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Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress

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Summary

The current and planned size and composition of the Navy, the annual rate of Navy ship procurement, the prospective affordability of the Navy's shipbuilding plans, and the capacity of the U.S. shipbuilding industry to execute the Navy's shipbuilding plans have been oversight matters for the congressional defense committees for many years.

In December 2016, the Navy released a force-structure goal that calls for achieving and maintaining a fleet of 355 ships of certain types and numbers. The 355-ship goal was made U.S. policy by Section 1025 of the FY2018 National Defense Authorization Act (H.R. 2810/P.L. 115-91 of December 12, 2017). The Navy and the Department of Defense (DOD) have been working since 2019 to develop a successor for the 355-ship force-level goal. The new goal is expected to introduce a new, more distributed fleet architecture featuring a smaller proportion of larger ships, a larger proportion of smaller ships, and a new third tier of large unmanned vehicles (UVs).

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 UVs. The Biden Administration can choose to adopt, revise, or set aside this document.

The Biden Administration will submit the Navy's proposed FY2022 budget later this year, and is required by law to additionally submit an FY2022 30-year (FY2022-FY2051) Navy shipbuilding plan in conjunction with its proposed FY2022 defense budget. Although the executive branch is required by law to submit a 30-year shipbuilding plan each year in conjunction with its annual budget submission, past Administrations have sometimes chosen to not submit a 30-year shipbuilding plan during their first year in office, on the grounds that they were spending that year reviewing and revising the previous administration's defense strategy, plans, and programs, so as to create a basis for subsequently devising a 30-year shipbuilding plan.

The issue for Congress is whether to approve, reject, or modify the Navy's proposed FY2022 shipbuilding program and the Navy's longer-term shipbuilding plans. Decisions that Congress makes on this issue can substantially affect Navy capabilities and funding requirements, and the U.S. shipbuilding industrial base. Key questions for Congress include the following:

- Does the Biden Administration plan to present a new force-level goal to replace the 355-ship goal, and, if so, when?
- Is the Navy's force-level goal (either the existing 355-ship goal or a possible successor goal) appropriate for supporting U.S. national security strategy and U.S. defense strategy? Is the more distributed fleet architecture envisioned by the Navy the most cost effective fleet architecture for meeting future mission needs?
- Will the Navy's proposed FY2022 shipbuilding funding request, five-year shipbuilding plan, and 30-year shipbuilding plan (if submitted) be consistent with the Navy's force-level goal?
- Given finite defense resources and competing demands for defense funds, what is the prospective affordability of the Navy's shipbuilding plans?
- Does the U.S. shipbuilding industry, including both shipyards and supplier firms, have adequate capacity for executing the Navy's shipbuilding plans?

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Introduction

Issue for Congress

This report presents background information and issues for Congress concerning the Navy's force structure and shipbuilding plans. The current and planned size and composition of the Navy, the annual rate of Navy ship procurement, the prospective affordability of the Navy's shipbuilding plans, and the capacity of the U.S. shipbuilding industry to execute the Navy's shipbuilding plans have been oversight matters for the congressional defense committees for many years.

The issue for Congress is whether to approve, reject, or modify the Navy's proposed FY2022 shipbuilding program and the Navy's longer-term shipbuilding plans. Decisions that Congress makes on this issue can substantially affect Navy capabilities and funding requirements and the U.S. shipbuilding industrial base.

CRS Reports on Individual Navy Shipbuilding Programs

Detailed coverage of certain individual Navy shipbuilding programs can be found in the following CRS reports:

- CRS Report R41129, *Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report RS20643, *Navy Ford (CVN-78) Class Aircraft Carrier Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS In Focus IF11679, *Navy DDG(X) Future Large Surface Combatant Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R44972, *Navy Constellation (FFG-62) Class Frigate (Previously FFG[X]) Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R43543, *Navy LPD-17 Flight II and LHA Amphibious Ship Programs: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R46374, *Navy Light Amphibious Warship (LAW) Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R43546, *Navy John Lewis (TAO-205) Class Oiler Shipbuilding Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS In Focus IF11674, *Navy Next-Generation Logistics Ship (NGLS) Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R45757, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*, by Ronald O'Rourke.

Background

Navy's Force-Level Goal

Navy's Existing (355-Ship) Force-Level Goal

355-Ship Goal Released in December 2016

The Navy's existing force-level goal, which the Navy released on December 15, 2016, calls for achieving and maintaining a fleet of 355 ships of the types and numbers shown in **Table 1**.[1]

Table 1. 355-Ship Force-Level Goal

Ship Category	Number of ships
Ballistic missile submarines (SSBNs)	12
Attack submarines (SSNs)	66
Aircraft carriers (CVNs)	12
Large surface combatants (i.e., cruisers [CGs] and destroyers [DDGs])	104
Small surface combatants (i.e., frigates [FFGs], Littoral Combat Ships, and mine warfare ships)	52
Amphibious ships	38
Combat Logistics Force (CLF) ships (i.e., at-sea resupply ships)	32
Command and support ships	39
TOTAL	**355**

Source: U.S. Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*, Table A-1 on page 10.

355-Ship Fleet Is a Goal to Be Attained in the Future

The 355-ship fleet is a goal to be attained in the future. As shown in **Table G-1**, the actual size of the Navy in recent years has generally been between 270 and 300 ships. Increasing the numerical size of the Navy from 300 ships to 355 would equate to an increase of about 18%.

