AMPHIBIOUS OPERATIONS, SEABASING, FORCIBLE ENTRY COMMERCIAL SHIPS, FLOAT ON/FLOAT OFF SHIPS

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FUTURE WAR PAPER

THE CONNECTOR CARRIER: U.S.M.C. USE OF YACHT FERRIES TO AUGMENT AMPHIBIOUS OPERATIONS

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

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AY 2012-13

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Approved: 18 May 2013
Date: 18 May 2013
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EXECUTIVE SUMMARY

The United States Navy and Marine Corps are at a critical juncture where a solution needs to be selected for amphibious operations if a forcible entry capability is to remain a standing requirement for the United States Marine Corps. Creative solutions using commercial ferrying capabilities to transport equipment in an amphibious operation may be required and would be significantly less expensive than building new ships to fill the void. The Department of the Navy should buy, lease, or charter commercial yacht ferries with a float-on/float-off (FLO/FLO) capability to transport combat loaded connectors and landing craft to help mitigate the existing amphibious forcible entry shortfalls in L-Class amphibious shipping.

These FLO/FLO yacht ferries are unique, inexpensive, submersible hull ships designed to transport yachts or other small ships around the world. These yacht ferries could solve the problem of a shortage of connectors by carrying numerous combat loaded landing craft utility (LCU) for use in an amphibious operation. These connectors would also significantly reduce the amount of time it would take to offload an amphibious task force over a beach.

LCUs are easier to maintain, carry more, and are easier to pilot. They are also significantly less expensive than LCACs. Aside from amphibious assault, the benefits a yacht ferry with LCUs could offer in Theater Security Cooperation exercises, Special Purpose MAGTFs, and any humanitarian or disaster relief crises are evident. Current amphibious doctrine does not address the integration of Civilian Merchant Ships with amphibious capabilities. This interface should then be codified in doctrine so lessons don’t have to be relearned in the time of crisis. The potential to augment an amphibious operation with just one yacht ferry fully loaded with LCUs would allow a force to cycle twice the numbers of LCUs than traditionally would allow.
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"Two roads diverged in a wood, and I, I took the one less traveled by, and that has made all the difference."

Robert Frost

Introduction

The United States Navy and Marine Corps are at a critical juncture where a solution needs to be selected for amphibious operations if a forcible entry capability is to remain a standing requirement for the United States Marine Corps. One path leads to a gradual reduction in amphibious capability while the U.S. Navy focuses on other force projection priorities; and one path leads to innovative solutions that seek to retain deterrence and force projection options unique to the expeditionary capabilities residing within the Nation’s naval forces. The nation’s current amphibious needs exceed the amphibious shipping capacity of the Navy. The United States Navy and Marine Corps should consider options beyond using current L-class amphibious ships when it plans for amphibious operations. Numerous possibilities exist by using commercial vessels to augment amphibious ships during peace, but especially during a time of crisis when a large amphibious forcible entry may be required.

Creative solutions using commercial ferrying capabilities to transport equipment in an amphibious operation would be significantly less expensive than building new ships to fill the void. Doing so would provide Combatant Commanders an additional flexible forcible entry capability and the Department of the Navy a fiscally acceptable alternative to overcome projected naval lift shortage. An active effort begun now will ensure that the nation is able to retain its forcible entry capability as fiscal austerity squeezes L-Class amphibious shipping lift. The Department of the Navy should buy, lease, or charter commercial yacht ferries with a float-on/float-off (FLO/FLO) capability to transport combat loaded connectors and landing craft to mitigate the existing amphibious forcible entry shortfalls in L-Class amphibious shipping.
An amphibious capability provides Combatant Commanders options, both in war and across the range of other military operations. It offers the flexibility to move large numbers of troops and equipment quickly to an amphibious operations area. Geographic Combatant Commanders’ demand for amphibious forces has increased by over 85% over the last five years, while requests for individual ships with amphibious capabilities have jumped by more than 50%. Because of limited availability of amphibious shipping, naval forces cannot fill all of the current requests.

