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Navy Light Amphibious Warship (LAW) Program: Background and Issues for Congress

Updated June 7, 2021

Congressional Research Service
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R46374

CRS REPORT
Prepared for Members and
Committees of Congress

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SUMMARY

R46374

June 7, 2021

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Navy Light Amphibious Warship (LAW) Program: Background and Issues for Congress

The Navy's new Light Amphibious Warship (LAW) program envisions procuring a class of 28 to 30 new amphibious ships to support the Marine Corps, particularly in implementing a new Marine Corps operational concept called Expeditionary Advanced Base Operations (EABO). The Navy envisions the first LAW being procured in FY2023. The Navy's proposed FY2022 budget requests $13.2 million in research and development funding for the program.

The EABO concept was developed with an eye toward potential conflict scenarios with China in the Western Pacific. Under the concept, the Marine Corps envisions, among other things, having reinforced-platoon-sized Marine Corps units maneuver around the theater, moving from island to island, to fire anti-ship cruise missiles (ASCMs) and perform other missions so as to contribute, alongside Navy and other U.S. military forces, to U.S. operations to counter and deny sea control to Chinese forces. The LAW ships would be instrumental to these operations, with LAWs embarking, transporting, landing, and subsequently reembarking these small Marine Corps units.

As conceived by the Navy and Marine Corps, LAWs would be much smaller and individually much less expensive to procure and operate than the Navy's current amphibious ships. The Navy wants LAWs to be 200 to 400 feet in length, and to have a unit procurement cost of $100 million to $150 million.

The LAW as outlined by the Navy is small enough that it could be built by any of several U.S. shipyards. The Navy states that in response to an initial request for information (RFI) about the LAW, it received responses from 13 firms, including nine shipyards. The Navy's baseline preference is to have a single shipyard build all 28 to 30 ships, but the Navy is open to having them built in multiple yards to the same design if doing so could permit the program to be implemented more quickly and/or less expensively.

The LAW program poses a number of potential oversight matters for Congress, including the merits of the EABO concept, how LAWs would fit into the Navy's future fleet architecture, the Navy's preliminary unit procurement cost target for the ship, and the industrial-base implications of the program.

The issue for Congress is whether to approve, reject, or modify the Navy's annual funding requests and envisioned acquisition strategy for the program. Congress's decisions regarding the program could affect Navy and Marine Corps capabilities and funding requirements and the U.S. shipbuilding industrial base.

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Introduction

This report provides background information and issues for Congress on the Navy's new Light Amphibious Warship (LAW) program, which envisions procuring a class of 28 to 30 new amphibious ships to support the Marine Corps, particularly in implementing a new Marine Corps operational concept called Expeditionary Advanced Base Operations (EABO). The Navy envisions the first LAW being procured in FY2023. The Navy's proposed FY2022 budget requests $13.2 million in research and development funding for the program.

The LAW program poses a number of potential oversight matters for Congress. The issue for Congress is whether to approve, reject, or modify the Navy's annual funding requests and envisioned acquisition strategy for the program. Congress's decisions regarding the program could affect Navy and Marine Corps capabilities and funding requirements and the U.S. shipbuilding industrial base.

A separate CRS report discusses the Navy's programs for building much-larger LPD-17 Flight II and LHA-class amphibious ships.[1] Other CRS reports provide an overview of new Navy and Marine Corps operational concepts, including EABO, the overall strategic and budgetary context in which amphibious ship and other Navy shipbuilding programs may be considered, and the Marine Corps' plans for redesigning Marine Corps units and their equipment.[2]

Background

U.S. Navy Amphibious Ships in General

Roles and Missions

Navy amphibious ships are operated by the Navy, with crews consisting of Navy personnel. They are battle force ships, meaning ships that count toward the quoted size of the Navy. The primary function of Navy amphibious ships is to lift (i.e., transport) embarked U.S. Marines and their weapons, equipment, and supplies to distant operating areas, and enable Marines to conduct expeditionary operations ashore in those areas. Although amphibious ships can be used to support Marine landings against opposing military forces, they are also used for operations in permissive or benign situations where there are no opposing forces. Due to their large storage spaces and their ability to use helicopters and landing craft to transfer people, equipment, and supplies from ship to shore without need for port facilities,[3] amphibious ships are potentially useful for a range of combat and noncombat operations.[4]

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[1] CRS Report R43543, *Navy LPD-17 Flight II and LHA Amphibious Ship Programs: Background and Issues for Congress*, by Ronald O'Rourke.

[2] CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke; and CRS Insight IN11281, *New U.S. Marine Corps Force Design Initiatives*, by Andrew Feickert.

[3] Amphibious ships have berthing spaces for Marines; storage space for their wheeled vehicles, their other combat equipment, and their supplies; flight decks and hangar decks for their helicopters and vertical take-off and landing (VTOL) fixed-wing aircraft; and in many cases well decks for storing and launching their landing craft. (A well deck is a large, garage-like space in the stern of the ship. It can be flooded with water so that landing craft can leave or return to the ship. Access to the well deck is protected by a large stern gate that is somewhat like a garage door.)

[4] Amphibious ships and their embarked Marine forces can be used for launching and conducting humanitarian-assistance and disaster-response (HA/DR) operations; peacetime engagement and partnership-building activities, such

On any given day, some of the Navy's amphibious ships, like some of the Navy's other ships, are forward-deployed to various overseas operating areas in multiship formations called amphibious groups (ARGs). Amphibious ships are also sometimes forward-deployed on an individual basis, particularly for conducting peacetime engagement activities with foreign countries or for responding to smaller-scale or noncombat contingencies.

Current Types of Amphibious Ships

The Navy's current amphibious-ship force consists entirely of large amphibious ships, including the so-called "big-deck" amphibious assault ships, designated LHA and LHD, which look like medium-sized aircraft carriers, and the smaller (but still quite sizeable) amphibious ships, designated LPD or LSD, which are sometimes called "small-deck" amphibious ships.[5] As mentioned earlier, a separate CRS report discusses the Navy's current programs for procuring new LHA- and LPD-type ships.[6] The LAWs discussed in this CRS report would be much smaller than the Navy's current amphibious ships.

Amphibious Fleet Force-Level Goal

Current Force-Level Goal

The Navy's current 355-ship force-level goal, which was released on December 15, 2016, calls for achieving and maintaining a fleet of 355 ships, including 38 amphibious ships, of which 12 are to be 12 LHA/LHD-type ships and 26 are to be LPD-17 Flight I and Flight II ships.[7] This 38-ship force-level goal predates the initiation of the LAW program and consequently includes no LAWs.

The 38-ship force-level goal is intended to meet a wartime requirement for having enough amphibious lift for transporting the assault echelons of two Marine Expeditionary Brigades (MEBs), a requirement known as the 2.0 MEB lift requirement. The 2.0 MEB lift requirement dates to 2006. The translation of this lift requirement into a Marine Corps-preferred force-level goal of 38 ships dates to 2009, and the Navy's formal incorporation of the 38-ship goal (rather than a more fiscally constrained goal of 33 or 34 ships) into the Navy's overall ship force-structure goal dates to 2016.[8] Navy and Marine Corps officials have testified in the past that fully

as exercises; other nation-building operations, such as reconstruction operations; operations to train, advise, and assist foreign military forces; peace-enforcement operations; noncombatant evacuation operations (NEOs); maritime-security operations, such as anti-piracy operations; smaller-scale strike and counter-terrorism operations; and larger-scale ground combat operations. Amphibious ships and their embarked Marine forces can also be used for maintaining forward-deployed naval presence for purposes of deterrence, reassurance, and maintaining regional stability.

[5] U.S. Navy amphibious ships have designations starting with the letter L, as in amphibious *landing*. LHA can be translated as landing ship, helicopter-capable, assault; LHD can be translated as landing ship, helicopter-capable, well deck; LPD can be translated as landing ship, helicopter platform, well deck; and LSD can be translated as landing ship, well deck. Whether noted in the designation or not, almost all these ships have well decks. The exceptions are LHAs 6 and 7, which do not have well decks and instead have expanded aviation support capabilities. For an explanation of well decks, see footnote 3. The terms "large-deck" and "small-deck" refer to the size of the ship's flight deck.

[6] CRS Report R43543, *Navy LPD-17 Flight II and LHA Amphibious Ship Programs: Background and Issues for Congress*, by Ronald O'Rourke.

