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LST Redux

Adapting to the Future of Maritime Warfare by Understanding the Past

Evan Phillips, EdD

21 June 2023

https://doi.org/10.36304/ExpwMCUP.2023.06

Abstract: The United States and its allies must produce a new class of landing ship, tank (LST), to regain the versatile maritime capability once provided by that vessel. The U.S. military lacks a platform with the capabilities of the LST. The changing character of warfare during the last century has yet to make maritime logistics less relevant. Future maritime conflicts will require a versatile, survivable maritime connector that can be mass-produced and features advanced technologies for Joint and coalition command and control concepts. Emerging platforms are too costly and cannot be mass-produced effectively. However, some modern technologies

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Dr. Evan Phillips is an active-duty U.S. Marine Corps major currently assigned to the 5th Marine Expeditionary Brigade. He earned a doctor of education degree from the University of Illinois Urbana–Champaign in 2020. He also has a master's degree in criminal justice administration from Lindenwood University in St. Charles, MO. He is a graduate of the Marine Corps School of Advanced Warfighting and a distinguished graduate of the Marine Corps Command and Staff College, both at Marine Corps University in Quantico, VA. Dr. Phillips is a former Missouri state trooper with years of experience in law enforcement and has spent more than 40 months stationed in the U.S. Indo-Pacific Command (INDOPACOM) area of operations. The views expressed in this article are solely those of the author. They do not necessarily reflect the opinions of Marine Corps University, the U.S. Marine Corps, the Department of the Navy, or the U.S. government.

can enhance a proven LST platform into a worthy successor to the World War II-era LST. Obstacles still need to be addressed, including how to justify mass production. The United States and its allies must consider how best to support future maritime operations. Tomorrow's conflicts will require a new, cost-effective LST that can be mass-produced with partners on a scale to support global conflict. This revitalized maritime connector should spur further discussions regarding Joint force support in a contested maritime environment.

Keywords: maritime; logistics; connector; shipbuilding; landing ship, tank; LST; engineer special brigade; stand-in forces

The U.S. military today lacks the maritime logistics capability once provided by the landing ship, tank (LST).[1] Maritime logistics platforms are still essential, but the United States has yet to mass-produce a connector to replace the LST.[2] This article defines *maritime connectors* as surface vessels that may be used to support maritime terminal operations "conducted at fixed, unimproved, bare beach, and/or degraded port facilities, and at off-shore anchorages."[3] Unified command concepts such as Joint logistics over-the-shore (JLOTS) employ maritime connectors and have served the U.S. military for decades. However, looking to the future, these unified command constructs have a capacity and capability gap with versatile maritime connectors. Simply put, the Joint force needs more capacity to execute or sustain maritime conflict on the scale that may be required.[4] Future conflicts will require the United States to produce a versatile and survivable maritime connector that can be mass-produced with allied nations and operate in a systems-dominated conflict.[5] The United States and its allies must produce a new class of LST to regain the versatile maritime capability once provided by that vessel.

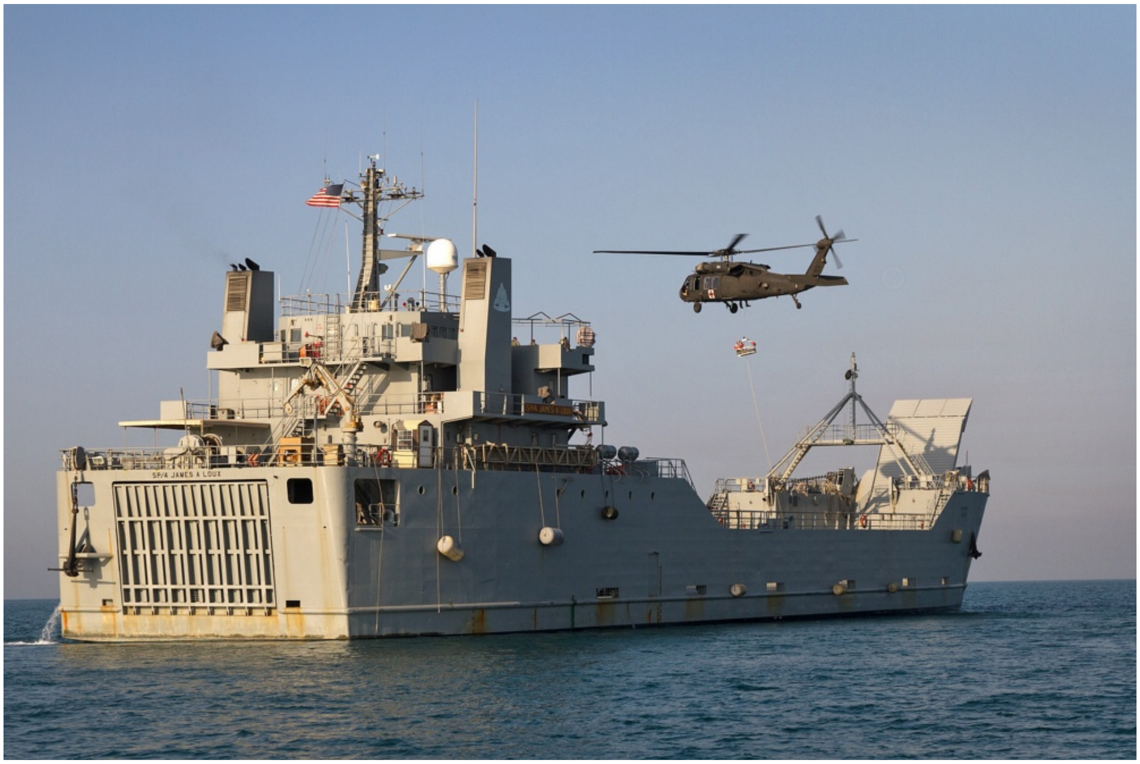
Newly fielded maritime connectors, such as the expeditionary fast transport (EPF) vessel, are meant to support stand-in forces but need essential characteristics for sustained maritime logistics. *Stand-in forces* "are small but lethal, low signature, mobile, relatively simple to maintain and sustain forces designed to operate across the competition continuum within a contested area as the leading edge of a maritime defense-in-depth to intentionally disrupt the plans of a potential or actual adversary. Depending on the situation, stand-in forces are composed of elements from the Marine Corps, Navy, Coast Guard, special operations forces, interagency, and allies and partners."[6] A new LST must have all the qualities of its forebearers and modifications to enhance its capabilities for modern war.