The United States Marine Corps and Navy currently require enough amphibious lift to support the movement of 2.0 Marine Expeditionary Brigades (MEBs) and to be able to conduct successful forcible entry operations if required. In a perfect world, each MEB would consist of at no less than seventeen amphibious ships resulting in a requirement for a minimum of thirty-eight fully operational amphibious ships to lift the 2.0 MEBs. This number includes four ships in normal maintenance cycles not available for use. According to the Annual Report to Congress on Long-Range Plan for Construction of Naval Vessels for FY2013, the Navy expects to reach a high water mark of 34 amphibious ships in 2025 with a subsequent reduction to 31 amphibious ships by 2042. According to the numbers in Table 1, at no time in the next twenty-eight years does the Navy plan to have the capacity to meet the minimum requirement of 38 ships.\footnote{The reduction in its amphibious fleet exposes the Department of Defense to unnecessary risks. However, while the fiscal constraint in front of the nation is making leaders face hard choices, it is also providing the opportunity to devise unique, innovative solutions that may satisfy the amphibious lift requirements and do so in a fashion that ultimately serves the Nation’s fiscal bottom-line as this known shortfall is mitigated.}
Table 1: Long-Range Plan for Construction of Naval Vessels (FY2013)

<table>
<thead>
<tr>
<th>FY</th>
<th>Amphibs</th>
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<td>2039</td>
<td>32</td>
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<tr>
<td>2019</td>
<td>31</td>
<td>2026</td>
<td>34</td>
<td>2033</td>
<td>33</td>
<td>2040</td>
<td>31</td>
</tr>
</tbody>
</table>


The most significant factor affecting the size of the amphibious fleet is fiscal constraints. Up to $100-200 billion in defense cuts are projected over the next 10 years. In an effort to save more than $4 billion over the next five years, the U.S. Navy initially sought to decommission nine ships, including two amphibious LSDs, as early as 2014. Amphibious ships equate to 10-11% of the overall Navy fleet and are a lower shipbuilding priority than aircraft carriers, submarines, cruisers, destroyers, and logistics support ships. This low priority for amphibious ships against capital ships is unlikely to change. Therefore, fiscal realities require solutions to mitigate the impending gap in amphibious ships.

**Charting a New Path: OPERATION CORPORATE: The 1982 Falklands War**

Historically, commercial ships and ferries have been used to augment war ships. The precedents for using commercial ships to augment amphibious operations were set in WWI and have been used in many conflicts since. The best known and documented modern example of using commercial ships in a conflict was by the British during the Falklands war in 1982. The
British converted fifty-five commercial vessels to overcome challenges the Navy faced in order to accomplish its missions in the South Atlantic.\textsuperscript{5} The distance to the Falklands from Great Britain proved to be a daunting task as some of the commercial ships did not have the typical endurance or sea faring capabilities of warships.\textsuperscript{6}

Besides lacking the endurance for extended operation in the South Atlantic’s, there were other problems that had to be resolved to incorporate the commercial ferries into military operations. Providing fuel, freshwater, and port facilities for commercial ships that normally do not operate in open oceans 8,000 miles from their home ports proved to be a challenge.\textsuperscript{7} Because of the large sea states in South Atlantic, one of the most significant issues was how to transfer troops and equipment once in the Falklands area of operations.\textsuperscript{8}

Significant modifications were also required to allow for more fuel, freshwater, and naval communications.\textsuperscript{9} The United Kingdom initially chose not to arm the vessels for protection as they were to operate in rear areas in comparative safety to warships.\textsuperscript{10} Civilian operators needed to operate their ships in the war zone were subject to military orders. Though there were some initial problems between the Royal Navy and Merchant Navy, in no way could the Royal Navy have succeeded without the extensive support of the Merchant Navy.\textsuperscript{11} Modifications, training, arming, and the manning of commercial vessels all cost money. If the Navy and Marine Corps decide to use commercial ships to augment amphibious ships in a wartime situation and transport combat loaded connectors, vehicles, and gear many of these same questions will have to be addressed in order to avoid the same problems that plagued the British during the Falklands War.

**Maximizing Civilian Capacity: Benefits of the FLO/FLO Ferry**

Several types of commercial ships could augment amphibious ships. The most well-known and abundant are the Lift-On/Lift-Off (LO/LO) vessels which utilize cranes to manage
their cargo, and the larger Roll-On/Roll-Off (RO/RO) vessels that allow cargo to load/unload cargo utilizing ramps. Both the LO/LO and RO/RO vessels typically require secure ports with an adequate capacity to handle the expected throughput of the associated cargo.