[7] For more on the Navy's 355-ship force-level goal, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke. For a more detailed review of the 38-ship force structure requirements, see Appendix A of archived CRS Report RL34476, *Navy LPD-17 Amphibious Ship Procurement: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

[8] For additional discussion of the 2.0 MEB lift goal and earlier amphibious lift goals dating back to 1980, see Appendix

meeting U.S. regional combatant commander requests for day-to-day forward deployments of amphibious ships (as opposed to wartime needs) would require a force of 50 or more amphibious ships of the current large types.[9]

The 38-ship force-level goal is a target that the Navy wants to achieve and maintain in coming years. Under the Navy's FY2021 budget submission, the Navy projected that it would have 33 amphibious ships at the end of FY2020, including 10 LHA/LHD-type ships and 23 LSD/LPD-type ships.[10]

Potential New Force-Level Goal

Overview

The Navy and DOD since 2019 have been working to develop a new force-level goal to replace the Navy's current 355-ship force-level goal. This new force-level goal is expected to introduce a once-in-a-generation change in fleet architecture, meaning basic the types of ships that make up the Navy and how these ships are used in combination with one another to perform Navy missions. This new fleet architecture is expected to be more distributed than the fleet architecture reflected in the 355-ship goal or previous Navy force-level goals. In particular, the new fleet architecture is expected to feature

- a smaller proportion of larger ships (such as large-deck aircraft carriers, cruisers, destroyers, large amphibious ships, and large resupply ships);
- a larger proportion of smaller ships (such as frigates, corvettes, smaller amphibious ships, smaller resupply ships, and perhaps smaller aircraft carriers); and
- a new third tier of surface vessels about as large as corvettes or large patrol craft that will be either lightly manned, optionally manned, or unmanned, as well as large unmanned underwater vehicles (UUVs).

Navy and DOD leaders believe that shifting to a more distributed fleet architecture is

- **operationally necessary**, to respond effectively to the improving maritime anti-access/area-denial (A2/AD) capabilities of other countries, particularly China;[11]

A of archived CRS Report RL34476, *Navy LPD-17 Amphibious Ship Procurement: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

[9] For example, in testimony to the Seapower and Projection Forces subcommittee of the House Armed Services Committee on February 25, 2015, Marine Corps Lieutenant General Kenneth J. Glueck, Jr., Deputy Commandant for Combat Development and Integration and Commanding General of the Marine Corps Combat Development Command, stated that the number needed to fully meet regional combatant commander demands for forward-deployed amphibious ships is "close to 54." (Source: Spoken testimony of Lieutenant General Glueck, as reflected in transcript of hearing.)

[10] Department of the Navy, *Highlights of the Department of the Navy FY 2021 Budget*, February 10, 2020, Figure 3-2 on p. 3-2.

[11] See, for example, David B. Larter, "With China Gunning for Aircraft Carriers, US Navy Says It Must Change How It Fights," *Defense News*, December 6, 2019; Arthur H. Barber, "Redesign the Fleet," *U.S. Naval Institute Proceedings*, January 2019. Some observers have long urged the Navy to shift to a more distributed fleet architecture, on the grounds that the Navy's current architecture—which concentrates much of the fleet's capability into a relatively limited number of individually larger and more expensive surface ships—is increasingly vulnerable to attack by the improving A2/AD capabilities (particularly anti-ship missiles and their supporting detection and targeting systems) of potential adversaries, particularly China. Shifting to a more distributed architecture, these observers have argued, would

- complicate an adversary's targeting challenge by presenting the adversary with a larger number of Navy units

- **technically feasible** as a result of advances in technologies for UVs and for networking widely distributed maritime forces that include significant numbers of UVs; and
- **affordable**—no more expensive, and possibly less expensive, than the current fleet architecture, so as to fit within expected future Navy budgets.

December 9, 2020, Shipbuilding Document

On December 9, 2020, the outgoing Trump Administration released a document that can be viewed as its own vision for future Navy force structure and/or a draft version of the FY2022 30-year Navy shipbuilding plan. The document presents an envisioned Navy force-level goal for achieving by 2045 a Navy with a more distributed fleet architecture, including 382 to 446 manned ships and 143 to 242 large unmanned vehicles (UVs). Within the total of 382 to 446 manned ships, the document calls for an amphibious fleet of 61 to 67 amphibious ships, including 9 to 10 LHA/LHD-type ships and a combined total of 52 to 57 LPD-type ships and LAWs. (The document did not break down the figure of 52 to 57 ships into separate figures for LPD-type ships and LAWs.) In establishing its force-level goals and shipbuilding plans for the Navy, the Biden Administration can choose to adopt, revise, or set aside this document.

Operational Rationale

To improve their ability to perform various missions in coming years, including a potential mission of countering Chinese forces in a possible conflict in the Western Pacific, the Navy and Marine Corps want to implement a new operational concept called Distributed Maritime Operations (DMO).[12] DMO calls for U.S. naval forces (meaning the Navy and Marine Corps)[13] to operate at sea in a less concentrated, more distributed manner, so as to complicate an adversary's task of detecting, identifying, tracking, and targeting U.S. naval forces, while still being able to bring lethal force to bear against adversary forces. To support the implementation of DMO, the Navy wants to shift to the new and more distributed fleet architecture outlined above.

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to detect, identify, and track;

- reduce the loss in aggregate Navy capability that would result from the destruction of an individual Navy platform;
- give U.S. leaders the option of deploying USVs and UUVs in wartime to sea locations that would be tactically advantageous but too risky for manned ships; and
- increase the modularity and reconfigurability of the fleet for adapting to changing mission needs.

For more on China's maritime A2/AD capabilities, see CRS Report RL33153, *China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress*, by Ronald O'Rourke.

[12] For additional discussion, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report RL33153, *China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress*, by Ronald O'Rourke.

[13] Although the term *naval* is often used to refer specifically to the Navy, it more properly refers to both the Navy and Marine Corps, because both the Navy and Marine Corps are naval services. Even though the Marine Corps sometimes operates for extended periods as a land fighting force (as it has done in recent years, for example, in Afghanistan and Iraq), and is often thought of as the country's second land army, it nevertheless is, by law, a naval service. 10 U.S.C. §8001(a)(3) states, "The term 'member of the naval service' means a person appointed or enlisted in, or inducted or conscripted into, the Navy or the Marine Corps." DON officials sometimes refer to the two services as the Navy-Marine Corps team. For additional discussion, see CRS In Focus IF10484, *Defense Primer: Department of the Navy*, by Ronald O'Rourke.

In parallel with DMO, and with an eye toward potential conflict scenarios in the Western Pacific against Chinese forces, the Marine Corps has developed two supporting operational concepts, called Littoral Operations in a Contested Environment (LOCE) and Expeditionary Advanced Base Operations (EABO). Under the EABO concept, the Marine Corps envisions, among other things, having reinforced-platoon-sized Marine Corps units maneuver around the theater, moving from island to island, to fire anti-ship cruise missiles (ASCMs) and perform other missions so as to contribute, alongside Navy and other U.S. military forces, to U.S. operations to counter and deny sea control to Chinese forces.

More specifically, the Marine Corps states that the EABO concept includes, among other things, establishing and operating "multiple platoon-reinforced-size expeditionary advance base sites that can host and enable a variety of missions such as long-range anti-ship fires, forward arming and refueling of aircraft, intelligence, surveillance, and reconnaissance of key maritime terrain, and air-defense and early warning,"[14] The use of Marine Corps units to contribute to U.S. sea-denial operations against an opposing navy by shooting ASCMs would represent a new mission for the Marine Corps.[15]

The LAW ships would be instrumental to these operations, with LAWs embarking, transporting, landing, and subsequently reembarking these small Marine Corps units. An August 27, 2020, press report states, "Maj. Gen. Tracy King, the director of expeditionary warfare on the chief of naval operations' staff (OPNAV N95), said today that LAW was perhaps the most important investment the Marine Corps was making to optimize itself for expeditionary advance base operations (EABO)."[16] The December 9, 2020, shipbuilding document submitted by the outgoing Trump Administration stated that the Marine Corps

> is reducing a number of legacy systems to reinvest in development of more NDS [National Defense Strategy]-relevant capabilities such as Marine Littoral Regiments (MLRs), as outlined in the Commandant's Planning Guidance and Force Design. The FNFS [Future Naval Force Study] highlights the important contributions MLRs provide to Sea Denial and Sea Control missions. This approach requires a new mix of amphibious warships including the Light Amphibious Warship (LAW), which is critical to MLR mobility and sustainability. The overall number of amphibious warships grows to support the more distributed expeditionary force design, with an increased number of LAW complementing fewer legacy amphibious warships.[17]

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[14] Emailed statement from Marine Corps as quoted in Shawn Snow, "New Marine Littoral Regiment, Designed to Fight in Contested Maritime Environment, Coming to Hawaii," *Marine Times*, May 14, 2020. See also David H. Berger, "Preparing for the Future, Marine Corps Support to Joint Operations in Contested Littorals," *Military Review*, April 2021, 8 pp.