The debate regarding maritime connectors has been continuous during the last decade in recognition of rising threats in the naval domain, including threats posed by the People's Republic of China (PRC).[7] The U.S. Navy's priorities center on assets such as nuclear aircraft carriers, leaving little room in the budget for other types of ships considered less relevant. As a result, the U.S. Marine Corps is promoting a new connector in the stern landing vessel (SLV) and the Navy's landing ship, medium (LSM), formally known as the light amphibious warship (LAW).[8] Although the 35 requested SLVs would be a massive step in the right direction, they may differ from what the Marine Corps or the Joint force wants or needs for the future fight. In addition, critical questions about the SLV's support capacity need to be answered, given that it is too small and that only a limited number are being built.[9]

In addition, expeditionary advanced base operations (EABO) require a robust naval logistic connector capability.[10] The current deputy U.S. secretary of defense, Kathleen H. Hicks, has argued that the Joint force needs a versatile and survivable maritime workhorse.[11] The United States must be prepared to engage in a large-scale conflict reminiscent of the Pacific theater of World War II.[12] The best answer is a battle-tested, low-cost, versatile, quickly produced, and highly capable maritime platform like the LST.

The U.S. Army may have the closest platform to what the Joint force requires in its logistics support vessel (LSV) (figure 1). These vessels can carry up to 900 short tons (15 M1 Abrams main battle tanks) and have a range of 6,500 nautical miles fully loaded. However, they are woefully slow at a maximum speed of 12.5 knots fully loaded, and a limited number exist in the U.S. inventory.[13] Most importantly, these vessels fall short of the capabilities of the former *Newport*-class LST, which should be the starting point for a modern LST. Despite efforts to transform the LSV into the answer for the Joint force, it ultimately falls short.[14]

Figure 1. USAV *SP4 James A. Loux* (LSV 6), 7 November 2013



Source: official U.S. Army photo by Maj Randall Stillinger.

The Problem

Current maritime platforms cannot logistically support a theater-level naval war, are not cost-effective, and are not being mass-produced. In addition, the United States needs the capacity to mass-produce naval ships due to its severely atrophied shipbuilding industry.[15] *Maritime connectors need more capacity to move the logistics required in an intense naval war.* This makes the United States too reliant on air lines of communication, which depend on global air bases that will be targeted in a future war.[16] In addition, the United States and its allies seem unwilling to employ their naval assets within a protective task force inside the weapons engagement zone, as fleets did in the Pacific theater of World War II.[17] This makes the calculus for determining the future survivability of naval assets, including maritime connectors, difficult to assess.

The LST proved essential to the United States' victory in World War II and filled a crucial role from World War II to Operation Desert Storm.[18] First developed in 1939, more than 1,000 LSTs supported Allied operations in World War II from 1939 to 1945. Its unique design allowed for ocean crossings, shore groundings, deployment of amphibious vehicles, and the ability to remain beached for extended periods. Its logistical capacity was impressive; it carried 500 tons of cargo to beaches worldwide in all climates.[19] The LST was necessary in World War II's European and Pacific theaters. The United States used LSTs into the early 1990s to support all Services in transport, logistical, and offensive roles.

The availability of LSTs within the European and Pacific theaters of World War II was a primary planning factor in that war. The United States understood the critical need for maritime connectors in the postwar era, and the LST remained highly regarded for its abilities. The last LSTs to see service in the U.S. military, the *Newport* class, could carry heavy vehicles, troop formations, and supplies too large for helicopters and smaller landing craft. Each could haul 510 tons of vehicles, had 19,000 square feet of cargo space, and could carry up to 431 troops. Additional davits (cranes), an extendable ramp, a stern gate, vehicle turntables, and pontoon causeway sections further enhanced the LST's capabilities.[20] Unfortunately, the United States military has not enjoyed this versatile logistics support since decommissioning the last *Newport*-class LST in 2002. It was subsequently left with a capability gap that could not be sufficiently filled by modern amphibious ships and maritime connectors such as the landing craft, air cushion (LCAC); the landing craft utility (LCU); or the more modern EPF.[21]

A new LST platform must be more survivable in a contested maritime environment with multiple enemy air, surface, subsurface, cyber, and space-based weapons systems. The future battlefield will rely on integrated command and control networks capable of massing precision fires in a time-constrained environment.[22] Survivability of maritime assets may be challenging to achieve and necessitate a Joint force approach in which considerable focus is put on deception. While initial actions in a future war with near-peer adversaries may start in the space domain, the speed of conflict will be extreme, placing considerable demands on the survivability of naval assets.[23] The risk of substantial combat losses must be accepted, and combat replacements must be made readily available.

A future LST must be able to perform multiple missions, including amphibious operations, humanitarian assistance/disaster relief, and noncombatant evacuation operations. Despite the changing character of warfare that includes new domains, the need for traditional maritime missions still exists.[24] These missions require a naval vessel to launch and recover Marine Corps amphibious combat vehicles (ACV), Bell Boeing V-22 Osprey tiltrotor transport aircraft, small boats, and landing craft carrying troops, vehicles, and/or equipment. Additionally, this vessel must be able to offload and recover cargo at sea, pier side, and on a beach. The current capability gap must be overcome to provide a Joint or coalition force with the needed support in the large-scale maritime conflicts of the future.