Large RO/RO vessels have been in use by the Military Sealift Command operations since 1949. The Large, Medium Speed, Roll-On/Roll-Off ship (LMSR) is the prime mover of U.S. military equipment assigned to the Maritime Pre-positioned Force (MPF) program. The drawback to using LO/LO or RO/RO ships is that neither was designed to directly support amphibious operations during the initial phases of a forcible entry operation without tying into an existing seabase. Unloading commercial RO/RO and LO/LO ships is also a time consuming process that could take days. It requires either a permissive port or a link up with significant seabasing assets in a permissive environment with little to no Anti-Access Area Denial (A2AD) threat. These MPF ships are large, slow, and present easy targets if maritime superiority has not been achieved. Both LO/LO and RO/RO options would not be optimal in an amphibious operation should the United States be required to move a significant amount of combat power ashore quickly, across a potentially hostile beach, while still trying to gain and maintain maritime and air superiority.

While car ferries could be an option to augment amphibious ships within a given theater by carrying military wheeled-vehicles, AAVs, and possibly tanks, a better option would be to use smaller Float-On/Float-Off (FLO/FLO) yacht ferries. Float-on/Float-Off ferries are unique submersible hull ships designed to transport yachts or other small ships (see figure 1). These yacht ferries could solve the problem of carrying numerous combat loaded connectors such as the landing craft utility (LCU) or Landing Craft Air Cushioned (LCAC) for use in an amphibious operation. These connectors would be additional beyond those connectors already embarked on
amphibious ships. Though not as likely of a scenario, the yacht ferries could also potentially launch and recover AAVs if required.

Figure 1: Example of FLO/FLO: Yacht Express

![Yacht Express](http://www.yacht-transport.com)

While still an unexplored capacity within the Merchant Maritime fleet and the military, yacht transport using FLO/FLO ships has been steadily increasing in the civilian market. One of the most popular companies in the industry, Dockwise Yacht Transport (DYT), uses vessels with a float-on/float-off loading method that allows yachts of any size to be safely floated on and off as cargo.

The operation of FLO/FLO ships is unique in that, unlike LO/LO and RO/RO ships, FLO/FLO ships are loaded by lowering the hull below the waterline, much like a standard amphibious L-Class ship might, and floating cargo into position (figure 2). Once positioned, the cargo is secured to the deck and the hull is pumped dry and raised back above the waterline. Off-loading is done in a simple reversing of the cycle. Some of the vessels have a 10-ton crane with a 15-meter outreach for cargo handling, which is an additional capability useful for military purposes. The water depth to accommodate such a FLO/FLO vessel for a 'wet' offload increases with the FLO/FLO ship's size. The larger the FLO/FLO ship, the deeper it needs to be
to unload its cargo. This is a limitation that needs to be considered when considering these ships for use. However, as a mitigation factor, it should be noted that the cargo intended to be transported on FLO/FLO vessels is by its very nature already amphibious or loaded on amphibious craft that should be unaffected by having to operate slightly further from the shore.\textsuperscript{14}

**Figure 2: FLO/FLO embarkation on a DYT Ferry**

![Image of FLO/FLO embarkation on a DYT Ferry](http://www.yacht-transport.com)

DYT ships have provided world-wide service to main harbors since 2008 and presently service routes that include the U.S. East Coast, the Mediterranean, the Bahamas, the Caribbean, the U.S. West Coast, and the South Pacific.\textsuperscript{15} Yacht Ferries offer the U.S. Navy and Marine Corps an inter-theater world-wide capability to augment L-Class ships with minimal maintenance or replenishment requirements while at sea. With a USMC emphasis to move towards the Pacific in the next decade, these ships not only possess the capacity to support the Marine Corps' requirements, they are often geographically located in the area that is most likely to need the capacity these vessels can provide.\textsuperscript{1} These yacht carriers offer unique advantages when compared to other civilian ships. One of the biggest problems with most commercial

\textsuperscript{1} DYT only has four yacht carriers in its inventory as of February 2013.
vessels is they are typically single purpose, and using them for military options requires modification. The sizes, carrying capacities, square footage, and ranges as depicted in Table 2 show the potential of using yacht ferries with connectors to augment amphibious ships.