355-Ship Goal Made U.S. Policy by FY2018 NDAA

Congress made the 355-ship goal U.S. policy via Section 1025 of the FY2018 National Defense Authorization Act, or NDAA (H.R. 2810/P.L. 115-91 of December 12, 2017).[2]

[1] For previous Navy force-level goals, see **Appendix A**.

[2] Section 1025 of P.L. 115-91 states

> SEC. 1025. Policy of the United States on minimum number of battle force ships.
>
> (a) Policy.—It shall be the policy of the United States to have available, as soon as practicable, not fewer than 355 battle force ships, comprised of the optimal mix of platforms, with funding subject to the availability of appropriations or other funds.
>
> (b) Battle force ships defined.—In this section, the term "battle force ship" has the meaning given the term in Secretary of the Navy Instruction 5030.8C.

355-Ship Goal Resulted from a Force Structure Assessment (FSA) Done in 2016

The 355-ship force-level goal is the result of a Force Structure Assessment (FSA) conducted by the Navy in 2016. An FSA is an analysis in which the Navy solicits inputs from U.S. regional combatant commanders (CCDRs) regarding the types and amounts of Navy capabilities that CCDRs deem necessary for implementing the Navy's portion of the national military strategy, and then translates those CCDR inputs into required numbers of ships, using current and projected Navy ship types. The analysis takes into account Navy capabilities for both warfighting and day-to-day forward-deployed presence.[3]

The Navy conducts a new FSA or an update to the existing FSA every few years, as circumstances require, to determine its force-level goal. Previous Navy force-level goals that resulted from earlier FSA are shown in **Appendix A**.

Navy's Force-Level Goal Is Not Just a Single Number

Although the result of an FSA is often reduced for convenience to single number (e.g., 355 ships), FSAs take into account a number of factors, including types and capabilities of Navy ships, aircraft, unmanned vehicles, and weapons, as well as ship homeporting arrangements and operational cycles. Thus, although the number of ships called for by an FSA might appear to be a one-dimensional figure, it actually incorporates multiple aspects of Navy capability and capacity.

355-Ship Goal Includes Only Manned Ships

The 355-ship force-level goal, like previous Navy force-level goals, includes manned ships only. The Navy has operated smaller unmanned surface vehicles (USVs) and unmanned underwater vehicles (UUVs) for many years, but because these UVs are launched from manned ships to act essentially as extensions of the manned ships, they have not been considered ships in their own right and consequently have not been included in the top-level expression of the Navy's force-level goal or the publicly cited figure for the number of ships in the Navy.

Navy's Next Force-Level Goal Might Include Large Unmanned Vehicles (UVs)

In the years since the 2016 FSA, the Navy has developed plans to acquire large USVs and UUVs. Because of their size and projected capabilities, these large unmanned vehicles (UVs) are to be deployed directly from pier, rather than from manned ships, to perform missions that might otherwise be assigned to manned ships and submarines.[4] In view of this, some observers have raised a question as to whether these large UVs should be included in the top-level expression of the Navy's next force-level goal (see next section) and the publicly cited figure for the number of ships in the Navy. Department of Defense (DOD) officials since late 2019 have sent mixed

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The term *battle force ships* in the above provision refers to the ships that count toward the quoted size of the Navy in public policy discussions about the Navy. The battle force ships method for counting the number of ships in the Navy was established in 1981 by agreement between the Secretary of the Navy and the Secretary of Defense, and has been modified somewhat over time, in part by Section 1021 of the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015 (H.R. 3979/P.L. 113-291 of December 19, 2014).

[3] For further discussion, see U.S. Navy, *Executive Summary, 2016 Navy Force Structure Assessment (FSA)*, December 15, 2016, pp. 1-2.

[4] For further discussion of these large UVs, see CRS Report R45757, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*, by Ronald O'Rourke.

signals on this question, but September 2020 indicated that the Navy's next force-level goal (see next section) will include large unmanned vehicles (UVs).[5]

Navy's Next Force-Level Goal

Work on Navy's Next Force-Level Goal Underway Since 2019

The Navy and DOD since 2019 have been working to develop a new force-level goal to replace the current 355-ship force-level goal. The conclusion of this work and the release of its results to Congress have been delayed repeatedly since late-2019.

Next Navy Force-Level Goal Will Introduce More Distributed Fleet Architecture

Remarks from Navy and DOD officials since 2019 have indicated that the Navy's next force-level goal will 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 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).

[5] In December 2019, it was reported that the Office of Management and Budget (OMB) had directed the Navy to include in its FY2021 budget submission a legislative proposal to formally change the definition of which ships count toward the quoted size of the Navy (known as the number of battle force ships) to include not only manned ships, but also large UVs that operate essentially as unmanned ships. (See Justin Katz, "OMB: Pentagon Must Submit Proposal to 'Redefine' Battleforce Ships to Include Unmanned Vehicles," *Inside Defense*, December 20, 2019; Joseph Trevithick, "White House Asks Navy To Include New Unmanned Vessels In Its Ambitious 355 Ship Fleet Plan," *The Drive*, December 20, 2019; Paul McCleary, "Navy To Slash 24 Ships in 2021 Plan, Bolster Unmanned Effort," *Breaking Defense*, December 20, 2019, David B. Larter, "Pentagon Proposes Big Cuts to US Navy Destroyer Construction, Retiring 13 Cruisers," *Defense News*, December 24, 2019.)

