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

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SUMMARY

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Ronald O'Rourke
Specialist in Naval Affairs

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's proposed FY2021 budget requests $30 million in research and development funding for initial industry studies and concept design work on the ship. The Navy envisions procuring the ships on an expedited schedule, with the first LAWs potentially being procured in FY2023 and a total of 28 notionally being procured by FY2026.

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 to be "several digit millions not triple digit millions," a phrase that might be interpreted to mean a unit procurement cost of less than $100 million, or perhaps one that is closer to $100 million than to several hundred million dollars.

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 FY2021 funding request 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's proposed FY2021 budget requests $30 million in research and development funding for initial industry studies and concept design work on the ship. The Navy envisions procuring the ships on an expedited schedule, with the first LAWs potentially being procured in FY2023 and a total of 28 notionally being procured by FY2026.

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 FY2021 funding request 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

[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.

ship to shore without need for port facilities,[3] amphibious ships are potentially useful for a range of combat and noncombat operations.[4]

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 ship force-level goals, including its force-level goal for amphibious ships, are determined in a Navy analysis called a Force Structure Assessment (FSA). The Navy conducts a new FSA (or updates the most recent FSA) once every few years. The Navy's current 355-ship force-level goal, which is the result of a FSA that was done in 2016 and released in December 2016, includes a goal for achieving and maintaining a 38-ship amphibious force that includes 12 LHA/LHD-type ships and 26 LPD /LSD-type ships.[7] This 38-ship force-level goal predates the initiation of the LAW program and consequently includes no LAWs.

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[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 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*

The 38-ship force-level goal is a target that the Navy wants to achieve and maintain in coming years. The Navy's actual amphibious force at the end of FY2019 included 32 ships, including 9 LHA/LHD-type ships and 23 LPD/LSD-type ships.

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 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]

Proposed Change in Force-Level Goal

Overview of Proposed Change

The Navy in early 2020 completed a new FSA, which the Navy and Marine Corps call an Integrated Naval FSA (INFSA),[10] to succeed the FSA whose results were released in December 2016. Navy officials have stated that the INFSA is undergoing final review within DOD and may be released sometime during 2020.[11] The Office of the Secretary of Defense (OSD) is conducting its own review of future Navy force structure requirements, and its conclusions may differ from those of the INFSA.

Statements from General David H. Berger, the Commandant of the Marine Corps—particularly a July 2019 document called the *Commandant's Planning Guidance*—suggest that the INFSA will call for changing the Navy's amphibious ship force-level goal to one reflecting a new amphibious-ship force architecture that includes not only LHA/LHD-type and LPD/LSD-type amphibious ships, but other kinds of ships as well, including

- smaller amphibious ships,
- ships like the Navy's Expeditionary Sea Base (ESB) and Expeditionary Fast Transport (EPF) ships,

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 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] The Navy and Marine Corps call the new FSA an "INFSA" to signal that the new FSA more fully integrates the Marine Corps' needs into the Navy's analysis.

[11] For additional discussion of the FSA process and the next FSA, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

- ships based on commercial-ship hull designs, and
- unmanned surface vehicles (USVs).[12]

The LAW ships discussed in this CRS report would be smaller amphibious ships, and as discussed later, their design might be based on a commercial-ship hull design.

Operational Rationale for Proposed Change

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).[13] DMO calls for U.S. naval forces (meaning the Navy and Marine Corps)[14] 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 implement DMO, the Navy wants to shift to a new and more distributed fleet architecture that includes a reduced proportion of larger ships, an increased proportion of smaller ships, and a new, third component of unmanned surface vessels (USVs) and unmanned underwater vessel (UUVs), including large models that would deploy from pier rather than from manned Navy ships.[15] As discussed further in a separate CRS report,[16] Navy and Marine Corps officials argue that a more distributed fleet architecture