Table 2: Characteristics of DYT Yacht Carriers

<table>
<thead>
<tr>
<th></th>
<th>Yacht Express</th>
<th>Super Servant 3</th>
<th>Super Servant 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Length:</td>
<td>209.00 m / 685.7 ft.</td>
<td>139.09 m / 456.3 ft.</td>
<td>169.49 m / 556 ft.</td>
</tr>
<tr>
<td>Overall Width:</td>
<td>32.20 m / 105.64 ft.</td>
<td>32.00 m / 104 ft.</td>
<td>32.03 m / 104 ft.</td>
</tr>
<tr>
<td>Deck length:</td>
<td>165.00 m / 541.34 ft.</td>
<td>116m / 380 ft.</td>
<td>146m / 479 ft.</td>
</tr>
<tr>
<td>Deck width:</td>
<td>31.00 m / 101.71 ft.</td>
<td>32m / 104 ft.</td>
<td>32m / 104 ft.</td>
</tr>
<tr>
<td>Vehicle/Cargo Space</td>
<td>55,057 sqft.</td>
<td>39,956 sqft.</td>
<td>50,289 sqft.</td>
</tr>
<tr>
<td>Deadweight</td>
<td>11,000 t</td>
<td>14,236 t</td>
<td>17,600 t</td>
</tr>
<tr>
<td>Service Speed</td>
<td>18 knots</td>
<td>13 knots</td>
<td>14 knots</td>
</tr>
<tr>
<td>Range</td>
<td>~2600 nm</td>
<td>~2600 nm</td>
<td>~2600 nm</td>
</tr>
</tbody>
</table>

Source: http://www.yacht-transport.com

Yacht Ferries with the use of Landing Craft

Amphibious forces are critically dependent of surface connectors in amphibious operations. The majority of a MAGTFs ground combat power and combat service support equipment requires surface connectors to move from ship to shore. With equipment getting progressively heavier, this requirement for surface connectors is not likely to decline in the future. With little to no modifications, yacht ferries can be used to augment amphibious ships to transport multiple fully combat loaded LCACs, LCU's, or small boats. This way L-Class ships could be used primarily to launch AAVs during an assault and would keep the yacht ferries over the horizon to launch LCUs or LCACs loaded with tanks, LAVs and other items needed in a MEB's initial assault echelons following in waves closely behind the AAVs. This would mitigate possible coastal defense cruise missile (CDCM) threats and keep these vessels out of the immediate threat range of enemy weapons in the current amphibious operating environment.

The overall object of a MEB assault is to put a significant amount of combat power ashore in a short amount of time. Combat loaded LCACs and LCU's launched over the horizon
from yacht ferries in conjunction with L-Class ships launching AAVs simultaneously could provide a significant advantage to a Naval force. Two yacht ferries with LCU's or LCACs could significantly enhance the number of LCU's and LCACs available to a MEB. These ferries would also offer double to triple the number of connectors that could cycle between the amphibious ships and shore increasing the overall throughput across the beach. When comparing the sizes of yacht ferries in Table 2 with the overall size of amphibious connectors in Table 3, it becomes readily apparent in Table 4 how many extra LCU's or LCACs would be available with just two of the larger yacht ferries augmenting an amphibious task force. The sky is limit on how these additional connectors could be used. For example, two yacht ferries similar to the Yacht Express loaded with LCU's could carry 36 M1A1 tanks, or be preloaded with equipment that could be anticipated in to be used as a floating dumps or in subsequent on call waves.

Table 3: Landing Craft Characteristics/Dimensions

<table>
<thead>
<tr>
<th></th>
<th>LCU 1600</th>
<th>Army LCU 2000</th>
<th>LCAC</th>
<th>LCM-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Length:</td>
<td>42 m / 135 ft.</td>
<td>53 m / 174 ft.</td>
<td>26.4 m / 87.11 ft.</td>
<td>22.7 m / 74.6 ft.</td>
</tr>
<tr>
<td>Overall Width:</td>
<td>8.9 m / 29.6 ft.</td>
<td>13 m / 42 ft.</td>
<td>14.3 m / 47 ft.</td>
<td>6.4 m / 21 ft.</td>
</tr>
<tr>
<td>Cargo Deck SqFt</td>
<td>1850 sqft.</td>
<td>2500 sqft.</td>
<td>1809 sqft.</td>
<td>714 sqft.</td>
</tr>
</tbody>
</table>

Source: MCRP 3-31 Amphibious Ships and Landing Craft Data Book

Table 4: Landing Craft Carrying Capacity on Yacht Ferry

<table>
<thead>
<tr>
<th></th>
<th>LCU 1600</th>
<th>Army LCU 2000</th>
<th>LCAC</th>
<th>LCM-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yacht Express</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>Super Servant 3</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>Super Servant 4</td>
<td>9</td>
<td>4</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: MCRP 3-31 Amphibious Ships and Landing Craft Data Book