Integration of the new LST capabilities among the Joint force and allies may take time. The Military Sealift Command could maintain responsibility for a fleet of war reserve LSTs. However, Joint integration and focus on sustained combat in a nonpermissive environment may require maintaining some of this new LST capability in the active force.[25] Solving integration problems in World War II took time and necessitated the creation of U.S. Army engineer special brigades (ESB) to more ably support LST operations. These units specialized in amphibious assaults and shore-to-shore operations.[26] Each ESB included an engineer shore regiment, a truck battalion, a quartermaster battalion, ordnance battalions, and other support entities.[27] In addition, the ESBs incorporated a smaller version of the LST called the landing craft, tank (LCT) as an essential part of the Joint construct.[28] These versatile units contributed to many large-scale amphibious operations, including at Normandy, Sicily, New Guinea, Leyte, Luzon, and Okinawa. The resourcefulness displayed by the ESBs in a contested maritime environment was crucial to the Allied victory in World War II.[29] An ESB capability will be required to make future LST usage more effective.

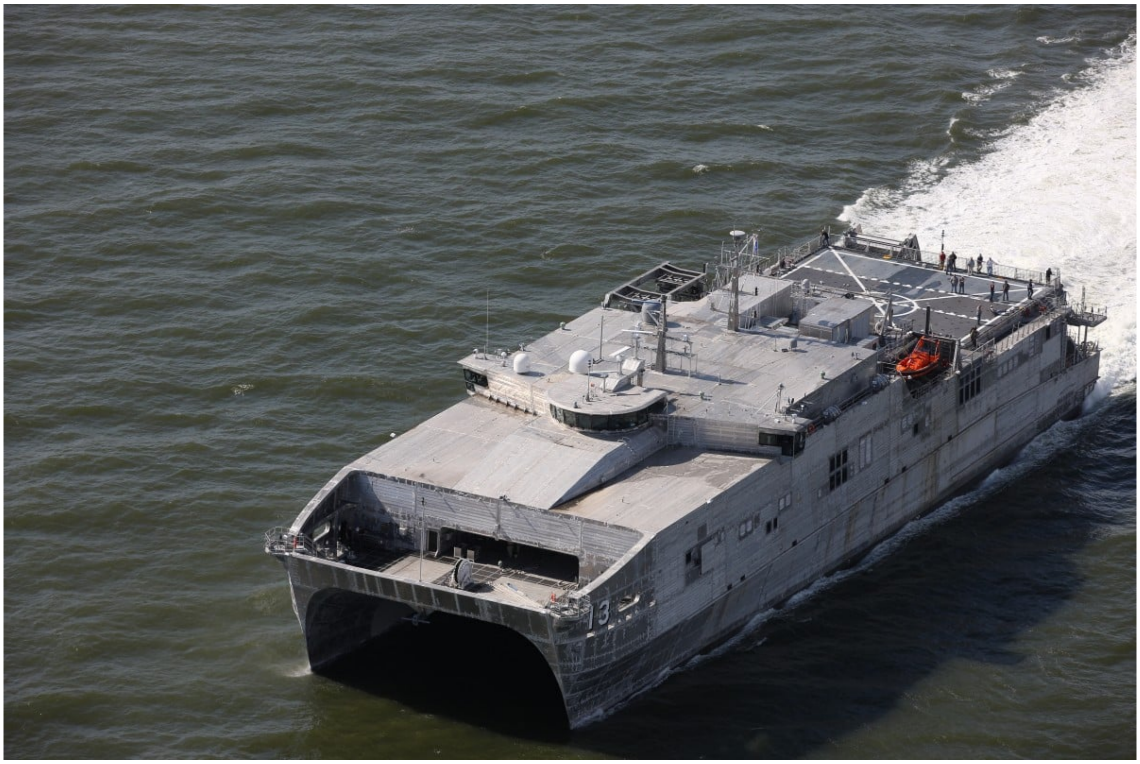
The U.S. military and its allies do not have the capabilities the LST once provided. They need the organizational structure to employ the LST as part of the Joint concept. More reliance on air lines of communication, assumptions about enduring air superiority, unproven ideas, insufficient maritime platforms, and unsolved questions about the sustainability of the force in a contested maritime environment should be cause for concern. The risk is unacceptable. Unchallenged control of the world’s oceans for the better part of a century may have left the U.S. military complacent and unrealistic about what it needs to win a war.

Why Modern Connectors Fall Short

The EPF is a prime example of a modern platform that supports emerging concepts such as stand-in forces and EABOs. Still, it falls short of being classified as a "workhorse" maritime connector. Platforms like the EPF may be versatile enough to perform in a range of specific mission sets, including the support of drug interdiction and antipiracy operations in addition to Joint force sustainment missions.[30] However, despite its noteworthy qualities, the catamaran EPF vessel lacks the basic abilities needed for enduring maritime logistics, including less-than-desirable seaworthiness.[31] It provides an excellent example of the modern forces' attempt to use an expensive niche platform to address complex maritime logistic shortfalls.

The Navy has invested in the construction and development of the EPF, allowing a handful of these crafts to be used in exercises worldwide and modified based on needs identified by the Joint force.[32] The American shipbuilder Austal USA won a contract to build an upgraded EPF vessel in addition to the newly fielded USNS *Apalachicola* (T-EPF 13) (figure 2).

Figure 2. USNS *Apalachicola* (T-EPF 13)



Source: courtesy of Austal USA.

Apalachicola differs from its predecessors in the *Spearhead* class of catamaran EPF vessels. The most important aspect of *Apalachicola* is its ability to demonstrate autonomous capability. In addition, *Apalachicola* can be quickly converted to an ambulance version and can support MV-22 Osprey operations, which will be crucial to Joint integration with the Marine Corps and the special operations community. The fact that the Navy has invested hundreds of millions of dollars in the program is noteworthy. A platform like the EPF costs $180 million per unit and $26 million a year to maintain, making it costly to mass-produce.[33] Naval procurement considerations that focus on modern fleets and advanced aircraft carriers such as the $16-billion USS *Gerald R. Ford* (CVN 78) often keep maritime connector programs like the EPF from expanding to the level that may be required to support future marmite operations.