[15] For press articles discussing these envisioned operations, see, for example, Bill Gertz, "Marine Commandant Reveals New Mission Preparing for China Conflict," Washington Times, April 21, 2021; Megan Eckstein, "CMC Berger Outlines How Marines Could Fight Submarines in the Future," *USNI News*, December 8, 2020; David Axe, "Meet Your New Island-Hopping, Missile-Slinging U.S. Marine Corps," *Forbes*, May 14, 2020; Shawn Snow, "New Marine Littoral Regiment, Designed to Fight in Contested Maritime Environment, Coming to Hawaii," *Marine Times*, May 14, 2020; William Cole (Honolulu Star-Advertiser), "The Marine Corps Is Forming a First-of-its-Kind Regiment in Hawaii," *Military.com*, May 12, 2020; Joseph Trevithick, "Marines To Radically Remodel Force, Cutting Tanks, Howitzers In Favor Of Drones, Missiles," *The Drive*, March 23, 2020; Chris "Ox" Harmer, "Marine Boss's Audacious Plan To Transform The Corps By Giving Up Big Amphibious Ships," *The Drive*, September 5, 2019.

[16] Megan Eckstein, "Marines Already In Industry Studies for Light Amphibious Warship, In Bid to Field Them ASAP," *USNI News*, August 27 (updated August 28), 2020. See also Paul McLeary, "'If It Floats, It Fights:' Navy's New Small Ship Strategy," *Breaking Defense*, August 28, 2020.

[17] U.S. Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels*, December 9, 2020, p. 11.

A February 2021 Marine Corps tentative manual on EABO states:

> Littoral maneuver will rely heavily on surface platforms such as the light amphibious warship (LAW) and a range of surface connectors, as well as aviation assets. The LAW is envisioned as the principal littoral maneuver vessel of the littoral force….
>
> The LAW supports the day-to-day maneuver of stand-in forces operating in the LOA [littoral operations area]. It complements L-class amphibious ships[18] and other surface connectors. Utilizing the LAW to transport forces of the surface reduces the impacts of tactical vehicles on the road network, increases deception, and allows for the sustainment of forces during embarkation. The range, endurance, and austere access of LAWs enable the littoral force to deliver personnel, equipment, and sustainment across a widely distributed area. Shallow draft and beaching capability are keys to providing the volume and agility to maneuver the required capabilities to key maritime terrain.
>
> LAW employment requires reconnaissance and prior planning relating to the bathymetry of the littoral environment. Effective LAW employment relies on knowledge of the beach makeup, slope, currents, tidal effects, and other environment factors.
>
> As envisioned and when properly postured, LAWs possess the range, endurance, speed, sea-keeping, and C4ISR capabilities to support and conduct complementary operations with, but not as part of, US Navy tactical groups, including an expeditionary strike group (ESG) or amphibious ready group (ARG). Forward-positioned LAWs may augment the capabilities of deploying ARG/MEUs during regional engagement and response to crises or contingencies.
>
> The LAW with embarked forces, generates and/or enables the following effects:
>
> - Rapidly maneuver forces from shore-to-shore in a contested environment
> - Sustain a combat-credible force ashore
> - Conduct enduring operations
> - Enable persistent joint-force operations and power projection
> - Provide increased and capable forward presence[19]

The survivability of the LAW ships would come from their ability to hide among islands and other sea traffic, from defensive support they would receive from other U.S. Navy forces, and from the ability of their associated Marine Corps units to fire missiles at Chinese ships and aircraft that could attack them with their own missiles (which can be viewed as an application of the notion that the best defense is a good offense).

For additional background information on the proposed change in the amphibious-ship force architecture and the EABO-related operational rationale behind it, see the **Appendix**.

[18] The term *L-class amphibious ships* refers to the Navy's LHA/LHD- and LPD-type amphibious ships, whose designation begins with the letter L in reference to amphibious *landing*.

[19] Department of the Navy, Headquarters, United States Marine Corps, *Tentative Manual for Expeditionary Advanced Base Operations*, February 2021, pp. 7-9 to 7-10.

Light Amphibious Warship (LAW) Program[20]

Overview

The LAW program envisions procuring a class of 28 to 30 new ships that would be much smaller and individually much less expensive to procure and operate than the Navy's current amphibious ships. The Navy envisions the first LAW being procured in FY2023. The Navy's proposed FY2022 budget requests $13.2 million in research and development funding for the program.

Ship Design

The Navy wants LAWs to be a relatively simple and relatively inexpensive ships with the following features, among others:

- a length of 200 feet to 400 feet;[21]
- a maximum draft of 12 feet;
- a displacement of up to 4,000 tons;[22]
- a ship's crew of no more than 40 Navy sailors;[23]
- an ability to embark at least 75 Marines;
- 4,000 to 8,000 square feet of cargo area for the Marines' weapons, equipment, and supplies;[24]

[20] Unless otherwise stated, information in this section about the LAW is taken from Navy briefing slides and Navy answers to industry questions from LAW program industry days that were held on March 4 and April 9, 2020, and posted on March 20, May 5, and May 7, 2020, at "RFI: US Navy Light Amphibious Warship (LAW)," https://beta.sam.gov/opp/90a9ece86ade48089e9f6d57d2969d23/view, accessed by CRS on May 15, 2020.

For press articles about the LAW, see Megan Eckstein, "Navy Researching New Class of Medium Amphibious Ship, New Logistics Ships," *USNI News*, February 20, 2020. See also Rich Abott, "FY 2021 Request Starts Work on Future Amphibs and Logistics Ships," *Defense Daily*, February 20, 2020; David Axe, "This Weird Little Ship Could Be the Future of Amphibious Warfare," *National Interest*, February 24, 2020; Mallory Shellbourne, "Navy begins pursuit of Light Amphibious Warship," *Inside Defense*, March 26, 2020; Joseph Trevithick, "Navy Wants To Buy 30 New Light Amphibious Warships To Support Radical Shift In Marine Ops," *The Drive*, May 5, 2020; Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020.

[21] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020.

[22] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020.

[23] A draft circular of requirements (CoR) attached to a request for information (RFI) on the Law program that Navy released on October 16, 2020, states that "The ship shall be capable of at least 11 day missions without replenishment for 40 crew and 50 embarked personnel." ("Light Amphibious Warship (LAW) Circular of Requirements (CoR), Draft for Preliminary Design RFI, Ver 0.12, 10-13-20, PDF page 6 of 19, attachment to "RFI: DRAFT US Navy Light Amphibious Warship Preliminary Design/Contract Design Statement of Work," Beta.sam.gov, accessed November 23, 2020, at https://beta.sam.gov/opp/c1c8a3900504442fa5ad3bac48cec001/view?index=opp.)

[24] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020. A draft circular of requirements (CoR) attached to a request for information (RFI) on the Law program that Navy released on October 16, 2020, states that the "ship shall have a cargo deck capable of carrying 648 ST [short tons] and a minimum deck area of 8000" square feet. ("Light Amphibious Warship (LAW) Circular of Requirements (CoR), Draft for Preliminary Design RFI, Ver 0.12, 10-13-20, PDF page 5 of 19, attachment to "RFI: DRAFT US Navy Light Amphibious Warship Preliminary Design/Contract Design Statement of Work," Beta.sam.gov, accessed November 23, 2020, at https://beta.sam.gov/opp/c1c8a3900504442fa5ad3bac48cec001/view?index=opp.)

- a stern or bow landing ramp for moving the Marines and their weapons, equipment, and supplies the ship to shore (and vice versa) across a beach;
- a modest suite of C4I equipment;[25]
- a 25mm or 30mm gun system and .50 caliber machine guns for self-defense;
- a transit speed of at least 14 knots, and preferably 15 knots;[26]
- a minimum unrefueled transit range of 3,500 nautical miles;[27]
- a "Tier 2+" plus level of survivability (i.e., ruggedness for withstanding battle damage)—a level, broadly comparable to that of a smaller U.S. Navy surface combatant (i.e., a corvette or frigate), that would permit the ship to absorb a hit from an enemy weapon and keep the crew safe until they and their equipment and supplies can be transferred to another LAW;[28]
- an ability to operate within fleet groups or deploy independently; and
- a 20-year expected service life.[29]

In addition to the above points, the Navy states that the LAW's design can be based on a commercial-ship design.

A ship fitting the requirements listed above would be only a fraction as large as the Navy's current amphibious ships—the Navy's LHA/LHD-type ships are 844 to 855 feet long and have a full load displacements between 40,000 and 45,000 tons, while its and LPD-17 class ships are 684 feet long and have a full load displacement of 24,900 tons.

The LAW's maximum draft of 12 feet is intended to permit the ship to transit shallow waters on its way to and from landing beaches. The Navy prefers that the ship's cargo space be in the form of open deck storage. Unlike most of the Navy's current amphibious ships, the LAW would not have a well deck.[30] A transit speed of about 15 knots would be less than the approximate 22-knot maximum sustained speed of larger U.S. Navy amphibious ships, but it is a relatively fuel-

[25] C4I is command and control, communications, computers, and intelligence.

[26] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020. A draft circular of requirements (CoR) attached to a request for information (RFI) on the Law program that Navy released on October 16, 2020, states that the "ship shall be capable of a minimum transit speed of 14 knots in Sea State three (SS3) at the ship's full load condition…." ("Light Amphibious Warship (LAW) Circular of Requirements (CoR), Draft for Preliminary Design RFI, Ver 0.12, 10-13-20, PDF page 6 of 19, attachment to "RFI: DRAFT US Navy Light Amphibious Warship Preliminary Design/Contract Design Statement of Work," Beta.sam.gov, accessed November 23, 2020, at https://beta.sam.gov/opp/c1c8a3900504442fa5ad3bac48cec001/view?index=opp.)