Along with carrying LCU's or LCACs, the FLO/FLO ferries could be used as they are designed by carrying small ships or boats. The Navy and Marine Corps employ a wide range of coastal patrol or special warfare vessels of similar sizes to yachts that include, Rigid-Hulled Inflatable Boats (RHIB), Small Unit Riverine Craft (SURC), and the Combat Rubber Raiding Craft (CRRC). These ferries could be used to clandestinely insert RHIBs, CRRCs and other vessels from over the horizon for raids or the insertion of reconnaissance forces during pre-
assault operations. For example, one Yacht Express could carry over one hundred 11-meter RHIBs with eight Marines in each. These reconnaissance or small assault forces could also be used to seize key pieces of terrain not accessible by AAVs, LCUs or LCACs during an amphibious assault.

**Comparison: Amphibious Ships**

Commercial Yacht Ferries cannot replace L-Class ships but they can augment them. Most L-Class ships have varying internal characteristics that affect their cargo space and carrying capacities. The comparison between L-Class ships and Yacht Ferries in Table 6 shows that most cases yacht ferries capacity often exceeds the connector carrying capacity of amphibious ships.\(^2\)

<table>
<thead>
<tr>
<th>Ship Type and Class</th>
<th>Cargo/Vehicle Capacity(^3)</th>
<th>LCU Capacity</th>
<th>LCAC Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSD-41 Whidbey Island</td>
<td>33,831 sqft.</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>LSD-49 Harpers Ferry</td>
<td>29,200 sqft.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>LPD-17 San Antonio</td>
<td>34,400 sqft.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>LHA-1 Tarawa</td>
<td>47,624 sqft.</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>LHD-1 Wasp</td>
<td>40,112 sqft.</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>DYT Yacht Express</td>
<td>55,057 sqft.</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>DYT Super Servant 3</td>
<td>39,956 sqft.</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>DYT Super Servant 4</td>
<td>50,289 sqft.</td>
<td>9</td>
<td>10</td>
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</tbody>
</table>

*Source: MCRP 3-31 Amphibious Ships and Landing Craft Data Book and http://www.yacht-transport.com*

Compared to a standard three ship Marine Expeditionary Unit/Amphibious Ready Group (MEU/ARG) consisting of a LHD, LPD and LSD, one additional yacht ferry loaded with connectors would double the number of connectors available for an offload. This in effect would significantly reduce the amount of time it would take for the MEU to offload over a beach.

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\(^2\) One Tarawa Class LHA remains in the inventory and is expected to be decommissioned in 2015.

\(^3\) Cargo/Vehicle Capacity in amphibious ships is equal to the combined vehicle square space and the well deck space per the MCRP 3-31.
Comparison: Joint High Speed Vessel (JHSV)

In the U.S. Navy, there is a trend toward buying and leasing more Joint High Speed Vessels (JHSV) to augment amphibious operations in the Pacific region. There are also concepts in place to tie the JHSV into current seabasing capabilities to bridge the gap of airlift. It enables the rapid closure of combat forces from advanced regional bases to ports or a seabease in a potentially austere environment. A FLO/FLO yacht ferry could complement the JHSV in the region by bringing additional combat loaded connectors that could not be carried on the JHSV.

There are distinct advantages a Yacht Ferry offers when compared to the JHSV. First, the available square footage and weight capacity on two of the three yacht ferries is double that of a JHSV (see figure 6). For example, a typical AAV company is equipped with approximately 46 AAVs. Two yacht ferries (the Yacht Express or the Super Servant 4) would be sufficient to carry the numbers of AAVs required to support a baseline MEB or to support two mechanized infantry battalions. In contrast, the JHSV can carry less than requisite 24 AAVs typically associated with two AAV platoons. In a time of extremis, a yacht ferry has the ability to launch and recover AAVs without any significant vessel modification. Second, the yacht ferries have twice the range of a JHSV offering an intertheater capability of sailing anywhere in the world from their home ports. They are not limited to intratheater operations like the JHSV. Other advantages yacht ferries have is that they do not have the height limitations that the JHSV, current MPF ships, and even RO/RO commercial car ferries might have, should the yacht ferries be required to carry up-armored 7-ton trucks on LCUs. Finally, yacht ferries do not require a permissive port to offload their gear offering additional options to a commander.