EPF vessels and emerging maritime connectors correctly emphasize launching and recovering MV-22 Ospreys to support stand-in forces as part of the EABO concept.[34] Open ocean autonomous control is another proven capability of the EPF that reduces costs and manpower requirements. The technological development of autonomous platforms adds a unique ability that may be essential for future war.[35] This concept could be adapted to a new LST to transport logistical assets across the maritime environment with minimal risk to the force.[36]

The EPF can transit 350 nautical miles in 10 hours. With this ability, it could reach any maritime terrain in eastern China or the South China Sea from U.S. bases in Japan in less than half a day.[37] The EPF can cruise at 35 to 40 knots with a range of 1,200 nautical miles. It could be used for high-risk missions and deception efforts. The potential downside to autonomous operation is the ship's susceptibility to enemy hacking. Adversaries have demonstrated the ability to interfere with U.S. military ship controls and navigation.[38] Additional measures should be taken to protect networks essential to the success of the Joint maritime Force. The EPF can quickly move and launch logistical, counter reconnaissance, offensive, evacuation, and other missions supporting the Joint force. There is undoubtedly a place for platforms like the EPF in certain missions.

However, the EPF is not an LST, and it needs the ability to beach, carry high tonnage, transit high-sea states, and remain cost-effective enough to mass-produce. These are the essential qualities a future maritime connector should possess. Investment in a high-cost, technologically advanced platform like the EPF instead of an updated version of a low-cost, proven platform like the LST exacerbates a severe deficiency in maritime logistics.

A Modern LST

The LST is one of military history's most battle-tested and proven maritime connectors and was produced with unparalleled efficiency during World War II.[39] The U.S. military should invest in and improve a new LST to complement the Joint force now rather than in a decade or after the first battle of the next war. With specific improvements, a new LST can be a versatile, cost-effective, mass-produced enabler to the Joint force during a future maritime conflict. Too often in military history, innovative weapons, platforms, and concepts devised in a time of peace are not implemented appropriately until after the next war has already begun.

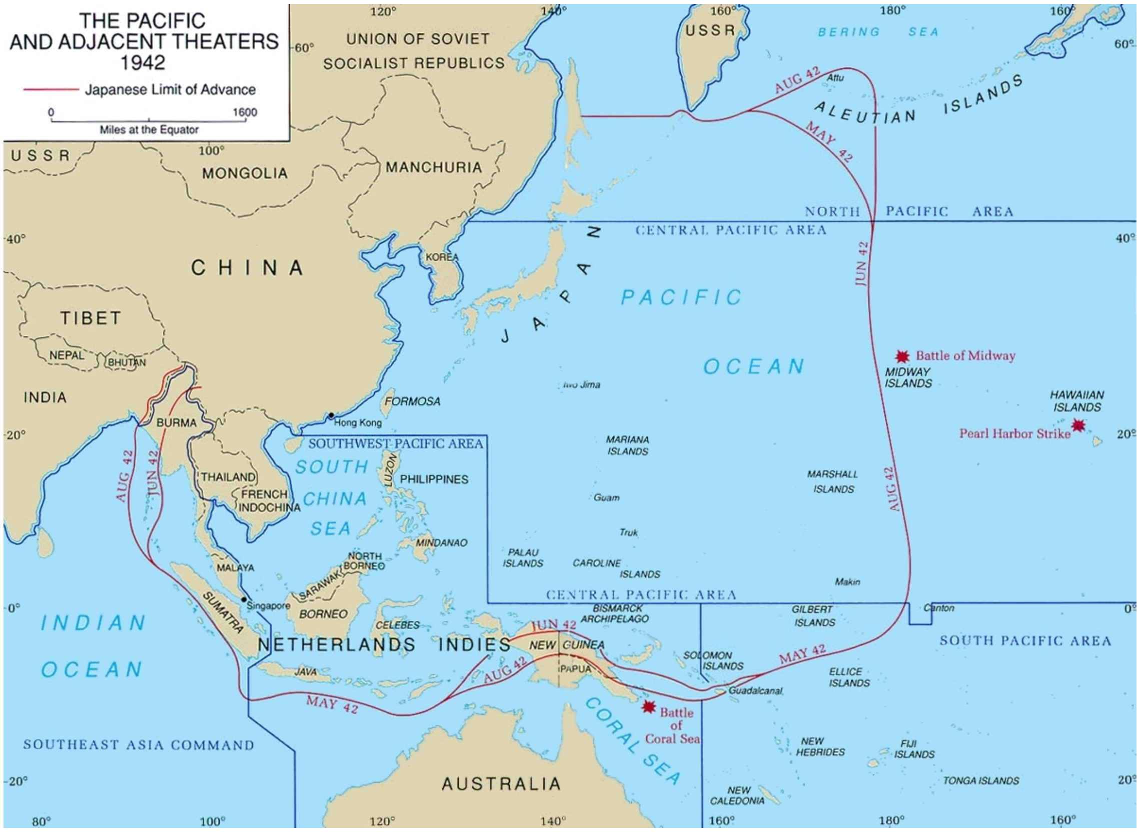
The number one priority for a naval connector remains the ability to offload and on load troops and equipment from a beach without using a pier (figure 3). The ideal beach for landing craft and amphibious operations has deep water close to shore, a firm bottom of hard-packed sand and gravel, minimum variation in tides, and a moderate to gentle (1:15 to 1:60) underwater beach gradient. Appropriate beaches also have no underwater obstructions to seaward and little current or surf. The beach gradient or underwater slope is usually expressed as a depth-to-horizontal distance ratio. For example, a gradient of 1:50 indicates an increase in depth of 1 foot (.3048 meters) for every 50 feet (15.2 meters) of horizontal distance. Therefore, finding the gradient from the water's edge seaward to a depth of three fathoms (5.5 meters) is usually necessary for landing operations.[40] Like its *Newport*-class predecessor, the new LST must carry an extendable ramp for pier side and beach offloads to extend its utility on beaches of less than an ideal gradient.

Figure 3. *Newport*-class LST offload during Exercise Team Spirit, 1987

Source: National Archives and Records Administration.