[27] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020. A draft circular of requirements (CoR) attached to a request for information (RFI) on the Law program that Navy released on October 16, 2020, states that The ship shall be capable of 3500 nautical miles endurance at 14 knots without refueling at the ship's full load condition…." ("Light Amphibious Warship (LAW) Circular of Requirements (CoR), Draft for Preliminary Design RFI, Ver 0.12, 10-13-20, PDF page 6 of 19, attachment to "RFI: DRAFT US Navy Light Amphibious Warship Preliminary Design/Contract Design Statement of Work," Beta.sam.gov, accessed November 23, 2020, at https://beta.sam.gov/opp/c1c8a3900504442fa5ad3bac48cec001/view?index=opp.)

[28] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020.

[29] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020.

[30] As noted in footnote 3, a well deck is a large, covered, garage-like space in the stern of the ship. It can be flooded with water so that landing craft can leave or return to the ship. Access to the well deck is protected by a large stern gate that is somewhat like a garage door.

efficient speed for moving ships through water,[31] which would permit the ship to be equipped with a less powerful and consequently less expensive propulsion plant. The 20-year expected service life is less than the 30- to 45-year expected service lives of larger U.S. Navy amphibious ships—a difference that could reduce the LAW's construction cost for a ship of its type and size—and closer to the 25-year expected service life of the Navy's Littoral Combat Ships (LCSs).[32]

Figure 1, **Figure 2**, **Figure 3**, **Figure 4**, and **Figure 5** show published artist's renderings of one firm's notional design for a LAW-like ship. The notional design shown has a length of about 70 meters (i.e., about 230 feet), a draft of less than 12 feet, and 600 square meters (i.e., about 6,458 square feet) of deck space.[33] The Navy's eventual preferred design for the LAW might or might not look like this design.

Figure 1. Notional Design for a LAW-Like Ship

Artist's rendering

Source: Illustration accompanying Megan Eckstein, "Navy Researching New Class of Medium Amphibious Ship, New Logistics Ships," *USNI News*, February 20, 2020. The article credits the image to Sea Transport Solutions, a naval architecture, consulting, surveying, and project-management firm.

[31] Due to the density of water, fuel consumption for moving monohull ships through the water tends to increase steeply for speeds above 14 to 16 knots.

[32] For more on the LCS program, see CRS Report RL33741, *Navy Littoral Combat Ship (LCS) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[33] Source: "Stern Landing Vessel (SLV) vs Conventional Landing Craft" (video), posted on YouTube January 10, 2018, by Sea Transport Solutions, a naval architecture, consulting, surveying, and project-management firm, and accessed May 15, 2020, at https://www.youtube.com/watch?v=7uUSJx-8fSc. See also "Stern Landing Vessel (SLV) vs Conventional Landing Craft – Updated" (video), posted on YouTube on April 28, 2019, by Sea Transport Solutions, and accessed May 15, 2020, at https://www.youtube.com/watch?v=qnfVxP67w_Y.

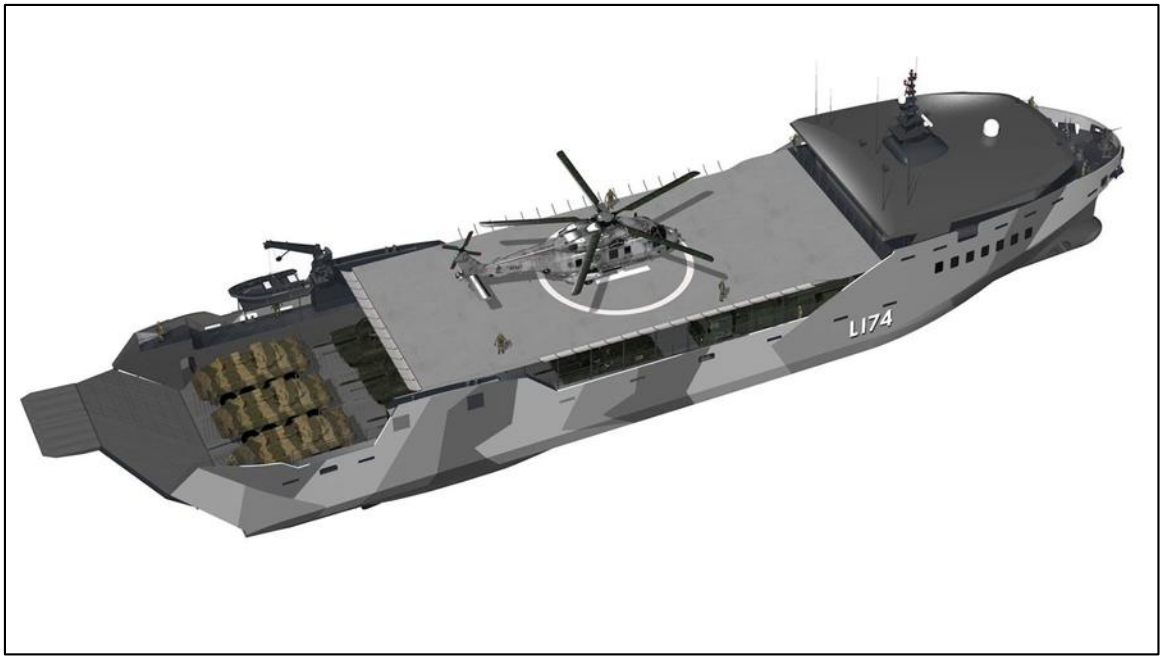
Figure 2. Notional Design for a LAW-Like Ship

Artist's rendering

Source: Illustration accompanying David Axe, "This Weird Little Ship Could Be the Future of Amphibious Warfare," *National Interest*, February 24, 2020. The article credits the image to Sea Transport Solutions, a naval architecture, consulting, surveying, and project-management firm.

Figure 3. Notional Design for a LAW-Like Ship

Artist's rendering



Source: Illustration accompanying Joseph Trevithick, "Navy Wants To Buy 30 New Light Amphibious Warships To Support Radical Shift In Marine Ops," *The Drive*, May 5, 2020.

Figure 4. Notional Design for a LAW-Like Ship

Artist's rendering

Source: Illustration accompanying Megan Eckstein, "Hudson Recommends 581 Ships, New Class of Corvette as Part of Input to Pentagon Fleet Plan," *USNI News*, September 30, 2020. The caption to the illustration credits it to Sea Transport Solutions, a naval architecture, consulting, surveying, and project-management firm.

Figure 5. Notional Design for a LAW-Like Ship

Artist's rendering

Source: Cropped version of illustration accompanying Caleb Larson, "New Light Amphibious Warship Will be the U.S. Marine Corps' Workhorse," *National Interest*, December 10, 2020. The article credits the illustration to Sea Transport Solutions.

Procurement Schedule

The Navy envisions the first LAW being procured in FY2023. The December 9, 2020, shipbuilding document submitted by the outgoing Trump Administration shows the first 10 LAWs being scheduled for procurement in FY2022-FY2026 in annual quantities of 1-1-2-3-3.

Procurement Cost

The Navy stated in November 2020 that it wants the LAW's unit procurement cost to be $100 million to $130 million.[34] The December 9, 2020, shipbuilding document submitted by the outgoing Trump Administration shows the first 10 LAWs being procured in FY2022-FY2026 at a unit procurement cost of about $150 million.

By way of comparison, the Navy's most recently procured LHA-type amphibious ship, which was procured in FY2017, has an estimated unit procurement cost in the Navy's FY2022 budget submission of about $3.8 billion, and LPD-17 Flight II amphibious ships being procured by the Navy have unit procurement costs of about $2.0 billion.

As additional comparisons, the Navy's Ship-to-Shore Connectors (SSCs)—its new air-cushioned landing craft—are about 92 feet long and have a unit procurement cost of roughly $65 million, the Coast Guard's new Fast Response Cutters (FRCs) are 154 feet long and have a unit procurement cost of about $65 million, and the Navy's new TATS towing, salvage, and rescue ships are 263 feet long and have a unit procurement cost of about $80 million.

Potential Builders

The LAW as outlined by the Navy is small enough that it could be built by any of several U.S. shipyards. The Navy states that in response to an initial request for information (RFI) about the LAW, it received responses from 13 firms, including nine shipyards.

Acquisition Strategy

The Navy wants to award contracts to multiple firms for conducting industry studies that will help inform the Navy's understanding of potential cost-capability tradeoffs in the design of the ship. Following that, the Navy wants to award contracts to multiple firms for developing preliminary designs for the ship. From those preliminary designs, the Navy would then choose its preferred design and builder. The Navy's baseline preference is to have a single shipyard build all 28 to 30 ships, but the Navy is open to having them built in multiple yards to the same design if doing so could permit the program to be implemented more quickly and/or less expensively.[35]

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[34] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020.