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[12] U.S. Marine Corps, *Commandant's Planning Guidance, 38th Commandant of the Marine Corps*, undated, released July 2019, pp. 4-5, 10. See also Megan Eckstein, "New Commandant Berger Sheds 38-Amphib Requirement in Quest to Modernize USMC for High-End Fight," *USNI News*, July 18, 2019; Paul McLeary, "Sacred Cows Die As Marine Commandant Changes Course On Amphibs," *Breaking Defense*, July 26, 2019; David Ignatius, "The Marines' New Commandant Has Set the Bar for Real Military Reform," *Washington Post*, August 8, 2019; Megan Eckstein, "Marine Planners Using Commandant's Guidance to Start Crafting Future of the Corps," *USNI News*, September 18, 2019; Shawn Snow, "An Unmanned Ship That Can Travel 500 Nautical Miles Without Resupply—the Corps Is Looking at It," *Marine Corps Times*, September 19, 2019; Chris "Ox" Harmer, "Marine Boss's Audacious Plan To Transform The Corps By Giving Up Big Amphibious Ships," *The Drive*, September 5, 2019; Megan Eckstein, "Marines, Navy Both Considering Something Like an Offshore Support Vessel to Supplement Amphibs," *USNI News*, September 20, 2019; David Axe, "U.S. Navy and Marine Corps Want Small Ships to Land Troops in a War," *National Interest*, September 21, 2019; Megan Eckstein, "Navy, Marines Rethinking How to Build Future Fleet with Unmanned, Expeditionary Ships," *USNI News*, September 26, 2019; David Barno and Nora Bensahel, "A Striking New Vision for the Marines, and a Wakeup Call for the Other Services," *War on the Rocks*, October 1, 2019; Megan Eckstein, "Berger: Marine 2030 Force Design Is Nearly Complete; Concepts Now Being Modeled, Tested," *USNI News*, October 3, 2019; Patrick Tucker, "The Future of the Marines Is Smaller, More Robotic, More Naval," *Defense One*, October 3, 2019.

[13] 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.

[14] 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.

[15] For more on these large unmanned vehicles, see CRS Report R45757, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*, by Ronald O'Rourke.

[16] See CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

- has become necessary due to China's improving anti-ship capabilities;
- is technically feasible due to improvements in networking and unmanned vehicle technologies;
- will be just as lethal, if not more lethal, than today's fleet architecture; and
- will be no more expensive, and perhaps less expensive in some respects, than today's fleet architecture.

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,"[17] 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.[18]

The LAW ships would be instrumental to these operations, with LAWs embarking, transporting, landing, and subsequently reembarking these small Marine Corps units. 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 excerpts from the *Commandant's Planning Guidance* that further discuss the proposed change in the amphibious-ship force architecture and the EABO-related operational rationale behind it, see the **Appendix**.

[17] 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.

[18] For press articles discussing these envisioned operations, see, for example, 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.

Light Amphibious Warship (LAW) Program[19]

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's proposed FY2021 budget requests $30 million in research and development funding for initial industry studies and concept design work on the ship. The Navy envisions procuring the ships on an expedited schedule, with the first LAWs potentially being procured in FY2023 and a total of 28 notionally being procured by FY2026.

Ship Design

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

- a minimum length of 200 feet;
- a maximum draft of 12 feet;
- a ship's crew of no more than 40 Navy sailors;
- an ability to embark at least 75 Marines;
- a minimum of 8,000 square feet of cargo area for the Marines' weapons, equipment, and supplies;
- 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;[20]
- a 25mm or 30mm gun system and .50 caliber machine guns for self-defense;
- a minimum transit speed of 14 knots;
- a minimum unrefueled transit range of 3,500 nautical miles;
- an ability to operate within fleet groups or deploy independently; and
- a 10-year expected service life.

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. Compared with LHA/LHD-type ships, which are 844 to 855 feet long

[19] 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.

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

and have a full load displacements between 40,000 and 45,000 tons, and LPD-17 class ships, which are 684 feet long and have a full load displacement of 24,900 tons, a LAW with a length of 200 to 400 feet could have a displacement of between 1,000 and 8,000 tons.[21]

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 8,000 square feet of 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.[22] The minimum transit speed of 14 knots is less than the approximate 22-knot maximum sustained speed of larger U.S. Navy amphibious ships, but it is a relatively fuel-efficient speed for moving ships through water,[23] which would permit the ship to be equipped with a less powerful and consequently less expensive propulsion plant. The 10-year expected service life is considerably 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.

Figure 1, **Figure 2**, and **Figure 3** show published artist's renderings of one 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.[24] The Navy's eventual preferred design for the LAW might or might not look like this design.

Procurement Schedule

The Navy envisions procuring a total of 28 LAWs over the four-year period FY2023-FY2026 in annual quantities of 3, 6, 10, and 9. These ships do not appear in the Navy's FY2021 five-year (FY2021-FY2025) shipbuilding plan, but they could appear in the Navy's FY2022 five-year (FY2022-FY2026) shipbuilding plan, which the Navy would submit to Congress in 2021 as part of its FY2022 budget submission.