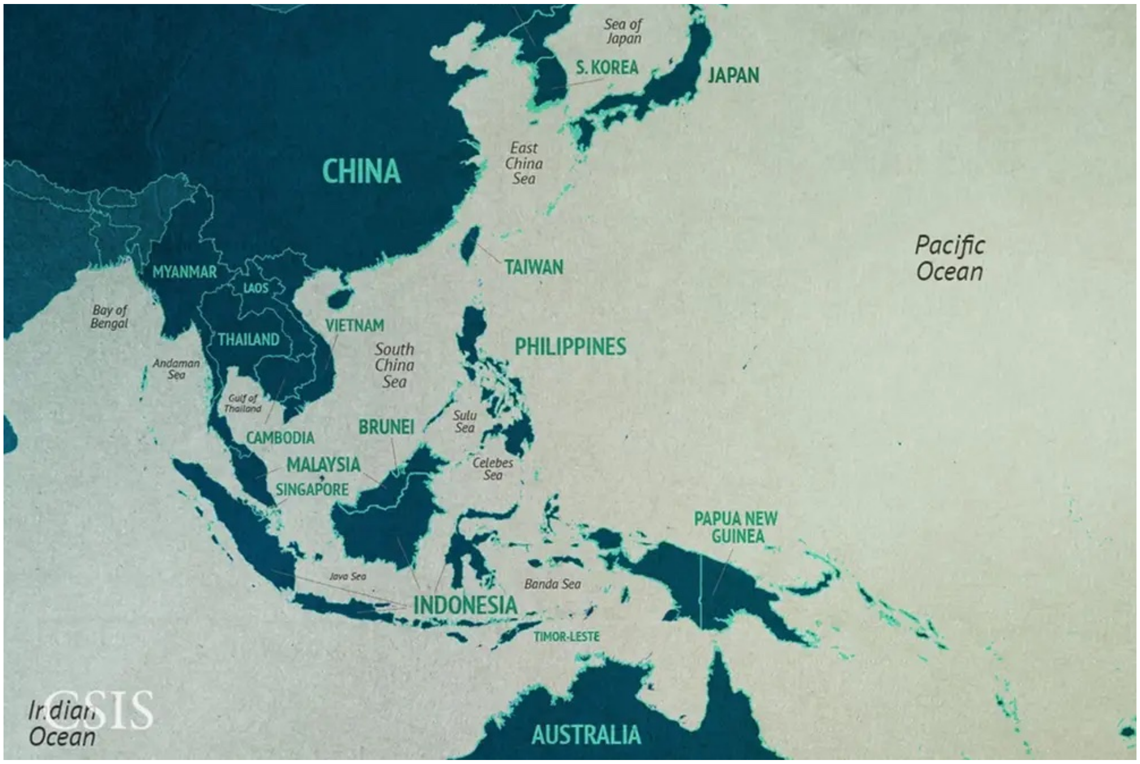
A *Newport*-class LST had a maximum range of 2,500 nautical miles (figure 4).[41] In a future Pacific war, enhanced LSTs could quickly launch from ports in Guam, Hawaii, Australia, Japan, and the Philippines with enough troops and equipment to garrison multiple clusters of key maritime terrain such as islands in the Spratly, Paracel, Babuyan, or Sankaku chains (figure 5).

Figure 4. Maritime range depictions in the Pacific theater of World War II



Source: LtCol Clayton R. Newell, USA, *Central Pacific, 7 December 1941–6 December 1943*, U.S. Army Campaigns of World War II (Washington, DC: U.S. Army Center of Military History, 2019), 16–17.

Figure 5. Key maritime terrain in the Pacific



Source: Asia Maritime Transparency Initiative, Center for Strategic and International Studies, adapted by MCUP.

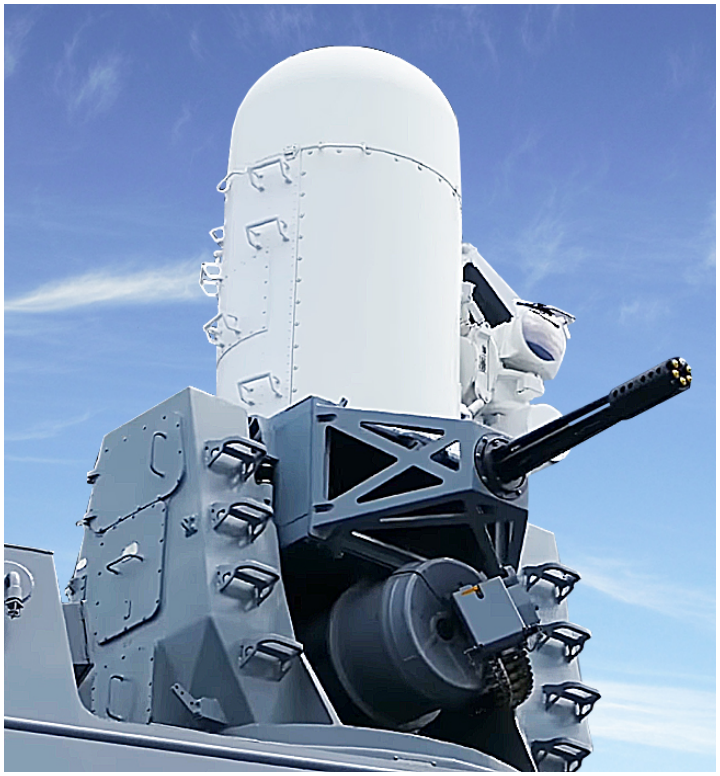
A new LST, like its legacy version, transports and launches a variety of motorized and amphibious assets. Deploying amphibious boats and vehicles from the new LST complements the dwindling capacity of the U.S. Navy's amphibious force. Employing amphibious assets may be required to overcome the dreadful deficiency that the Navy's dwindling amphibious ship fleet has presented to the Joint force.[42] A new LST should be able to supplement amphibious operations across a maritime environment. The ACV may be the only light amphibious armor available to stand-in forces in a contested maritime environment. Incorporating employment versatility by embarking on an LST may be imperative to the success of future maritime operations.[43]