[35] The Q&A document from the Navy's April 9, 2020, industry day on the LAW program (see footnote 20) states

> Q [from industry]: Once [the industry] studies are done, what is the likelihood of [the Navy making] multiple [contract] awards [for the next stage]?
>
> A [from Navy]: When the [industry] studies are done, there will be multiple [contract] awards for preliminary design [work]. Then [the Navy will] down select for a [preferred] prototype. [There is] No plan for [building the ships at] multiple [ship]yards and [building them to multiple] designs like [the] LCS [Littoral Combat Ship program]. It's too hard of a logistics tail [to provide lifecycle support for ships built to multiple designs]. But options are open if it is cheaper/faster.
>
> Q [from industry]: Do you envision something similar to LCS variance [sic: variants]? Multiple yards and designs?

An August 27, 2020, press report states

> The Navy and Marine Corps' new Light Amphibious Warship program is already in industry studies, with the service pushing ahead as quickly as possible in an acknowledgement that they're already behind in their transformation of the force.
>
> Maj. Gen. Tracy King, the director of expeditionary warfare on the chief of naval operations' staff (OPNAV N95), said today that LAW was perhaps the most important investment the Marine Corps was making to optimize itself for expeditionary advance base operations (EABO).
>
> "Having these LAWs out there as an extension of the fleet, under the watchful eye of our Navy, engaging with our partners and allies, building partner capacity, is what I think we need to be doing right now. I think we're late to need with building the Light Amphibious Warship, which is why we're trying to go so quickly," he said, saying that N95 was copying the surface warfare directorate's playbook from the frigate program, which moved quickly from requirements-development to design to getting under contract thanks to the use of mature technology and designs from industry.[36]

An October 6, 2020, press report stated that the Navy in July 2020 awarded contracts for LAW concept design studies to 15 firms, with the studies due in November 2020. According to the press report, the 15 companies awarded contracts included Austal USE, BMT Designers, Bollinger Shipyards, Crescere Marine Engineering, Damen, Hyak Marine, Independent Maritime Assessment Associates, Nichols Brothers Boat Builders, Sea Transport, Serco, St John Shipbuilding, Swiftships, Technology Associates, Thoma-Sea, and VT Halter Marine. The studies reportedly were intended to help inform concepts of operation, technical risk, and cost estimates for the LAW program, in support of a planned lead-ship contract award in FY2022. The press report stated

> Because the LAW program is a new [program] start, any formal solicitation to launch the program is hamstrung until an FY-21 defense appropriations bill is enacted….
>
> The Navy's FY-21 budget request includes a $30 million request for a "Next Generation Medium Amphibious Ship," a sum that, if included in a final appropriations law, is intended to support award of a preliminary design contract and development of required acquisition, logistics and test documentation needed to set the stage for a FY-22 detail design and construction contract award.[37]

On October 16, 2020, the Navy released a request for information (RFI) to solicit industry input on draft versions of documents relating to an eventual solicitation for conducting design work on the ship.[38]

> A [from Navy]: No, it involves too much logistics and O&S [operation and support costs]. This drives overall costs initially [i.e., locks higher life-cycle support costs into the program from the outset of the program] and we're not trying to go down that path. As we've said before, if studies tell us we are wrong, if it's affordable and fields faster, then we won't ignore it. The data and cost drivers will help us decide. The Government wants to field [the ships] as rapidly as possible, and we believe that using multiple yards is not the best and most affordable path.

[36] Megan Eckstein, "Marines Already In Industry Studies for Light Amphibious Warship, In Bid to Field Them ASAP," *USNI News*, August 27 (updated August 28), 2020. See also Rich Abott, "Marine Corps In Industry Studies For Light Amphibious Warship, Trying To Move Quickly," *Defense Daily*, August 28, 2020.

[37] Jason Sherman and Aidan Quigley, "Navy Awaits 15 Light Amphibious Warship 'Concept Designs' to Support Program Launch in FY-21," *Inside Defense*, October 6, 2020.

[38] See "RFI: DRAFT US Navy Light Amphibious Warship Preliminary Design/Contract Design Statement of Work," Beta.sam.gov, accessed November 23, 2020, at https://beta.sam.gov/opp/c1c8a3900504442fa5ad3bac48cec001/view?index=opp. See also Rich Abott, "Navy Issues RFI For Light Amphibious Warship Preliminary Design," *Defense*

A November 9, 2020 press report stated that, as part of its LAW industry studies, the Navy had received nine LAW concept designs from 16 design firms and shipyards, some of which have paired into teams. The report quoted a Navy official as stating that the following firms were participating in the industry studies: Austal USA, BMT Designers, Bollinger Shipyards, Crescere Marine Engineering, Damen, Hyak Marine, Independent Maritime Assessment Associates, Nichols Brothers Boat Builders, Sea Transport, Serco, St. John Shipbuilding, Swiftships, Technology Associates Inc., Thoma-Sea, VT Halter Marine and Fincantieri.[39] A November 19, 2020, press report stated that "about six industry teams are working with the sea services [i.e., the Navy and Marine Corps] after two industry days and industry studies over the summer.[40]

A January 11, 2021, press report stated:

> The Navy and Marine Corps are quickly seeking new ideas that allow Marines to support the Navy in sea control and other maritime missions, including the rapid acquisition of a light amphibious ship and a movement toward using Marine weapons while at sea.
>
> Maj. Gen. Tracy King, the director of expeditionary warfare on the chief of naval operations' staff (OPNAV N95), told USNI News during a Jan. 8 media call that the services are moving quickly to buy their first light amphibious warship (LAW) in Fiscal Year 2022, as outlined in the recent long-range shipbuilding plan.
>
> "We're moving out at flank speed; I got a chance to brief the CNO and the commandant recently, and they told me to maintain course and heading," he said during the media call ahead of the annual Surface Navy Association symposium.
>
> "We're going through the formal JCIDS (Joint Capabilities Integration and Development System) process right now. [Naval Sea Systems Command] has completed its second industry studies, and we're working on all those documents."
>
> For now, 10 or 11 industry teams remain involved in the NAVSEA competition, which recently held a second round of industry studies. NAVSEA is working with those teams to help iterate what King called "novel" designs, to ensure they were the right size and could achieve cost and performance requirements. Mid next year, he said, NAVSEA would downselect to three teams for full design, and then would downselect to just one to build the first LAW in late FY 2022.
>
> "My suspicion is that we'll begin [research, development, test and evaluation] next year, and then we are aiming at lead ship construction in FY '22, it's going to be late in FY '22 ,but I still consider that pretty fast," King said.
>
> "We're just going to build one, get that out and start playing with it. We'll probably build one the next year because we've got to get the doctrine right. The [Marine Littoral Regiments] are going to start coming online at about the same time – first one's in Hawaii, we'll get it out there and let them play with it. And then we'll go into a build profile of, I don't know, probably four or five a year or something like that is what we're going to aim for."[41]

Daily, October 19, 2020; Aidan Quigley, "Navy Solicits Light Amphibious Warship Preliminary Designs," *Inside Defense*, October 19, 2020.

[39] Aidan Quigley, "Nine Concept Designs Submitted for LAW Industry Studies," *Inside Defense*, November 9, 2020.

[40] Megan Eckstein, "Navy Officials Reveal Details of New $100M Light Amphibious Warship Concept," *USNI News*, November 19, 2020.

[41] Megan Eckstein, "Marines, Navy Moving Quickly on Light Amphib, Anti-Ship Missiles to Create More Warfighting Options," *USNI News*, January 11, 2021. Material in brackets as in original. See also Rich Abott, "Kilby Outlines Factors Leading To Faster New Light Amphib Development," *Defense Daily*, February 5, 2021.

FY2022 Funding Request

The Navy's proposed FY2022 budget requests $13.2 million in research and development funding for the program. The funding is requested in Project 4044 (Next Generation Medium Amphibious Ship) of PE (Program Element) 0603563N (Ship Concept Advanced Design), which is line number 46 in the Navy's FY2022 research and development account.

Issues for Congress

The LAW program poses a number of potential oversight matters for Congress, including those discussed briefly in the sections below.

EABO Operational Concept

One potential oversight issue for Congress concerns the merits of the EABO operational concept that the LAW is intended to help Marine Corps implement. Debate on the merits of the EABO concept concerns issues such as

- whether the concept is focused too exclusively on potential conflict scenarios with China at the expense of other kinds of potential Marine Corps missions;
- the ability of Marine forces to gain access to the islands from which they would operate;
- the ability to resupply Marine forces that are operating on the islands;[42]
- the survivability of Marine forces on the islands and in surrounding waters;[43]
- how much of a contribution the envisioned operations by Marine forces would make in contributing to overall U.S. sea-denial operations; and
- potential alternative ways of using the funding and personnel that would be needed to implement EABO.[44]

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[42] See, for example, John M. Doyle, "Berger Says Supporting a Widely Distributed Maritime Force Will Be a Challenge," *Seapower*, May 14, 2021.