The launching of AAVs is only an example using AAVs to compare capabilities of the JHSV and a yacht ferry. The launching and recovery of AAVs should be left to the L-Class ships which by design can operate closer to hostile beaches.
Table 6: Comparisons JHSV and DYT Yacht Carriers

<table>
<thead>
<tr>
<th></th>
<th>Yacht Express</th>
<th>Super Servant 3</th>
<th>Super Servant 4</th>
<th>JHSV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Length:</td>
<td>209.00 m / 685.7 ft.</td>
<td>139.09 m/456.3 ft.</td>
<td>169.49 m/556 ft.</td>
<td>107m/351 ft.</td>
</tr>
<tr>
<td>Overall Width:</td>
<td>32.20 m / 105.64 ft.</td>
<td>32.00 m/104 ft.</td>
<td>32.03 m/104 ft.</td>
<td>&gt;28.5m/93.5 ft.</td>
</tr>
<tr>
<td>Deck length:</td>
<td>165.00 m / 541.34 ft.</td>
<td>116m/380 ft.</td>
<td>146m/479 ft.</td>
<td>103.0 m/337.9 ft.</td>
</tr>
<tr>
<td>Deck width:</td>
<td>31.00 m / 101.71 ft.</td>
<td>32m/104ft</td>
<td>32m/104ft</td>
<td>28.5m/93.5 ft.</td>
</tr>
<tr>
<td>Vehicle/Cargo</td>
<td>55,057 sqft.</td>
<td>39,956 sqft.</td>
<td>50,289 sqft.</td>
<td>22,000 sqft.</td>
</tr>
<tr>
<td>Capacity</td>
<td>50+ AAVs</td>
<td>~40 AAVs</td>
<td>~50 AAVs</td>
<td>~20 AAVs</td>
</tr>
<tr>
<td>Deadweight</td>
<td>11,000 t</td>
<td>14,236 t</td>
<td>17,600 t</td>
<td>700t</td>
</tr>
<tr>
<td>Service Speed</td>
<td>18 knots</td>
<td>13 knots</td>
<td>14 knots</td>
<td>35-40 knots</td>
</tr>
<tr>
<td>Range</td>
<td>~2600 nm</td>
<td>~2600 nm</td>
<td>2600 nm</td>
<td>~1200 nm</td>
</tr>
</tbody>
</table>

Source: http://www.yacht-transport.com and USMC Seabasing Integration Division powerpoint brief, December 2012

Cost Comparisons and Solutions

One of the most significant factors when comparing Yacht Ferries with L-Class ships is the cost associated with the platforms. On average, an LPD-17 costs $2.2 - $2.7 billion to build. The estimated cost of the future big deck replacement option, LHA-8 which reintroduces the well deck, is estimated at a range of $4.0 - $4.3 billion per copy and the future LX(R) is estimated to cost $1.5- $1.8 billion each. In 2008, the Navy awarded the Austal USA Corporation a contract to build the JHSV for $185.4 million each.

In comparison, the price for both the Super Servant-3 and Super Servant-4 Yacht Ferry was $18.4 million in 1982. The price of the larger and more modern Yacht Express was $69 million in 2006. Using these figures, the U.S: Navy could buy about ten Super Servant-3s or two ferries similar to the Yacht Express for the price of one JHSV. For the price of $2.7 billion LPD-17, the Navy could purchase over 140 Super Servant-3s or 39 of the Yacht Express. Even with slight modifications, the yacht ferry is half as expensive as the JHSV and significantly less expensive than an LPD-17.

If purchasing ferries are not required, large shipping companies such as, Maersk Line, Limited, also offer short duration charters. A typical rate for a ship similar in size to a yacht ferry would cost somewhere between $40,000-$45,000 a day based on 30 - 40 day time...
charters. There is also a delivery/redelivery fee to cover daily running costs/ fuel used to reposition the ships. The daily charter rate will decrease as the length of the charter increases.\textsuperscript{22}

A cost benefit of using FLO/FLO type ships is that they would require minimal modifications and could almost immediately be tied into existing seabasing capabilities like the Mobile Landing Platform (MLP) (see figure 3). There is a MOA between the Maritime Administration and OPNAV N42 whereby federal dollars can be given to a commercial operator to improve the military utility of their ships by providing for modifications.\textsuperscript{23} This money could also be used for other modifications from communications infrastructure to possible weapons systems for self-defense.