In January 2020, Admiral Michael Gilday, the Chief of Naval Operations, stated that the top-level expression of the ship force-level goal resulting from the Navy's next FSA would not include UVs. (See, for example, Sam LaGrone, "CNO Gilday Calls for Budget Increase to Reach 355 Ship Fleet; New Battle Force Count Won't Include Unmanned Ships," *USNI News*, January 14, 2020; Rich Abott, "CNO: Ship Count Will Not Include Unmanned; Bigger Topline Needed For Fleet Goal," *Defense Daily*, January 15, 2020; John M. Doyle, "CNO Wants Larger Slice of Defense Budget to Modernize, Meet China Threat," *Seapower*, January 15, 2020; Rich Abott, "CNO: Ship Count Will Not Include Unmanned; Bigger Topline Needed For Fleet Goal," *Defense Daily*, January 15, 2020.)

In September 2020, then-Secretary of Defense Mark Esper signaled that the stated ship-force level goal will include large UVs. (See, for example, Megan Eckstein, "Esper: Unmanned Vessels Will Allow the Navy to Reach 355-Ship Fleet," *USNI News*, September 18, 2020.)

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;[6]
- **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 for a given level of overall fleet capability, so as to fit within expected future Navy budgets.

Some elements of the Navy's new, more distributed fleet architecture were reflected in the Navy's proposed FY2021 budget. In particular, the Navy's proposed FY2021 budget included funding for the following:

- procurement of FFG-62-class frigates;[7]
- development of a smaller amphibious warship called the Light Amphibious Warship (LAW);[8]
- development of a smaller resupply ship called the Next-Generation Medium Logistics Ship;[9]
- development of two types of larger USVs—Large USVs (LUSVs) and Medium USVs (MUSVs);[10] and

[6] 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 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.

[7] For more on the FFG-62 program, see CRS Report R44972, *Navy Constellation (FFG-62) Class Frigate (Previously FFG[X]) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[8] For more on the LAW program, see CRS Report R46374, *Navy Light Amphibious Warship (LAW) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[9] For more on the next-generation Medium Logistics Ship, see, for example, Megan Eckstein, "Navy Researching New Class of Medium Amphibious Ship, New Logistics Ships," *USNI News*, February 20, 2020; Rich Abott, "FY 2021 Request Starts Work on Future Amphibs and Logistics Ships," *Defense Daily*, February 20, 2020; Justin Katz, "Navy Announces 'Next Generation Logistics Ship' Program with June 25 Industry Day," *Inside Defense*, May 14, 2020; Paul McLeary, "No Shipbuilding Plan, But Navy Works On New Ships To Counter China," *Breaking Defense*, May 18, 2020.

[10] For more on the LUSV and XLUUV programs, see CRS Report R45757, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*, by Ronald O'Rourke.

- procurement of large UUVs called Extra Large UUVs (XLUUVs).[11]

For additional background information on the effort in 2019 and 2020 to develop a new Navy force-level goal, see **Appendix H**.

Document Released on December 9, 2020, Outlining New Navy Force-Level Goal

On December 9, 2020, the outgoing Trump Administration released a document presenting 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 UVs.[12] **Table 2** compares the force-level goal in this document with the 355-ship force-level goal.

Table 2. Force-Level Goal in Document Released on December 9, 2020, Compared to 355-Ship Force-Level Goal

Ship type	355-ship goal	Force-level goal in document released on December 9, 2020	Difference
Ballistic missile submarines (SSBNs)	12	12	0
Attack submarines (SSNs)	66	72 to 78	+6 to +12
Large aircraft carriers (CVNs)	12	8 to 11[a]	-4 to -1
Light aircraft carriers (CVLs)	0	0 to 6[b]	0 to +6
Large surface combatants (cruisers and destroyers)	104	73 to 88	-31 to -16
Small surface combatants (frigates and Littoral Combat Ships [LCSs])	52	60 to 67	+8 to +15
Amphibious ships	38	61 to 67	+23 to +29
Large-deck (LHA/LHD)	*12*	*9 to 10*	*-3 to -2*
LPD-type	*26*	—	—
Light Amphibious Warships (LAWs)	*0*	—[c]	—[c]
LPD-type and LAWs combined	*26*	*52 to 57*[c]	*+26 to +31*[c]
Combat Logistics Force (CLF) ships	32	69 to 87[d]	+37 to +55[d]
Command and support ships	39	27 to 30	-12 to -9
Subtotal manned ships	***355***	***382 to 446***	***+27 to +91***
Unmanned and optionally manned ships			
Large and medium unmanned surface vessels (LUSVs and MUSVs)	0	119 to 166	+119 to +166
Extra-large unmanned underwater vehicles (XLUUVs)	0	24 to 76	+24 to +76
Subtotal unmanned and optionally manned ships	***0***	***143 to 242***	***+143 to +242***
TOTAL manned and unmanned ships	**355**	**525 to 688**	**+170 to +333**

[11] For more on the XLUUV program, see CRS Report R45757, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*, by Ronald O'Rourke.

[12] U.S. Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels*, December 2020, 23 pp. See also Russ Vought And Robert O'Brien, "The Navy Stops Taking On Water," *Wall Street Journal*, December 9, 2020; Marcus Weisgerber and Katie Bo Williams, "White House Shipbuilding Plan Would Shrink Ford Carrier Class Over Navy Objections," *Defense One*, December 9, 2020; Megan Eckstein, "UPDATED: White House-Led Navy Shipbuilding Plan Set to Will Push Boundaries of Pentagon Budgets, Industry Capacity," USNI News, December 10, 2020.