[43] See, for example, Yasmin Tadjdeh, "Light Amphibious Warships Face Survivability Questions," *National Defense*, April 23, 2021.

[44] For a CRS report on the proposed redesign of the Marine Corps to support new operational concepts such as EABO, see CRS Insight IN11281, *New U.S. Marine Corps Force Design Initiatives*, by Andrew Feickert.

For Marine Corps statements about the redesign of the Marine Corps and EABO, see U.S. Marine Corps, *Commandant's Planning Guidance, 38th Commandant of the Marine Corps*, undated, released July 2019, 23 pp.; U.S. Marine Corps, *Force Design 2030*, March 2020, 13 pp.; David H. Berger, "The Case for Change," *Marine Corps Gazette*, June 2020: 8-12. See also Megan Eckstein, "Marines Testing Regiment at Heart of Emerging Island-Hopping Future," *USNI News*, June 4 (updated June 12), 2020; Megan Eckstein, "Marines Look to Two New Ship Classes to Define Future of Amphibious Operations," *USNI News*, June 4 (updated June 12), 202; David Berger, "Marines Will Help Fight Submarines," *U.S. Naval Institute Proceedings*, November 2020.

For press articles discussing the proposed redesign of the Marine Corps to support new operational concepts such as EABO, see Philip Athey, "Marines vs. China—the Corps Just Put These Tactics to the Test," *Marine Corps Times*, October 19, 2020; Mark Perry, "The Marines Corps Is Rolling Out a 'Subversive' New Strategy to Take on China," Business Insider, October 15, 2020; David B. Larter, "Are the US Army and US Marine Corps Competing for Missions in the Pacific?" *Defense News*, October 14, 2020; Michael Fabey, "Template For Change: Marine Corps' New Vision Sets A Headmark For U.S. Navy Transformation," *Jane's Navy International*, September 9, 2020; Chris "Junior" Cannon, "The Commandant Needs Our Help: Accelerating Marine Corps Force Development," Center for International Maritime Security (CIMSEC), August 25, 2020; Mallory Shelbourne, "Panel: New Focus on China Fight Could Rob Marine Corps of Versatility," *USNI News*, July 30, 2020; Tanner Greer, "The Tip of the American Military Spear Is

Potential oversight questions for Congress include, What are the potential benefits, costs, and risks of the EABO concept? What work have the Navy and Marine Corps done in terms of analyses and war games to develop and test the concept? Would EABO be more cost effective to implement than other potential uses of the funding and personnel?

LAWs Within Overall Navy Fleet Architecture

Another potential oversight issue for Congress concerns how the LAW would fit into the Navy's overall future fleet architecture. Potential oversight questions for Congress include, What is the analytical basis for the envisioned procurement quantity of 28 to 30 LAWs? How well can the cost-effectiveness of a force of 28 to 30 LAWs be assessed if the remainder of the Navy's future fleet architecture is not yet fully known?

Preliminary Cost Target

Another potential oversight issue for Congress concerns the Navy's preliminary procurement cost target for the LAW. Potential oversight questions for Congress include the following: Is the Navy's estimated unit procurement cost reasonable, given the features the Navy wants the ship to have? As the LAW program proceeds, will the operational requirements (and thus cost) of the LAW increase? In connection questions such as these, a September 21, 2020, press report states

> The U.S. Marine Corps is moving as fast as it can to field a new class of light amphibious warship, but it remains unclear what it will do, where it will be based or what capabilities it will bring to the fight.
>
> The idea behind the ship is to take a commercial design or adapt a historic design to make a vessel capable of accommodating up to 40 sailors and at least 75 Marines to transport Marine kit over a range of about 3,500 nautical miles, according to a recent industry day presentation.
>
> While the presentation noted that the ship should have few tailored Navy requirements, that also creates a problem: If the Navy is going to pay tens of millions to develop, build, crew and operate them, should it not provide some additional value to the fleet [beyond its currently envisioned role]?
>
> Analysts, experts and sources with knowledge of internal discussions who spoke to Defense News say the answer to that question is a source of friction inside the Pentagon….

Being Blunted," *Foreign Policy*, July 6, 2020; Ben Wan Beng Ho, "Shortfalls in the Marine Corps' EABO Concept," *U.S. Naval Institute Proceedings*, July 2020; J. Noel Williams, "Force Design," *Marine Corps Gazette*, July 2020; Dakota Wood, "The Marines: To Boldly Go Where the Corps Has Gone Before," *Washington Times*, June 24, 2020; Paul McLeary, "In War, Chinese Shipyards Could Outpace US in Replacing Losses; Marine Commandant," *Breaking Defense*, June 17, 2020; Dakota Wood, *The U.S. Marine Corps: A Service in Transition*, Heritage Foundation, June 216, 2020, 18 pp.; David B. Larter, "In His Fight to Change the Corps, America's Top Marine Takes Friendly Fire," *Defense News*, June 11, 2020; Gina Harkins, "Marine 3-Star Hits Back at Claims that Corps' Future Design Is Too China-Focused," *Military.com*, June 2, 2020; Frank G. Hoffman, "Still First to Fight?" *Marine Corps Gazette*, June 2020; Gary Anderson, "Addressing the Chinese Threat in the Indo-Pacific Area," *Washington Times*, May 25, 2020; Matthew Fay and Michael A. Hunzeker, "No Sure Victory: The Marines New Force Design Plan and the Politics of Implementation," *War on the Rocks*, May 14, 2020; Jim Webb, "The Future of the U.S. Marine Corps," *National Interest*, May 8, 2020; Grant Newsham, "US Marines Revamp Amid China's Growing Threat," *Asia Times*, May 7, 2020; Jeff Cummings, Scott Cuomo, Olivia A. Garard, and Noah Spataro, "Getting the Context of Marine Corps Reform Right," *War on the Rocks*, May 1, 2020; Benjamin Jensen, "The Rest of the Story: Evaluating the U.S. Marine Corps Force Design 2030," *War on the Rocks*, April 27, 2020; T. X. Hammes, "Building a Marine Corps for Every Contingency, Clime, and Place," *War on the Rocks*, April 15, 2020; Mark F. Cancian, "The Marine Corps' Radical Shift toward China," Center for Strategic and International Studies (CSIS), March 25, 2020.

> When asked whether the ship should contribute to a more distributed sensor architecture to align with the Navy's desire to be more spread out over a large area during a fight, [he chief of naval operations' director of expeditionary warfare, Maj. Gen. Tracy King] answered in the affirmative.
>
> "[But] I really see it benefiting from [that architecture] more," he said. "We need to build an affordable ship that can get after the ability to do maritime campaigning in the littorals."
>
> The unstated implication appeared to be that if the ship is loaded up with sensors and requirements, it will slow down the process and increase the cost. Analysts who spoke to Defense News agreed with that, saying the Navy is likely trying to put more systems on the platform that will make it more complex and more expensive….
>
> "The hardest part is going to be appetite suppression, especially on the part of the Navy," said Dakota Wood, a retired Marine officer and analyst with The Heritage Foundation. "This is what we saw in the littoral combat ship LCS]:[45] It started out as a very light, near-shore, small and inexpensive street fighter. And then people started adding on requirements. You had ballooning costs, increasing complexity of the platform, and you get into all kinds of problems….
>
> [Jerry Hendrix, a retired Navy captain and analyst with the Telemus Group] acknowledged that the Navy has good reason to want the light amphibious warship to have more capability, but added that the Corps is more interested in something simple than something costly and elaborate.
>
> "What that does," Hendrix said, "is drive up unit cost and drive down the numbers that can be purchased."[46]

Potential Alternative of Adapting Existing Army LSVs

Another potential issue for Congress is whether at least some portion of the operational requirements for the LAW program could be met cost effectively met by adapting existing U.S. military ships rather than building new LAWs. Some observers, for example, argue that at least some portion of the operational requirements for the LAW program could be met more cost-effectively by transferring existing Army watercraft known as Logistics Support Vessels (LSVs) (**Figure 6**) to the Navy and adapting these LSVs to the LAW mission.

A June 22, 2020, opinion piece discussing this idea states

> The Navy intends to acquire up to 30 new light amphibious warships, or LAW, to support new Marine Corps requirements.… Rather than accepting a new amphibious design built from the ground up, however, decision-makers should take advantage of the fact that many key requirements of the new vessels are very similar to the capabilities of vessels operated by U.S. Army Transportation Command.
>
> The Navy and Marine Corps should delay any new construction and immediately acquire some of these existing vessels to drive experimentation and better inform their requirements for the LAW program….
>
> U.S. Army Transportation Command has over 100 vessels, and dozens have similar capabilities to those required of the LAW. The Army's LCU-2000s, also called the Runnymede-class large landing crafts, are smaller, with roughly half of the cargo space designed for the LAW and slightly slower, but they boast nearly double the range. The

[45] For more on the LCS program, see CRS Report RL33741, *Navy Littoral Combat Ship (LCS) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[46] David B. Larter, "US Marines Wants to Move Fast on a Light Amphibious Warship. But What is It?" *Defense News*, September 21, 2020.