The new LST also requires afloat medical facilities. In a future conflict, air superiority and sea control may be contested on a scale not seen since World War II. Medical facilities may be compromised or overwhelmed, making a medical facility that can geographically displace invaluable. The Joint force will face more difficulty in treating the wounded and sick if air and sea lines of communication are compromised, and existing medical hospital ships cannot position themselves adequately in the fight. This problem worsens when one considers how the Navy will support emerging concepts such as stand-in forces and EABOs. To address this gap, a new LST must be equipped to convert into a Role 2 medical treatment facility quickly. Role 2 care can provide packed blood products, limited X-ray services, laboratory work, dental support, combat and operational stress control, preventative medicine, and Role 2 veterinary medical and resuscitative surgical support. Role 2 has a limited hold capability—that is, no bed capacity.[44] The critical tasks of a Role 2 medical treatment facility include triage, advanced resuscitation procedures, emergency surgical interventions, and short-term intensive care.[45] While the Navy currently has 60 ships considered medical ships, there will be limited expeditionary-capable ships, such as a Role 2-capable EPF, by 2025.[46] The limited number of expeditionary medical ships that are Role 2-capable underscores another complementary dimension that a new LST could give the Joint force at a low cost. LSTs could be transformed into sea-based medical facilities operating in hostile or nonpermissive environments if required.

A new LST must also be versatile enough to conduct offensive actions such as drone strikes and swarming attacks using modular weapons systems and support traditional Joint forcible entry operations, which may have different considerations given the changing character of war.[47] A new LST would require several modifications to be effective in a future contested maritime environment. Artificial intelligence, quantum computing, genetic engineering, and advanced integrated command and control systems are emerging technologies that can be leveraged to enhance platforms like the new LST.[48] However, careful consideration must be given to incorporating technology of this nature lest it overburden the platform.

An LST may require defenses to counter precision fires, including antiship cruise missiles (ASCM) and other airborne threats. One of the main assumptions about future maritime conflict is that the nature of advanced integrated command and control systems will allow the massing of precision fires at a tempo and scale exceeding past wars.[49] Therefore, a future naval connector must be able to operate inside the enemy's weapons engagement zone and remain survivable. This requires defensive measures such as the Phalanx close-in weapons system (CIWS), the RIM-162 evolved sea sparrow missile (ESSM), and possibly advanced shipboard laser systems (figure 6).[50]

Figure 6. Phalanx CIWS aboard USS *Jason Dunham* (DDG 109)



Source: official U.S. Navy photo.

The CIWS and ESSM systems can be easily fitted to most naval connector platforms.[51] However, while the technology exists for shipboard lasers to shoot down enemy unmanned ariel surveillance (UAS), it does not exist to counter ASCMs. Two primary options exist to provide defensive measures against ASCMs and airborne threats. First, a new LST can feature these systems organically, giving flexibility in independent maneuvers, but this approach may bankrupt the project. Second, the Joint force can accept the risk of limited upgrades and compensate by operating a new LST with ships with those capabilities, like a World War II-type attack group or task group.[52]

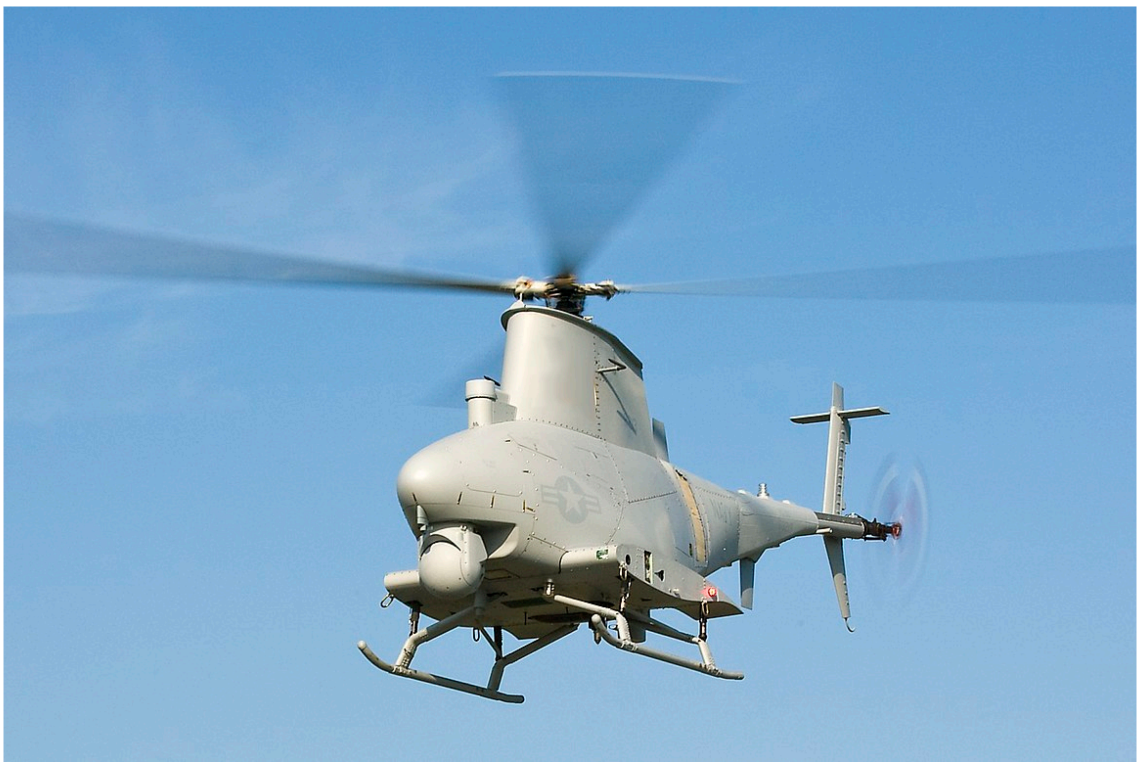
In addition to defensive capabilities, a new LST could be the primary platform for swarm munitions supporting offensive maritime operations.