Source: Table prepared by CRS based on U.S. Navy data for 355-ship plan and U.S. Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels*, December 2020, Table A1-1 on pp. 9-10.

a. The document released on December 9, 2020, states: "Lower [end of the] range may be enabled by acquisition of cost-effective CVL."

b. The document released on December 9, 2020, states: "Further study of cost-effective CVL capabilities and capacity required."

c. Current Navy plans call for a notional total of 28 to 30 LAWs—see CRS Report R46374, *Navy Light Amphibious Warship (LAW) Program: Background and Issues for Congress*, by Ronald O'Rourke.

d. The document released on December 9, 2020, states: "Includes Next Generation Logistic Ships (NGLS). Logistics force size/mix subject to on-going analysis."

Some Observations on the December 9, 2020, Document

Observations on the December 9, 2020, document include the following:

- The December 9, 2020, document is not the FY2021 30-year shipbuilding plan, because the five-year and 30-year shipbuilding tables in the document begin with FY2022, not FY2021 (as they would for an FY2021 30-year shipbuilding plan), and because the data in the document's five-year shipbuilding table includes changes from the Navy's FY2021 five-year (FY2021-FY2025) shipbuilding plan for the years FY2022-FY2025. An FY2021 30-year shipbuilding plan would have five-year and 30-year tables beginning with FY2021, and the details for the period FY2022-FY2025 would match those of the Navy's FY2021 five-year (FY2021-FY2025) shipbuilding plan. The FY2021 30-year shipbuilding plan to date has not been submitted.
- The December 9, 2020, document is not a final version of the FY2022 shipbuilding plan. The final version of the FY2022 30-year shipbuilding plan is to be submitted in conjunction with DOD's proposed FY2022 budget, which is to be submitted to Congress later this year.
- The December 9, 2020, document can be viewed as the outgoing Trump Administration's own vision for future Navy force structure[13] and/or a draft version of the FY2022 30-year Navy shipbuilding plan. It is not unprecedented for an outgoing Administration to present, in its final weeks in office, a document presenting information on what it says it would have submitted as its proposed DOD budget for the coming fiscal year.[14]
- In developing a new force-level goal for the Navy and preparing the FY2022 30-year shipbuilding plan that is to be submitted in conjunction with DOD's proposed FY2022 budget, the Biden Administration may choose to adopt, revise,

[13] See, for example, Russ Vought And Robert O'Brien, "The Navy Stops Taking On Water," *Wall Street Journal*, December 9, 2020.

[14] For example, in January 1993, then-Secretary of Defense Dick Cheney submitted an annual Secretary of Defense report to the President and Congress (a report which at the time was submitted by the Secretary of Defense each year) that presented details of what the outgoing George H.W. Bush Administration said it would have included in its proposed FY1994 DOD budget, if that Administration had been reelected. See Department of Defense, *Annual Report to the President and Congress, Dick Cheney, Secretary of Defense*, January 1993, 181 pp., accessed December 23, 2020, at https://history.defense.gov/Historical-Sources/Secretary-of-Defense-Annual-Reports/, a website that, as of December 23, 2020, presented the annual reports of the Secretary of Defense for the years 1969 through 2005 (except for 1969-1970 and 1972). The report's section on naval forces on pages 81-85 includes, among other things, Table 14 on page 82, which projects the numbers and types of Navy ships out to the year FY1999 under the outgoing Administration's vision.

or set aside the December 9, 2020, document. The force-level goal and FY2022 30-year shipbuilding plan developed by the Biden Administration could differ from those shown in the December 9, 2020, document.

- The December 9, 2020, document is available as a potential comparative reference for assessing and discussing future Navy force-level goals, budgets, and 30-year shipbuilding plans.[15]
- Although the Biden Administration's force-level goal and FY2022 30-year shipbuilding plan may differ from those shown in the December 9, 2020, document, the general idea of shifting the Navy toward a more distributed force architecture that includes a smaller proportion of larger ships, a larger proportion of smaller ships, and a new third tier of large UVs may remain, because support for this change has been developing within Navy planning for years as a consequence of changes in technologies and the capabilities of potential adversaries. As noted earlier, some elements of the more distributed architecture were reflected in the Navy's proposed FY2021 budget.
- The force-level goal presented in the December 9, 2020, document is not fully described. As shown in **Table 2**, the numerical goals for every ship category other than SSBNs are expressed as a ranges, and some of the ranges are relatively wide. Fleets of markedly varying compositions could fit within the incompletely described force-level goal in the December 9, 2020, document. The incompletely described force-level goal makes it difficult to assess with much precision the potential costs, timelines, and industrial-base impacts of achieving and maintaining the force-level goal.
- The force level goal in the December 9, 2020, document includes about 8% to 26% more manned ships than the 355-ship force-level goal, and about 48% to 94% more manned ships and large UVs combined than the 355-ship force-level goal. The additional costs of achieving and maintaining the document's force-level goal, relative to the costs of achieving the 355-ship force-level goal, however, could be less (and perhaps substantially less) than these percentage figures suggest, because the December 9, 2020, document's force-level goal includes smaller numbers of individually more expensive platforms (such as aircraft carriers, cruisers and destroyers and large amphibious ships) and larger numbers of individually less inexpensive platforms (such as frigates, Light Amphibious Warships [LAWs],[16] Next-Generation Logistics Ships [NGLSs],[17] and large UVs).[18]
- Even so, the costs of achieving December 9, 2020, document's force-level goal would be greater (and perhaps substantially greater) than the costs of achieving

[15] See, for example, Aidan Quigley, "Congressional Leaders Support Bigger Navy, but Split on Trump Administration Plan," *Inside Defense*, December 18, 2020; Lara Seligman, "The White House Is Making Big Changes at the Pentagon—but Biden Can Reverse Them," *Politico*, December 11, 2020; Paul McLeary, "Shipbuilding Plan Calls For Billions In Spending, Surprising Congress," *Breaking Defense*, December 10, 2020.