> Runnymede-class vessels have nearly 4,000 square feet of cargo space and can travel 6,500 miles when loaded and at 12 knots; and they can unload at the beach with their bow ramp.
>
> The Army's General Frank S. Besson-class logistics support vessels are larger than the future LAW, at 273 feet in length but can claim 10,500 square feet of cargo space and a 6,500-mile range loaded to match the LCU-2000. These vessels also have both a bow and stern ramp for roll-on/roll-off capability at the beach or ship-to-ship docking at sea. The version built for the Phillipine military also has a helipad.
>
> Army Transportation Command has 32 Runnymede-class and eight General Frank S. Besson-class vessels in service. Mostly built in the 1990s, both classes of vessel have many years left in their life expectancy and more than meet the Navy's 10-year life expectancy for the LAW.
>
> These vessels are operable today and could be transferred from the Army to the Navy or Marine Corps tomorrow. In fact, the Army was attempting to divest itself of these watercraft less than a year ago, which underscores the importance of this opportunity even further. Congress is firmly set against the Army getting rid of valuable, seaworthy vessels and has quashed all of the Army's efforts to do so thus far, but transferring this equipment to the Navy is a reasonable course of action that should satisfy all parties involved….
>
> By acquiring a watercraft that meets most of their requirements from the Army, the Navy and Marine Corps simultaneously fill current capability gaps and obtain an invaluable series of assets they can use to support the evaluation and experimentation of new designs and concepts. This will allow Navy and Marine leaders to give their units the maximum amount of time to evaluate and experiment with new designs to get a better idea of what they need both in future amphibious craft as well as operational and support equipment….
>
> Often overlooked, the availability of surplus vessels is absolutely critical to the process of developing new technologies, developing the tactics to employ them, conducting training, and providing decision-makers the requisite capacity to remain flexible in the face of unexpected challenges….
>
> [The Navy and Marine Corps have] long been in need of a boost in their amphibious capabilities so as to be better positioned to meet the demands of today and prepare for the challenges of tomorrow, and taking possession of the Army's Runnymede- and Frank S. Benson-class vessels is a solution on a silver platter.[47]

Potential questions for Congress include the following:

- How many of these watercraft would be available for transfer to the Navy for use in meeting the operational requirements of the LAW program?
- How do the capabilities of these watercraft compare with those required for the LAW?
- How much remaining service life do these watercraft have?
- Given the number of these watercraft that would be available for transfer to the Navy, their operational capabilities, and their remaining service life, what portion of the LAW program's operational requirements could transferred watercraft meet? How many LAWs, if any, would still need to be built to fully or substantially meet the LAW program's operational requirements?
- How do the acquisition and operation and support (O&S) costs of these watercraft compare to the estimated acquisition and O&S costs of the LAWs they would replace?

[47] Walker D. Mills and Joseph Hanacek, "The US Navy and Marine Corps Should Acquire Army Watercraft," *Defense News*, June 22, 2020.

- Taking into account capabilities, acquisition costs, and O&S costs, how does the cost effectiveness of an approach involving the transfer of these watercraft compare to that of the Navy's baseline approach of meeting the LAW program's requirements through the acquisition of 28 to 30 new LAWs?
- What would be the potential industrial-base implications of using transferred watercraft to meet at least some portion of the LAW program's operational needs?

Figure 6. Besson-Class Logistics Support Vessel (LSV)

Source: Cropped version of photograph accompanying Walker D. Mills and Joseph Hanacek, "The US Navy and Marine Corps Should Acquire Army Watercraft," *Defense News*, June 22, 2020. The caption to the photograph credits the photograph to the U.S. Navy and states, "U.S. Navy sailors conduct a simulated disaster relief supply offload from a General Frank S. Besson-class logistics support vessel at Joint Base Pearl Harbor-Hickam on July 10, 2016."

Industrial-Base Implications

Another potential oversight issue for Congress concerns the potential industrial-base implications of the LAW program. In recent years, all Navy amphibious ships have been built by the Ingalls shipyard of Pascagoula, MS, a part of Huntington Ingalls Industries (HII/Ingalls). As noted earlier, LAWs could be built by multiple U.S. shipyards,[48] and nine shipyards have expressed interest in the LAW program. Potential oversight questions for Congress include, What implications might the LAW program have for the distribution of Navy shipbuilding work among

[48] 10 U.S.C. §8679 requires that, subject to a presidential waiver for the national security interest, "no vessel to be constructed for any of the armed forces, and no major component of the hull or superstructure of any such vessel, may be constructed in a foreign shipyard." In addition, the paragraph in the annual DOD appropriations act that makes appropriations for the Navy's shipbuilding account (the Shipbuilding and Conversion, Navy account) typically contains these provisos: " … *Provided further,* That none of the funds provided under this heading for the construction or conversion of any naval vessel to be constructed in shipyards in the United States shall be expended in foreign facilities for the construction of major components of such vessel: *Provided further,* That none of the funds provided under this heading shall be used for the construction of any naval vessel in foreign shipyards…."

U.S. shipyards? How many jobs would the LAW program create at the shipyard that builds the ships, at associated supplier firms, and indirectly in surrounding communities? In a situation of finite defense resources, what impact, if any, would funding the procurement of LAWs have on funding available for procuring other types of amphibious ships, and thus on workloads and employment levels at HII/Ingalls, its associated supplier firms, and their surrounding communities?[49]

Legislative Activity for FY2022

Summary of Congressional Action on FY2022 Funding Request

Table 1 summarizes congressional action on the FY2022 procurement funding request for the LAW program.

Table 1. Congressional Action on FY2022 Procurement Funding Request

Millions of dollars, rounded to nearest tenth

		Authorization			Appropriation		
	Request	HASC	SASC	Conf.	HAC	SAC	Conf.
Research and development	13.2						

Source: Table prepared by CRS based on Navy's FY2022 budget submission, committee and conference reports, and explanatory statements on FY2022 National Defense Authorization Act and FY2022 DOD Appropriations Act. The funding is requested in Project 4044 (Next Generation Medium Amphibious Ship) of PE (Program Element) 0603563N (Ship Concept Advanced Design), which is line number 46 in the Navy's FY2022 research and development account.

Notes: HASC is House Armed Services Committee; **SASC** is Senate Armed Services Committee; **HAC** is House Appropriations Committee; **SAC** is Senate Appropriations Committee; **Conf.** is conference agreement.

[49] Two observers argue that shifting the Navy to a fleet architecture that includes a larger proportion of smaller ships would have beneficial impacts on U.S. shipbuilding industry's ability to support Navy shipbuilding needs. See Bryan Clark and Timothy A. Walton, "Shipbuilding Suppliers Need More Than Market Forces to Stay Afloat," *Defense News*, May 20, 2020.

Appendix. Proposed Change in Amphibious-Ship Force Architecture and EABO

This appendix presents additional background information on the proposed change in the amphibious-ship force architecture and the EABO-related operational rationale behind it.

Proposed Change in Amphibious Ship Force Architecture

Regarding the shift to a new amphibious-ship force architecture, the July 2019 *Commandant's Planning Guidance* document states in part (emphasis as in the original):

> Our Nation's ability to project power and influence beyond its shores is increasingly challenged by long-range precision fires; expanding air, surface, and subsurface threats; and the continued degradation of our amphibious and auxiliary ship readiness. The ability to project and maneuver from strategic distances will likely be detected and contested from the point of embarkation during a major contingency. Our naval expeditionary forces must possess a variety of deployment options, including L-class [amphibious ships] and E-class [expeditionary ships] ships, but also increasingly look to other available options such as unmanned platforms, stern landing vessels, other ocean-going connectors, and smaller more lethal and more risk-worthy platforms. **We must continue to seek the affordable and plentiful at the expense of the exquisite and few when conceiving of the future amphibious portion of the fleet.**
>
> We must also explore new options, such as inter-theater connectors and commercially available ships and craft that are smaller and less expensive, thereby increasing the affordability and allowing acquisition at a greater quantity. We recognize that we must distribute our forces ashore given the growth of adversary precision strike capabilities, so it would be illogical to continue to concentrate our forces on a few large ships. The adversary will quickly recognize that striking while concentrated (aboard ship) is the preferred option. We need to change this calculus with a new fleet design of smaller, more lethal, and more risk-worthy platforms. We must be fully integrated with the Navy to develop a vision and a new fleet architecture that can be successful against our peer adversaries while also maintaining affordability. To achieve this difficult task, the Navy and Marine Corps must ensure larger surface combatants possess mission agility acrosssea control, littoral, and amphibious operations, while we concurrently expand the quantity of more specialized manned and unmanned platforms….
>
> **We will no longer use a "2.0 MEB requirement" as the foundation for our arguments regarding amphibious ship building, to determine the requisite capacity of vehicles or other capabilities, or as pertains to the Maritime Prepositioning Force. We will no longer reference the 38-ship requirement memo from 2009, or the 2016 Force Structure Assessment, as the basis for our arguments and force structure justifications.** The ongoing 2019 Force Structure Assessment will inform the amphibious requirements based upon this guidance. The global options for amphibs [types of amphibious ships] include many more options than simply LHAs, LPDs, and LSDs. I will work closely with the Secretary of the Navy and Chief of Naval Operations (CNO) to ensure there are adequate numbers of the right types of ships, with the right capabilities, to meet national requirements.
>
> I do not believe joint forcible entry operations (JFEO) are irrelevant or an operational anachronism; however, we must acknowledge that different approaches are required given the proliferation of anti-access/area denial (A2AD) threat capabilities in mutually contested spaces. Visions of a massed naval armada nine nautical miles off-shore in the South China Sea preparing to launch the landing force in swarms of ACVs [amphibious combat vehicles], LCUs [utility landing craft], and LCACs [air-cushioned landing craft] are