BAE Systems defines *swarm munitions* as "a class of 'smart' weapons in which the classic military strategy of swarming an enemy is conducted by using a group of agile, networked, constantly communicating, semi-autonomous munitions to collectively overwhelm and damage targets that have been chosen by human controllers."[53] Many countries already use swarm munitions, and the technology exists to place them aboard a naval connector.[54] Suppose supporting fires are not available for an amphibious operation. In that case, the maritime connector could provide a solution by being able to shape the battlefield or support ongoing operations with kinetic fires. During World War II, the British Royal Navy's landing craft, gun demonstrated the support capability of an LST. A modern LST could provide similar enhanced fire support capabilities with more advanced technology.[55] Swarm weapons allow for additional employment options, including the flexibility to execute independent missions in semipermissive environments.

The United States has made noteworthy progress with the HERO family of loitering munitions. Launched from single- or multi-canister launchers and easily integrated into existing naval command and control and target-acquisition systems, HERO systems offer various targeting solutions to the naval warfare arena. Future amphibious operations will require flexible platforms capable of dispersed fires. The Joint force will need to leverage both centralized and dispersed fires to provide the desired effects in the kinetic maritime environment of the future.[56] Spreading loitering munition systems across connectors is one way to do so.

Advanced UAS assets may be another cheap enhancement for a modern LST. UAS platforms can conduct maritime reconnaissance, support amphibious operations in multiple ways, or function as an additional offensive weapons system. Especially beneficial for a new LST would be a small cadre of Northrop Grumman RQ-8A/B Fire Scout unmanned autonomous helicopters with the ability to deploy a small tactical munition (figure 7).[57] The relatively light logistical footprint of a cadre of organic UAS assets makes this capability feasible and cost-effective for offensive, self-defense, or reconnaissance missions.

Figure 7. Northrop Grumman RQ-8A/B Fire Scout



Source: official U.S. Navy photo by Kelly Schindler.

Another essential component of a new LST is an advanced joint communications architecture. A crucial requirement in future war is the ability to integrate complex command and control systems across a global battlefield.[58] The focus of these systems starts in space with advanced communications satellites that may be the first strategic targets in a future conflict.[59] A new LST must be able to integrate into the common command, control, computers, communications, cyber, intelligence, surveillance, and reconnaissance (C5ISR) joint command and control system. This requires advanced communications capabilities. The vulnerability of such connectivity is that if the system is compromised, the collaborative construct will be effectively disabled. All nodes, including connectors like the LST, must carry redundant command and control systems and act when required on mission-type orders in a communications-degraded environment. The versatility and survivability of naval connectors depend on how well they communicate and act independently in a degraded communications environment.

The next evolutionary step for a new LST is to carefully balance and determine the additional modifications and enhancements required for future contested maritime environments while maintaining the fundamental capabilities of the LST. It is one thing to enhance a platform; it is another to add technology and make it something it is not meant to be. Therefore, careful analysis of what technology is crucial to survivability should be the main effort in modifying an LST for future maritime conflict. In addition, the ability to mass-produce a modern LST in a highly efficient manner in partnership with allies to share production resources and costs will be essential to ramp up the new vessels' numbers and affordability.

Production of a New LST

The United States needs more shipyards to build large naval ships, and it can only build large numbers of LSTs with a wartime domestic economy or significant help from allies and partners. From 1939 to 1943, the United

States built 18 new shipyards and employed 650,000 Americans to build just Liberty ships. By 1943, this force was delivering three Liberty ships a day. This production rate created the largest fleet of ships ever built in such a brief period.[60] Meanwhile, 18 shipyards produced more than 1,000 LSTs in three years, a remarkable feat by any reckoning. At the beginning of 1943, the schedule allowed four months from when the keel was laid on a new LST to its final fitting-out and commissioning; that schedule was reduced to two months by the war's end. LSTs were such a priority during the war that they became the second-largest shipbuilding initiative in history. The LST was built in "cornfield Navy" shipyards in unlikely locales, such as Seneca, Illinois; Evansville and Jeffersonville, Indiana; and Pittsburgh and Ambridge, Pennsylvania. Approximately 670 LSTs were constructed in such inland shipyards. The Navy was forced to modify bridges through a "ferry command" to bring those LSTs to the oceans.[61]

Between 1986 and 2016, the United States built approximately 8.5 battle force ships annually.[62] Large naval warships typically take longer to build, have higher unit costs, have more suppliers, and are more technologically complex when compared with other U.S. weapons systems. In addition, the United States has a small domestic market for large U.S.-built civilian ships. Since the 1960s, 14 U.S. shipyards constructing vessels for the Navy have closed, and 3 have left the defense industry. Only one new shipyard has opened. As a result, just seven shipyards, owned by four prime contractors, build large warships for the U.S. Navy today. By comparison, the PRC has more than 20 shipyards supporting its naval surface ship expansion, with dozens of commercial shipyards that dwarf the largest U.S. shipyards in size and throughput.[63] The Chinese People's Liberation Army

Navy is growing at an annual rate of 10 ships, and it is expected to reach 460 ships in 2030. The U.S. Navy, which today has roughly 300 ships, is struggling to replace decommissioning ships to avoid shrinking.[64]

During Operation Dragoon, the Allied invasion of Southern France in August 1944, Task Force 84 required 52 landing craft, infantry (LCI) and 34 LSTs to lift an infantry division.[65] Today, the Joint force would need a similar number of new LSTs to put an infantry division ashore. Unfortunately, the United States military has no LSTs and only a handful of naval connectors that could attempt to perform the duties of a World War II-era LST. Further complicating the production calculus, the rapid construction of future LSTs will be hampered by the addition of too many overly complex and technologically sophisticated new systems.

An updated version of the LST could be built based on the original World War II model, sporting modern power plants, damage control systems, and navigation/communication suites. LSTs could be shipped in sections and assembled onsite anywhere in the world. This method was crucial to the LST's success in World War II. During the war, the United States fulfilled its connector requirements and numerous other high-capacity naval production efforts largely on its own.[66] However, the need may arise again in a future conflict to execute large-scale production of a new LST platform, and that will almost certainly require the help of allies and partners. In addition, the U.S. shipbuilding industry needs a sustained contract that enables companies to keep experienced employees and streamline production efforts.