[16] For more on the LAW program, see CRS Report R46374, *Navy Light Amphibious Warship (LAW) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[17] For more on the NGLS program, see CRS In Focus IF11674, *Navy Next-Generation Logistics Ship (NGLS) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[18] For more on the Navy's large UV programs, see CRS Report R45757, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*, by Ronald O'Rourke.

the 355-ship force-level goal. The document includes estimated total annual shipbuilding funding requirements that are higher than those of previous Navy 30-year shipbuilding plans, and the Congressional Budget Office (CBO) similarly estimates that the 30-year shipbuilding plan in the December 9, 2020, document would require substantially higher annual shipbuilding funding levels.[19]

- Some observers have questioned the prospective affordability of the December 9, 2020, document's force-level goal, particularly in a scenario where the overall DOD budget in coming years does not grow in real (i.e., inflation-adjusted) terms.[20] If DOD's total budget were not increased to accommodate the additional costs of the document's force-level goal, achieving the document's force-level goal would require reducing funding for other DOD priorities. Some observers speculated that funding the document's force-level goal would involve reducing funding for the Army, on the grounds that countering China's military is DOD's stated top planning priority, and that the Western Pacific—the region at the center of the evolving U.S.-China military balance—is, for the United States, primarily a maritime and aerospace theater rather than a ground-forces-centric theater.[21]

Navy's FY2022, Five-Year, and 30-Year Shipbuilding Plans

FY2022 Five-Year (FY2021-FY2025) Shipbuilding Plan (Not Yet Submitted)

The Navy's FY2022 five-year (FY2022-FY2026) shipbuilding plan is to be submitted to Congress later this year. As a placeholder pending the submission of the FY2022 five-year shipbuilding plan, **Table 3** shows the Navy's FY2021 five-year (FY2021-FY2025) shipbuilding plan, which includes for reference purposes, the ships funded for procurement in FY2020.

[19] See Congressional Budget Office, *Navy Shipbuilding: Prospects for Building a Larger Fleet*, Presentation by Eric J. Labs, an analyst in CBO's National Security Division, at the Surface Navy Association's 33rd Annual Symposium, January 15, 2021, 24 pp.

[20] See, for example, David B. Larter and Aaron Mehta, "Trump's Massive Navy Buildup Bets on Savings that Won't Materialize, Experts Say," *Defense News*, December 11, 2020.

[21] See, for example, Paul McLeary, "CJCS Milley Predicts DoD Budget 'Bloodletting' to Fund Navy," *Breaking Defense*, December 3, 2020; Rich Abott, "Milley: Battle Force 2045 Numbers Are 'Aspirations,' Elaborates On Carrier Plans," *Defense Daily*, December 3, 2020; Megan Eckstein, "CNO: Navy Will Have to Convince Biden Administration to Invest in Larger, Lethal Fleet," *USNI News*, December 3 (updated December 4), 2020; Gina Harkins, "Plans for a Bigger Navy Fleet Were Gaining Support. Now Leaders May Have to Start Over," *Military.com*, December 3, 2020; Paul McLeary, "Shipbuilding Plan Calls For Billions In Spending, Surprising Congress," *Breaking Defense*, December 10, 2020.

It might also be argued that while a shift in the U.S. role in the world to a more-restrained U.S. role—something that some observers have advocated (and which other observers oppose)—might imply a reduction in overall U.S. defense spending and the total required size and capabilities of the U.S. military, it might not necessarily imply a reduction in the Navy's budget and the required size and capabilities of the Navy, because the United States under a more-restrained role might need to rely as much or more than it does now on its ability to use the world's oceans as a buffer for protection from potential security challenges that might arise in Eurasia.. For additional discussion, see page 8 of CRS Testimony TE10057, *Future Force Structure Requirements for the United States Navy*, by Ronald O'Rourke.

Table 3. FY2021 Five-Year (FY2021-FY2025) Shipbuilding Plan Under Original FY2021 Budget Submission

FY2020 shown for reference

	FY20 (enacted)	FY21 (req.)	FY22	FY23	FY24	FY25	FY21-FY25 Total
Columbia (SSBN-826) class ballistic missile submarine		1			1		2
Gerald R. Ford (CVN-78) class aircraft carrier	*[a]*						
Virginia (SSN-774) class attack submarine	*2*	1	2	2	2	2	9
Arleigh Burke (DDG-51) class destroyer	*3*	2	2	1	2	1	8
FFG-62 frigate	*1*	1	1	2	2	3	9
LHA amphibious assault ship	*1 [b]*			[b]			
LPD-17 Fight II amphibious ship	*1 [b]*	[b]		1		1	2
Expeditionary Fast Transport (EPF) ship	*1*						
Submarine tender (AS[X])					1		1
John Lewis (TAO-205) class oiler	*2*			1	2	1	4
TATS towing, salvage, and rescue ship	*2*	2	1				3
TAGOS(X) ocean surveillance ship			1	1	1	1	4
TOTAL	***13***	**7**	**7**	**8**	**11**	**9**	**42**

Source: Table prepared by CRS based on FY2021 Navy budget submission, with adjustments as noted below.