> impractical and unreasonable. We must accept the realities created by the proliferation of precision long-range fires, mines, and other smart-weapons, and seek innovative ways to overcome those threat capabilities. I encourage experimentation with lethal long-range unmanned systems capable of traveling 200 nautical miles, penetrating into the adversary enemy threat ring, and crossing the shoreline—causing the adversary to allocate resources to eliminate the threat, create dilemmas, and further create opportunities for fleet maneuver. We cannot wait to identify solutions to our mine countermeasure needs, and must make this a priority for our future force development efforts….
>
> Over the coming months, we will release a new concept in support of the Navy's Distributed Maritime Operations (DMO) Concept and the NDS called – Stand-in Forces. The Stand-in Forces concept is designed to restore the strategic initiative to naval forces and empower our allies and partners to successfully confront regional hegemons that infringe on their territorial boundaries and interests. **Stand-in Forces are designed to generate technically disruptive, tactical stand-in engagements that confront aggressor naval forces with an array of low signature, affordable, and risk-worthy platforms and payloads.** Stand-in forces take advantage of the relative strength of the contemporary defense and rapidly-emerging new technologies to create an integrated maritime defense that is optimized to operate in close and confined seas in defiance of adversary long-range precision "stand-off capabilities."
>
> Creating new capabilities that intentionally initiate stand-in engagements is a disruptive "button hook" in force development that runs counter to the action that our adversaries anticipate. Rather than heavily investing in expensive and exquisite capabilities that regional aggressors have optimized their forces to target, naval forces will persist forward with many smaller, low signature, affordable platforms that can economically host a dense array of lethal and nonlethal payloads.
>
> By exploiting the technical revolution in autonomy, advanced manufacturing, and artificial intelligence, the naval forces can create many new risk-worthy unmanned and minimally-manned platforms that can be employed in stand-in engagements to create tactical dilemmas that adversaries will confront when attacking our allies and forces forward.[50]

EABO

Regarding EABO, the *Commandant's Planning Guidance* states the following (emphasis as in the original):

> The 2016 *Marine Corps Operating Concept* (MOC) predates the current set of national strategy and guidance documents, but it was prescient in many ways. It directed partnering with the Navy to develop two concepts, Littoral Operations in a Contested Environment (LOCE) and Expeditionary Advanced Base Operations (EABO) that nest exceptionally well with the current strategic guidance. It is time to move beyond the MOC itself, however, and partner with the Navy to complement LOCE and EABO with classified, threat-specific operating concepts that describe how naval forces will conduct the range of missions articulated in our strategic guidance….

[50] U.S. Marine Corps, *Commandant's Planning Guidance, 38th Commandant of the Marine Corps*, undated, released July 2019, pp. 4-5, 10.

> **EABO complement the Navy's Distributed Maritime Operations Concept and will inform how we approach missions against peer adversaries** ….
>
> EABO are driven by the aforementioned adversary deployment of long-range precision fires designed to support a strategy of "counter-intervention" directed against U.S. and coalition forces. EABO, as an operational concept, enables the naval force to persist forward within the arc of adversary long-range precision fires to support our treaty partners with combat credible forces on a much more resilient and difficult to target forward basing infrastructure. EABO are designed to restore force resiliency and enable the persistent naval forward presence that has long been the hallmark of naval forces. Most significantly, EABO reverse the cost imposition that determined adversaries seek to impose on the joint force. EABO guide an apt and appropriate adjustment in future naval force development to obviate the significant investment our adversaries have made in long-range precision fires. Potential adversaries intend to target our forward fixed and vulnerable bases, as well as deep water ports, long runways, large signature platforms, and ships. By developing a new expeditionary naval force structure that is not dependent on concentrated, vulnerable, and expensive forward infrastructure and platforms, we will frustrate enemy efforts to separate U.S. Forces from our allies and interests. EABO enable naval forces to partner and persist forward to control and deny contested areas where legacy naval forces cannot be prudently employed without accepting disproportionate risk….
>
> In February of 2019, the Commandant and Chief of Naval Operations co-signed the concept for EABO. The ideas contained in this document are foundational to our future force development efforts and are applicable in multiple scenarios.[51]

A February 2021 Marine Corps tentative manual on EABO defines EABO as follows:

> EABO are a form of expeditionary warfare that involves the employment of mobile, low-signature, persistent, and relatively easy to maintain and sustain naval expeditionary forces from a series of austere, temporary locations ashore or inshore within a contested or potentially contested maritime area in order to conduct sea denial, support sea control, or enable fleet sustainment.
>
> EABO support the projection of naval power by integrating with and supporting the larger naval campaign. Expeditionary operations imply austere conditions, forward deployment, and projection of power. EABO are distinct from other expeditionary operations in that forces conducting them combine various forms of operations to persist within the reach of adversary lethal and nonlethal effects. It is critical that the composition, distribution, and disposition of forces executing EABO limit the adversary's ability to target them, engage them with fires and other effects, and otherwise influence their activities.
>
> Missions of EABO include:
>
> - Support sea control operations;
> - Conduct sea denial operations within the littorals;
> - Contribute to maritime domain awareness;
> - Provide forward command, control, communications, computers, combat systems, intelligence, surveillance, reconnaissance, targeting (C5ISRT), and counter-C5ISRT capability;
> - Provide forward sustainment.

[51] U.S. Marine Corps, *Commandant's Planning Guidance, 38th Commandant of the Marine Corps*, undated, released July 2019, pp. 9, 11, 19. See also Jim Lacey, "The 'Dumbest Concept Ever' Just Might Win Wars," *War on the Rocks*, July 29, 2019; Megan Eckstein, "How to Seize Islands, Set Up a Forward Refueling Point: Marine Corps Recipes for Expeditionary Operations," *USNI News*, September 13, 2019.

EABO tasks include:

- Conduct surveillance and reconnaissance;
- Conduct operations in the information environment;
- Conduct screen/guard/cover;
- Deny or control key maritime terrain;
- Conduct surface warfare operations;
- Conduct air and missile defense;
- Conduct strike operations;
- Conduct antisubmarine warfare;
- Conduct sustainment operations;
- Conduct forward arming and refueling point (FARP) operations.

FMF formations may execute these tasks across the competition continuum both above and below the threshold of violence. In the former case, they are normally conducted to deny an adversary access to adjacent battlespace or to support a more comprehensive effort to establish sea control. In the latter, they are often conducted with the goal of deterring the enemy while preparing for conflict if deterrence fails ….

EABO provide engagement capabilities throughout the competition continuum. During competition below the threshold of violence, EABO engage allies and partners, preserve access, and shape the theater for future operations. EABO also enables stand-in engagement capabilities by the persistent posturing of littoral forces within a potential adversary's weapons engagement zone (WEZ). During armed conflict, the combination of stand-in and stand-off engagement capabilities… places the adversary on the horns of a dilemma: while the adversary seeks to discover and engage friendly stand-off forces, he exposes himself to the sensing, nonlethal, and lethal capabilities of stand-in forces….

The assigned mission sets within EABO are conducted within a joint and coalition framework, as part of not merely an interoperable, but an integrated naval force. Task-organized Marine and Navy units project naval power through EABO by fusing their landward and seaward roles….

A stand-in force executing EABO is strategically cost-effective by virtue of its ability to undermine a potential adversary's cost-imposition strategy. Potential adversaries are investing in large numbers of comparatively inexpensive systems of adequate lethality, extended range, and greater precision to hold at risk the US military's expensive, sophisticated, and relatively few multimission platforms. Forces executing EABO are small, numerous, dispersed, and relatively inexpensive and difficult to target, thus inverting an adversary's cost-benefit calculation when deciding whether to engage and upsetting the cost-imposition strategy.[52]

[52] Department of the Navy, Headquarters, United States Marine Corps, *Tentative Manual for Expeditionary Advanced Base Operations*, February 2021, pp. 1-3 to 1-5.

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