Procurement Cost

The Navy states that it wants the LAW's unit procurement cost to be "several digit millions not triple digit millions," a phrase that might be interpreted to mean a unit procurement cost of less than $100 million, or perhaps one that is closer to $100 million than to several hundred million dollars. 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 FY2021 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 $1.8 billion to $2.0 billion.

[21] Source: CRS analysis based on actual (LHA and LPD-17) and potential (LAW) lengths, beams, and drafts.

[22] 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.

[23] 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.

[24] 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 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.

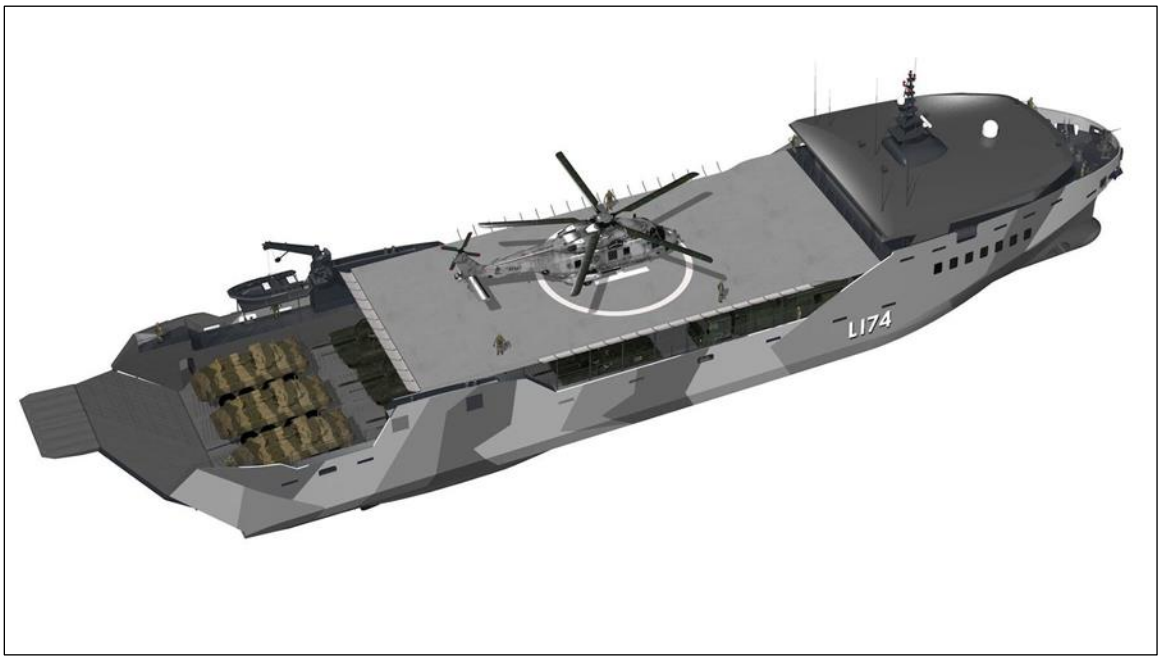
Figure 2. Notional Design for a LAW-Like Ship

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.

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.[25]

[25] The Q&A document from the Navy's April 9, 2020, industry day on the LAW program (see footnote 19) 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]?

FY2021 Funding

The Navy's proposed FY2021 budget requests $30 million in research and development funding for initial industry studies and concept design work on the ship. 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 45 in the Navy's FY2021 research and development account. Of the $30 million requested, $21.5 million is requested for industry studies and concept design work, which would sufficient to support the award of several contracts with values of up to perhaps $3 million each.[26]

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 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, the survivability of Marine forces on the islands and in surrounding waters, 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.[27] Potential oversight questions for Congress include, What

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> 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?
>
> 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.

[26] The remainder of the $30 million requested is proposed for use as follows: $5 million for program management and engineering support, $2.5 million for studies on specialized topics, and $1 million for development of an indicative design, meaning a notional in-house Navy design that the Navy would use in evaluating shipbuilder-developed designs.

[27] 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.

For press articles discussing the proposed redesign of the Marine Corps to support new operational concepts such as EABO, see 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*,

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, particularly since much of the Navy's future fleet architecture is currently a matter of discussion between the Navy and OSD. 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 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: Does the Navy's desire for the ship to have a unit procurement cost of "several digit millions not triple digit millions" mean a unit procurement cost of less than $100 million, or one that is closer to $100 million than to several hundred million dollars? Is the Navy's preliminary unit procurement cost target reasonable, given the features the Navy wants the ship to have?