Notes: [a] The Navy's FY2021 budget submission presents the aircraft carrier CVN-81 as a ship that Congress procured in FY2020. Consistent with congressional action on the Navy's FY2019 budget regarding the procurement of CVN-81, this CRS report treats CVN-81 as a ship that Congress procured (i.e., authorized and provided procurement funding for) in FY2019. [b] The Navy's FY2021 budget submission presents LPD-31, an LPD-17 Flight II amphibious ship, as a ship requested for procurement in FY2021, and the amphibious assault ship LHA-9 as a ship projected for procurement in FY2023. Consistent with congressional action on the Navy's FY2020 budget regarding the procurement of LPD-31 and LHA-9, this CRS report treats LPD-31 and LHA-9 as ships that Congress procured (i.e., authorized and provided procurement funding for) in FY2020.

FY2022 30-Year (FY2020-FY2049) Shipbuilding Plan (Not Yet Submitted)

The Trump Administration did not submit an FY2021 30-year (FY2021-FY2050) shipbuilding plan, and the Navy's FY2022 30-year (FY2022-FY2051) shipbuilding plan is to be submitted to Congress later this year, in conjunction with the FY2022 defense budget submission. As a placeholder pending the submission of the FY2022 30-year shipbuilding plan, **Table 4** shows the Navy's FY2020 30-year (FY2020-FY2049) shipbuilding plan, which was designed to support the Navy's 355-ship force-level objective and reflects the Navy's existing fleet architecture rather than a more distributed fleet architecture.

Although the executive branch is required by law to submit a 30-year shipbuilding plan each year in conjunction with its annual budget submission, past Administrations have sometimes chosen to not submit a 30-year shipbuilding plan during their first year in office, on the grounds that they were spending that year reviewing and revising the previous Administration's defense strategy, plans, and programs, so as to create a basis for subsequently devising a 30-year shipbuilding plan.

Table 4. FY2020 30-Year (FY2020-FY2049) Shipbuilding Plan

FY	CVNs	LSCs	SSCs	SSNs	LPSs	SSBNs	AWSs	CLFs	Supt	Total
20	1	3	1	3				2	2	**12**
21		2	2	2		1	1	1	1	**10**
22		2	2	2				1	2	**9**
23		3	2	2			1	2	3	**13**
24		3	2	2		1	1	1	1	**11**
25		3	2	2			1	1	2	**11**
26		2	2	2		1	1	1	2	**11**
27		3	2	2		1	2	1	1	**12**
28	1	2	2	2		1	1	1	1	**11**
29		3	2	2		1	1	1	1	**11**
30		2	1	2		1	1	1	2	**10**
31		3	2	2		1	2	1	2	**13**
32	1	2	2	2		1	1	1	2	**12**
33		3	2	2		1	1	1	2	**12**
34		2	2	2		1	2		2	**11**
35		3	2	2		1			1	**9**
36	1	2	2	2	1					**8**
37		3	2	2						**7**
38		2	2	2			1			**7**
39		3	2	2	1					**8**
40	1	2	2	2			1			**8**
41		3	2	2			1			**8**
42		2	2	2	1		1			**8**
43		3	2	2				1		**8**
44	1	2	2	2			1			**8**
45		3	2	2	1		2	2		**12**
46		2	2	2			1	2		**9**
47		3	2	2			1	2		**10**
48	1	2	2	2	1		2	2		**12**
49		3	2	2			1	2	3	**13**
Total	7	76	58	61	5	12	28	27	30	**304**

Source: U.S. Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*, Table A2-1 on page 13.

Key: FY = Fiscal Year; **CVNs** = aircraft carriers; **LSCs** = surface combatants (i.e., cruisers and destroyers); **SSCs** = small surface combatants (i.e., Littoral Combat Ships [LCSs] and frigates [FFG-62s]); **SSNs** = attack submarines; **LPSs** = large payload submarines; **SSBNs** = ballistic missile submarines; **AWSs** = amphibious warfare ships; **CLFs** = combat logistics force (i.e., resupply) ships; **Supt** = support ships.

In devising a 30-year shipbuilding plan to move the Navy toward its ship force-structure goal, key assumptions and planning factors include but are not limited to ship construction times and service lives, estimated ship procurement costs, projected shipbuilding funding levels, and industrial-base considerations.

Projected Force Levels Under 30-Year Shipbuilding Plan

Table 5 shows the Navy's projection of ship force levels for FY2020-FY2049 that would result from implementing the FY2020 30-year (FY2020-FY2049) shipbuilding plan shown in **Table 4**.