Globalization and internationalization provide unique benefits to better streamline multinational efforts at cooperative construction, including producing a new LST. Incorporating streamlined practices centered on efficiency and experience would improve the new line's cost-effectiveness. Possessing a surplus of raw materials, streamlining the supply chain, using automation techniques, and saving on energy consumption are other ways to minimize production costs. The ability to gain efficiencies and modernize production across an integrated platform would be crucial to mass-producing a new LST. In addition, more shipyards capable of producing a new LST would be required. This requires partnering with allies or building new shipyards in the United States.

Potential partners abound. The most capable of these potential partners in the Pacific include Australia, South Korea, and Japan. Elsewhere in the world, the United Kingdom, France, Italy, Germany, Israel, and Saudi Arabia may also be interested in joining an LST production consortium. India may also seek an affordable naval connector to enhance its presence on the Andaman and Nicobar Islands, allowing it to leverage the PRC's "Malacca dilemma," which refers to the PRC's dependence on oil that passes through the Strait of Malacca to maintain its economy and military.[67]

The imminent threat to the United States of a significant maritime conflict should spur the production of a new LST. Congress must ensure that a new LST or other maritime connector is a required asset in a future war. An extreme example of Congress ensuring the nation had the right ships for war was the Emergency Shipbuilding Program during World War II, in which 6,000 support ships were built in five years.[68] However, a proactive approach should be the desired course of action in this case. The U.S. Navy has begun production on a limited number of "nonstrategic" ships, constrained by the overall limited output of U.S. naval ships. Hundreds of

LSTs with modern technological improvements could be built for the cost of one *Gerald R. Ford*-class aircraft carrier.[69] The desire of senior U.S. naval leaders to invest only in strategic assets must be tempered with the need to budget for less sophisticated workhorse platforms that also support future operational success.

The integration of allies in an LST construction effort may be possible. A naval connector capability is sought by most maritime nations, who should be interested in partnering in a coalition-based development and construction effort. This concept has even more significant implications for a future maritime conflict. The interoperability and production potential for international partners are immense. The ability to mass-produce and operate a future naval connector is made easier with multiple technologically advanced nations with multiple shipbuilding yards partnering to share and benefit from developing a mutually advantageous capability.[70]

In addition, increased domestic and international support for a new LST program will allow the United States and its partners to mitigate their amphibious and naval logistics shortfalls. Attention to a future naval connector program could alleviate mass production and upgrade requirements required in a future maritime conflict. Near-peer competitors such as the PRC have made significant advancements in their amphibious and naval logistics capabilities, including the ability to mass key enablers toward a common objective, which indicates an investment in naval logistics capabilities.[71] The United States needs help resolving its naval connector deficiency. Without progress in this connector field, the Western powers will be at a significant disadvantage in the next naval conflict. Future battles will feature the United States at a considerable disadvantage, which a new LST could help alleviate.[72] The Joint force and the United States' international partners must be integrated and complementary in building a new LST. The next evolutionary step for the LST is incorporating additional modifications and enhancements required in a future contested maritime environment without overburdening the platform with unnecessary technology.

It is prudent to perform a cost analysis based on historical data to understand better some of the actual costs associated with the mass production of a new LST. Taking historical data such as past construction efforts, initial production, and operating costs will offer a clearer picture of the implications of restarting an LST line. In 2009, the United States had nearly finalized a sale to Peru of the last two *Newport*-class LSTs for $82 million.[73] The deal included spare parts, crew training, and an overhaul/refit of both ships.[74] Estimates based on historical startup costs and new construction costs (i.e., the light amphibious warship) suggest that a new LST will cost between $57.5 and $100 million per ship (table 1).[75] A comparison of World War II-era LST requirements for Operation Dragoon and a modern U.S. Marine Corps division structure suggests that a fleet of 54 LSTs would be required to support a Marine expeditionary force (MEF) (table 2).

Table 1. Cost analysis comparison, 2023 (USD)

Platform	Construction costs per unit
Upgraded LST	$57.5 million (Peru study *Newport*-class model)
U.S. Navy EPF	$180 million
U.S. Army LSV	$26 million
U.S. Marine Corps SLV	Testing phase

Source: data compiled by the author from the Congressional Research Service, the Congressional Budget Office, the Defense Security Cooperation Agency, and Austal USA.

Table 2. Implementation analysis for modern 54-ship LST fleet, 2023 (USD)

Total base cost	Peru model: $3.3 billion LAW model: $5.4 billion
Operating cost	$1 billion per year
Initial production cost	Peru model: $2.05 billion LAW model: $3.1 billion
Total cost	Peru model: $6 billion LAW model: $9 billion

Source: data compiled by the author from the Congressional Research Service, the Congressional Budget Office, and the Defense Security Cooperation Agency.

Conclusion

A new LST is necessary to help fill the maritime logistical capability gap currently plaguing the U.S. military. Despite the difficulty of initiating the production of a new LST, its need in future wars is evident. Near-peer competitors such as the PRC have advanced their naval capabilities, outpacing the United States' maritime capacity and capability. The United States must keep pace with its strategic competitors. This requires a versatile, flexible, and proven platform that can integrate with and be produced by allied nations. That platform is a new LST.

The LST's combination of mass, versatility, and survivability promises to solve the U.S. military's maritime connector problem. The LST should be central to discussions regarding Joint force support in a contested marine environment. An overly expensive, less-capable niche maritime connector is not viable. Investing in such platforms shows an unwillingness to consider and incorporate lessons from past wars.

The United States and its partners make a great mistake by not paying attention to naval history's lessons regarding maritime connectors and theater-level logistics. If the United States is serious about supporting concepts like EABOs and stand-in forces, it must first address the critical vulnerability of inadequate logistics that will doom the concept to failure. A solution may also involve taking lessons from World War II-era ESBs, including creating multiple inter-Service engineer support battalions with complementary capabilities to support a Joint force. Waiting until the next war begins to address a critical strategic problem is a recipe for failure. A new LST provides a straightforward way to address the connector shortfall. Future naval shipbuilding programs should focus on producing a new LST and how stakeholders can shift current funding to support this vital construction program.

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