\textbf{Figure 3: Mobile Landing Platform in Seabasing Capability}

There are other potential solutions to mitigate costs. The Maritime Security Act of 2003 (MSA 2003) requires that the Secretary of Transportation, in consultation with the Secretary of
Defense, to establish a fleet of active, commercially viable, militarily useful, privately-owned vessels to meet national defense and other security requirements. This fleet is known as the Maritime Security Program (MSP). Participating operators are required to make their ships and commercial transportation resources available upon request by the Secretary of Defense during time of war. Currently the MSA 2003 authorizes $186 million annually through 2015 to support the operation of 60 U.S.-flag vessels. Currently most ships in the MSP are RO/RO and LO/LO container ships. There are no yacht ferry FLO/FLO ships in the program. With the increased capabilities and advantages they offer, the USN and USMC should consider adding FLO/FLO ships to the MSP.

Disadvantages and Risks of using FLO/FLO Ferries

Though there are increased capabilities and advantages with a FLO/FLO ferry, there are also limitations to resolve should such vessels be leased or purchased. One of the concerns with commercial vessels is their vulnerability since they are not designated, built, or configured as warships. There is a belief that all naval warships must be built to standards to ensure the ship has the ability to continue its assigned missions. Merchant ship design is driven by different imperatives than warships. Warships are specifically designed to absorb damage from enemy attack and continue to float with three and sometimes four main compartments flooded. Their crews are also trained in damage control.

The ability to survive damage is a basic criterion when carrying troops. The United States is already accepting some risk and may have to accept more should a sizable forcible entry operation require using commercial ships. The JHSV is not currently built to wartime standards, yet, we are purchasing them in increased rates. Ships used in the current MPF and seabasing concepts are also not built to wartime standards. The most logical mitigation would be to keep
the FLO/FLO vessels outside current Coastal Defense Cruise Missile (CDCM) threat ranges with the ability to launch landing craft over the horizon (LCACs and LCUs). Ideally the FLO/FLO ferries will be employed in the outer sea echelon area or a designated area where seabasing efforts will occur after enemy anti-access area denial (A2AD) networks and weapons systems have been destroyed. This will enable increased freedom of action in an amphibious area of operations (AOA). Modifying a civilian ship to fully meet warship standards is not fiscally prudent and would not be cost effective in the long run.

Currently, Britain’s Ministry of Defense plans to increase the ability of naval support ships to defend themselves against attack from small boat swarm tactics and other threats in high threat areas. It plans to do so by installing Raytheon Phalanx 1B close in weapon systems on Royal Fleet Auxiliary ships. The same idea could be used for yacht ferries or other commercial ships if they are used to augment the United States Navy. Decoys, chaff, and electronic countermeasures could also be low-cost modifications to mitigate risks against the ships.

Another challenge is the ferry has insufficient berthing spaces for the crews and the Marines riding in the LCACs and LCUs during an assault. Somewhere in the theater of operations, the crews would need to marry up with the ferry to link up with their vehicles prior to an assault. The most logical solution would be to incorporate the ferry into existing seabasing capabilities tying it into the MLP and the JHSV to carry troops and move landing craft from L-Class ships or passenger liners to the yacht ferries. Another possibility is an LCU either off a yacht ferry or an L-Class ship could carry ~400 Marines from a ship to link up with their vehicles on a FLO/FLO yacht ferry. The Navy could also use Maritime Administration and OPNAV N42 dollars to modify the vessels with a small helicopter platform. This option would not be optimal as it would take away available space from landing craft. Costs of modifications
to the ships would need to be considered to ensure the losses do not outweigh the gains. Finally, another option to link forces up with their gear on a yacht ferry would be to use common car ferries that already operate in a theater. There are many different types of car ferries in existence today, and in certain places in the world, these ferries are a normal part of daily life. These commercial ferries are used to move cars, buses, and trucks using RO/RO ramps could to tie into the current seabasing construct with modifications to ensure a link up with the MLP and the ferry can occur. Again, one need not look too far beyond recent experiences with the JHSV and the other ferries that have been used in Hawaii and Japan to grow this capability.

The final challenge is the landing craft, AAVs and/or other vehicles would be exposed to the elements on an open ship, so they would not be able to remain embarked for extended periods of time. The plan to use FLO/FLO ferries would therefore have to be on a short term basis hauling gear from their port to an amphibious operations area immediately. If the operation is delayed, maintenance plans will need to be incorporated in order to deal with the wear and tear of the elements and exposure of the equipment. If gear were required to remain on the yacht ferries for an extended period of time, commercial options to protect the equipment against the elements would need to be explored and implemented.