Table 5. Projected Force Levels Resulting from FY2020 30-Year Shipbuilding Plan

	CVNs	LSCs	SSCs	SSNs	SSGN/LPSs	SSBNs	AWSs	CLFs	Supt	Total
355-ship goal	**12**	**104**	**52**	**66**	**0**	**12**	**38**	**32**	**39**	**355**
FY20	11	94	30	52	4	14	33	29	34	**301**
FY21	11	92	33	53	4	14	34	30	34	**305**
FY22	11	93	33	52	4	14	34	31	39	**311**
FY23	11	95	32	51	4	14	35	31	41	**314**
FY24	11	94	35	47	4	14	36	32	41	**314**
FY25	10	95	35	44	4	14	37	32	42	**313**
FY26	10	96	36	44	2	14	38	31	43	**314**
FY27	9	100	38	42	1	13	37	32	44	**316**
FY28	10	102	41	42		13	38	32	44	**322**
FY29	10	104	43	44		12	36	32	44	**325**
FY30	10	107	45	46		11	36	32	44	**331**
FY31	10	110	47	48		11	36	32	43	**337**
FY32	10	112	49	49		11	36	32	44	**343**
FY33	10	115	50	51		11	38	32	44	**351**
FY34	10	117	52	53		11	36	32	44	**355**
FY35	10	114	55	54		11	34	32	45	**355**
FY36	10	109	57	56		11	35	32	45	**355**
FY37	10	107	58	58		10	35	32	45	**355**
FY38	10	108	59	57		10	35	32	44	**355**
FY39	10	105	61	58		10	37	32	42	**355**
FY40	9	105	62	59		10	37	32	41	**355**
FY41	10	104	61	59		11	37	32	41	**355**
FY42	9	106	60	61		12	36	32	39	**355**
FY43	9	108	57	61	1	12	36	32	39	**355**
FY44	9	109	55	62	1	12	36	32	39	**355**
FY45	10	107	55	63	1	12	36	32	39	**355**
FY46	9	106	54	64	2	12	37	32	39	**355**
FY47	9	107	54	65	2	12	35	32	39	**355**
FY48	9	109	51	66	2	12	35	32	39	**355**
FY49	10	108	50	67	3	12	35	31	39	**355**

Source: U.S. Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*, Table A2-4 on page 13.

Note: Figures for support ships include five JHSVs transferred from the Army to the Navy and operated by the Navy primarily for the performance of Army missions.
Key: FY = Fiscal Year; **CVNs** = aircraft carriers; **LSCs** = surface combatants (i.e., cruisers and destroyers); **SSCs** = small surface combatants (i.e., frigates, Littoral Combat Ships [LCSs], and mine warfare ships); **SSNs** = attack submarines; **SSGNs/LPSs** = cruise missile submarines/large payload submarines; **SSBNs** = ballistic missile submarines; **AWSs** = amphibious warfare ships; **CLFs** = combat logistics force (i.e., resupply) ships; **Supt** = support ships.

Issues for Congress

Key Questions

The issue for Congress is whether to approve, reject, or modify the Navy's proposed FY2022 shipbuilding program and the Navy's longer-term shipbuilding plans. Decisions that Congress makes on this issue can substantially affect Navy capabilities and funding requirements, and the U.S. shipbuilding industrial base. Key questions for Congress include the following:

- Does the Biden Administration plan to present a new force-level goal to replace the 355-ship goal, and if so, when?
- Is the Navy's force-level goal (either the existing 355-ship goal or a possible successor goal) appropriate for supporting U.S. national security strategy and U.S. defense strategy? Is the more distributed fleet architecture envisioned by the Navy the most cost effective fleet architecture for meeting future mission needs?
- Will the Navy's proposed FY2022 shipbuilding funding request, five-year shipbuilding plan, and 30-year shipbuilding plan (if submitted) be consistent with the Navy's force-level goal?
- Given finite defense resources and competing demands for defense funds, what is the prospective affordability of the Navy's shipbuilding plans?
- Does the U.S. shipbuilding industry, including both shipyards and supplier firms, have adequate capacity for executing the Navy's shipbuilding plans?
- How might a more distributed fleet architecture affect the distribution of shipbuilding work among the nation's shipyards?[22]
- What impact is the COVID-19 pandemic having on the execution of Navy shipbuilding programs?

Affordability of the Shipbuilding Plan

Overview

The prospective affordability of the Navy's 30-year shipbuilding plan has been a matter of oversight focus for several years, and particularly since the enactment in 2011 of the Budget Control Act, or BCA (S. 365/P.L. 112-25 of August 2, 2011). Observers have been especially concerned about the 30-year shipbuilding plan's prospective affordability during the decade or so from the mid-2020s through the mid-2030s, when the plan calls for procuring Columbia-class ballistic missile submarines as well as replacements for large numbers of retiring attack submarines, cruisers, and destroyers.[23]

[22] For an opinion piece relating to this issue, see Bryan Clark and Timothy A. Walton, "Shipbuilding Suppliers Need More than Market Forces to Stay Afloat," *Defense News*, May 20, 2020.

[23] The Navy's 30-year plans in recent years have spotlighted for policymakers the substantial increase in Navy shipbuilding funding that would be required to implement the 30-year plan during the decade or so from the mid-2020s through the mid-2030s. As discussed in CRS testimony in 2011, a key function of the 30-year shipbuilding plan is to alert policymakers well ahead of time to periods of potentially higher funding requirements for Navy shipbuilding. (See Statement of Ronald O'Rourke, Specialist in Naval Affairs, Congressional Research Service, before the House Armed Services Committee, Subcommittee on Oversight and Investigations, hearing on the Department of Defense's 30-Year

Navy officials stated at hearings on the Navy's FY2021 budget submission that achieving and supporting a 355-ship fleet over the next 10 years would require increasing the Navy's budget by a cumulative total of $120 billion to $130 billion over the next ten years, or an average of $12 billion to $13 billion per year. This figure, Navy officials stated, included not only the cost of procuring new ships, but costs associated with crewing, arming, operating, and maintaining a 355-ship fleet.[24] Prior to that—in September and October 2019—Navy officials stated that if Navy budgets in coming years remain at current levels in real (i.e., inflation-adjusted terms), the Navy would not be able to properly maintain a fleet of more than 302 to 310 ships.[25] In January 2020, Admiral Michael Gilday, the Chief of Naval Operations, stated that fully funding the Navy's program goals, including the attainment of a 355-ship fleet, would require allocating a larger share of DOD's budget to the Navy.[26]

Potential Impact of Cost Growth

If one or more Navy ship designs turn out to be more expensive to build than the Navy estimates, then the Navy's shipbuilding plan as a whole would become more expensive to execute. As detailed by CBO[27] and GAO,[28] lead ships in Navy shipbuilding programs in many cases have turned out to be more expensive to build than the Navy had estimated. Ship designs that can be viewed as posing a risk of being more expensive to build than the Navy estimates include but are not necessarily limited to Columbia-class ballistic missile submarines and FFG-62 frigates, as well as other new classes of ships that the Navy wants to begin procuring years from now.