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,[28] 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 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

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.

[28] 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…."

employment levels at HII/Ingalls, its associated supplier firms, and their surrounding communities?[29]

Legislative Activity for FY2021

Summary of Congressional Action on FY2021 Funding Request

Table 1 summarizes congressional action on the FY2021 procurement funding request for the LAW program.

Table 1. Congressional Action on FY2021 Procurement Funding Request

Millions of dollars, rounded to nearest tenth

		Authorization			Appropriation		
	Request	HASC	SASC	Conf.	HAC	SAC	Conf.
Research and development	30.0	30.0	0.0				

Source: Table prepared by CRS based on Navy's FY2021 budget submission, committee and conference reports, and explanatory statements on FY2021 National Defense Authorization Act and FY2021 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 45 in the Navy's FY2021 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.

FY2021 National Defense Authorization Act (H.R. 6395/S. 4049)

House

The House Armed Services Committee, in its report (H.Rept. 116-442 of July 9, 2020) on H.R. 6395, recommended the funding level shown in the HASC column of **Table 1**.

H.Rept. 116-442 states:

> Utilization of Smaller Vessels in Indo-Pacific Area of Operations
>
> The committee remains concerned that the Navy has yet to provide an updated shipbuilding plan as required by section 231 of title 10, United States Code, or a briefing on the updated Integrated Force Structure Assessment. Without the requisite information, the committee is unable to properly assess whether vessels smaller than 200 meters in length may have a forward deployed mission set, such as supporting Expeditionary Advanced Base Operations. Therefore, the committee directs the Chief of Naval Operations to provide a briefing to the House Committee on Armed Services not later than February 1, 2021, on the feasibility of utilizing smaller vessels in the Indo-Pacific to patrol coastal areas and enhance presence in a contested environment. (Page 216)

Section 1028 of H.R. 6395 as reported by the committee states:

[29] 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.

SEC. 1028. REPORT ON IMPLEMENTATION OF COMMANDANT'S PLANNING GUIDANCE.

(a) IN GENERAL.—Not later than 180 days after the date of the enactment of this Act, the Secretary of Defense shall submit to the congressional defense committees a report on the implementation of the Commandant's Planning Guidance. Such report shall include a detailed description of each of the following:

(1) The specific number and type of manned littoral ships required to execute such Guidance.

(2) The role of long-range unmanned surface vessels in the execution of such Guidance.

(3) How platforms referred to in paragraphs (1) and (2) account for and interact with ground-based missiles fielded by teams of Marines deployed throughout the Indo-Pacific region.

(4) The integrated naval command and control architecture required to support the platforms referred to in paragraphs (1) and (2);

(5) The projected cost and any additional resources required to deliver the platforms referred to in paragraph (1) and (2) by not later than five years after the date of the enactment of this Act.

(b) FORM OF REPORT.—The report required under this section shall be submitted in unclassified form, but may contain a classified annex. The unclassified report shall be made publicly available.

Senate

The Senate Armed Services Committee, in its report (S.Rept. 116-236 of June 24, 2020) on S. 4049, recommended the funding level shown in the SASC column of **Table 1**. The recommended reduction of $30.0 (the entire requested amount) is for the funds being "early to need." (Page 505) Regarding this funding recommendation, S.Rept. 116-236 states (emphasis added):

Ship concept advanced design

The budget request included $21.5 billion in Research, Development, Test, and Evaluation (RDT&E), Navy, of which $126.4 million was for PE 63563N ship concept advanced design.

The committee lacks sufficient clarity on the capability requirements to support the following ship design efforts: Future Surface Combatant (project 2196, $19.1 million), **next generation medium amphibious ship (project 4044, $30.0 million)**, and next generation medium logistics ship (project 4045, $30.0 million). (Pages 98-99)

Appendix. Proposed Change in Amphibious-Ship Force Architecture

This appendix presents excerpts from the July 2019 *Commandant's Planning Guidance* document that provide additional background information on the proposed change in the amphibious-ship force architecture and the operational rationale for the proposed change.

Regarding the shift to a new amphibious-ship force architecture, the *Commandant's Planning Guidance* 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 across sea 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.[30]

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….

[30] 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.[31]

Author Information

Ronald O'Rourke
Specialist in Naval Affairs

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[31] 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.