**Other Nations Increasing Civilian Ferry Capabilities**

Other countries other than the United States are currently training in the use of commercial ferries today. Allies and possible near peer competitors are looking to increase their amphibious capacities. France, Italy, and the United Kingdom plan to invest in new capabilities specifically in landing craft and connectors.29

China is becoming a global naval power and has been increasing its naval amphibious capability over the past decade.30 This year, China held several large amphibious exercises with
large passenger and vehicle carrying ferries. Taiwan’s Ministry of National Defense estimates that with the use of its amphibious transports and its new large civil ferries to augment amphibious ships, China could transport at least six divisions worth of troops and equipment to Taiwan.31

In January 2012, the People’s Liberation Army Navy (PLAN) reported that China plans to expand the use of civilian sealift and reported the arrival of a new RO/RO ferry.32 The ferry is one of four new ferries that will be able to carry approximately 1,500 passengers and 200 vehicles that would enhance China’s power projection capabilities.33 The use of civilian ships is not new to the PLA. Civilian vessels are subject to mobilization in times of contingencies.34 These vessels are subsidized to ensure the PLAN retains the capability.35

**Recommendation**

To mitigate the fiscal cuts, the Department of the Navy should buy five yacht ferries with equal capabilities to the Yacht Express to primarily carry landing craft for use by the USMC in amphibious operations. These ferries should be assigned to the Third Marine Expeditionary Force (III MEF) in Okinawa, Marine Forces Central Command Forward in Bahrain, and to the Mediterranean for use by Marine Forces Europe and Marine Forces Africa. The remaining two should be assigned to I MEF in Camp Pendleton and II MEF at Camp Lejeune for large scale amphibious training and integration purposes. The department of the Navy should also buy forty five LCUs to fully outfit the yacht ferries with the requisite connectors. The LCUs are less expensive, easier to maintain, carry more, and are easier to pilot than LCACs. Even with inflation costs, the overall cost of buying five new yacht ferries loaded with forty five new LCUs is less than $500 million; less than one quarter the price of a new LPD-17.
Aside from amphibious assault, the benefits a yacht ferry with LCUs could offer in Theater Security Cooperation exercises, Special Purpose MAGTFs, and any humanitarian or disaster relief crises are apparent. The potential to augment an amphibious operation with just one yacht ferry fully loaded with LCUs would allow a force to cycle twice the numbers of LCUs than traditionally would allow.

Aside from MPF ships, current amphibious doctrine does not address the integration of Civilian Merchant Ships with amphibious capabilities. If the concepts are validated and proven, yacht ferries, combined and integrated into seabasing concepts should be codified in doctrine so lessons do not have to be relearned in the time of crisis.

**Conclusion**

Preserving the nation’s capability to conduct amphibious operations is important because projecting power from the sea remains an essential component of the United States’ strategy to prevent conflict, protect its interests, and prevail in war. Once eliminated, amphibious capabilities cannot be quickly reversed. When a maritime nation with global interests believes its amphibious capabilities are no longer needed, it often finds itself scrambling to recover the capability when the need arises again. Since the Persian Gulf War, no enemy has made an effort to deny U.S. forces entry into the theater. Future opponents may not be so cooperative. The United States cannot count on always having uncontested access to bases in from which it can project and build up power before going on the offensive. The ability to assault and seize an area by force from the sea and air could prove the critical to a future campaign.36

If the United States finds itself having to fully mobilize for war on a similar footing to WWII, there is little doubt that civilian vessels will have to augment naval ships because of current inventories and projected rates of build for amphibious ships. Also, if the United States
Navy and Marine Corps do not practice and train to use and integrate civilian ships, it will be more difficult when the time comes to actually do it as the British witnessed firsthand in 1982. The services must look to new ways to project combat power ashore do more with less resources and money available. Specifically, the Navy-Marine Corps team should actively experiment with how to procure (buy, lease, or charter) commercial yacht ferries with FLO/FLO capability and develop appropriate tactics, techniques, and procedures for their use. This is one example of looking to the past for adaptive solutions to future problems. The uses of Yacht Ferries in amphibious operations are clearly a 'road less traveled' and, in a time of war when our amphibious capability is needed the most,...it could make all the difference between success and failure.
Endnotes

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