CBO Estimate Compared to Navy Estimate

The statute that requires the Navy to submit a 30-year shipbuilding plan each year (10 U.S.C. 231) also requires CBO to submit its own independent analysis of the potential cost of the 30-year plan (10 U.S.C. 231[d]). CBO analyses of past Navy 30-year shipbuilding plans have generally estimated the cost of implementing those plans to be higher than what the Navy estimated. For example, CBO estimated that the cost of the first 10 years of the FY2020 30-year plan would be about 2% higher than the Navy's estimate; that the cost of the middle 10 years of the plan would be about 21% higher than the Navy's estimate; and that the cost of the final 10 years of the plan would be about 41% higher than the Navy's estimate.[29]

Aviation and Shipbuilding Plans, June 1, 2011, 8 pp.)

[24] See, for example, Ben Werner, "SECNAV Modly: Navy Needs Additional $120 Billion To Build 355-Ship Fleet By 2030," *USNI News*, February 27, 2020.

[25] Justin Katz, "Modly Acknowledges 355 Ships Won't Happen in 'Reasonable' Amount of Time," Inside Defense, September 16, 2019; Otto Kreisher, "Modly Doubts Future Budgets Will Allow for 355-Ship Fleet," *Seapower*, October 27, 2019; Ben Werner, "Admiral: Navy Can Afford to Field a 310-Ship Fleet, Not 355," *USNI News*, October 28, 2019. See also Rich Abott, "Navy Says Current Funding Only Supports 310 Ships," *Defense Daily*, October 28, 2019; Paul McLeary, "Navy May Scrap Goal of 355 Ships; 310 Is Likely," *Breaking Defense*, October 25, 2019.

[26] See, for example, Marcus Weisgerber, "The US Navy Needs More Money, Its Top Admiral Bluntly Argues," *Defense One*, January 14, 2020; Sam LaGrone, "CNO Gilday Calls for Budget Increase to Reach 355 Ship Fleet; New Battle Force Count Won't Include Unmanned Ships," *USNI News*, January 14, 2020; John M. Doyle, "CNO Wants Larger Slice of Defense Budget to Modernize, Meet China Threat," *Seapower*, January 15, 2020; Rich Abott, "CNO: Ship Count Will Not Include Unmanned; Bigger Topline Needed For Fleet Goal," *Defense Daily*, January 15, 2020.

[27] See Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2019 Shipbuilding Plan*, October 2018, p. 25, including Figure 10.

[28] See Government Accountability Office, *Navy Shipbuilding[:] Past Performance Provides Valuable Lessons for Future Investments*, GAO-18-238SP, June 2018, p. 8.

[29] Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2020 Shipbuilding Plan*, October 2019, Table 4

The growing divergence between CBO's estimate and the Navy's estimate as one moves from the first 10 years of the 30-year plan to the final 10 years of the plan is due in part to a technical difference between CBO and the Navy regarding the treatment of inflation. This difference compounds over time, making it increasingly important as a factor in the difference between CBO's estimates and the Navy's estimates the further one goes into the 30-year period. In other words, other things held equal, this factor tends to push the CBO and Navy estimates further apart as one proceeds from the earlier years of the plan to the later years of the plan.[30]

The growing divergence between CBO's estimate and the Navy's estimate as one moves from the first 10 years of the 30-year plan to the final 10 years of the plan is also due to differences between CBO and the Navy about the costs of certain ship classes, particularly classes that are projected to be procured starting years from now. The designs of these future ship classes are not yet determined, creating more potential for CBO and the Navy to come to differing conclusions regarding their potential cost.

For the FY2020 30-year plan, the largest source of difference between CBO and the Navy regarding the costs of individual ship classes was a new class of SSNs that the Navy wants to begin procuring years from now as the successor to the Virginia-class SSN design. This new class of SSNs, CBO says, accounted for 34% of the difference between the CBO and Navy estimates for the FY2020 30-year plan, in part because there were a substantial number of these SSNs in the plan, and because those ships occur in the latter years of the plan, where the effects of the technical difference between CBO and the Navy regarding the treatment of inflation show more strongly. The second-largest source of difference between CBO and the Navy regarding the costs of individual ship classes was the DDG(X)—a new class of large surface combatant (i.e., cruiser or destroyer) that the Navy wants to begin procuring around FY2028—which accounted for 33% of the difference, for reasons that are similar to those mentioned above for the new class of SSNs. The third-largest source of difference were the FFG-62 class that the Navy began procuring in FY2020, which accounted for 10% of the difference.

Sustainment Cost

In addition to the issue of the cost to build new ships, the Navy in its FY2020 30-year shipbuilding plan highlighted a concern over the potential costs to sustain a larger fleet. On this issue, the FY2020 30-year shipbuilding plan stated in part

> Coincident with the relatively new dynamic of purchasing more ships to grow the force instead of simply replacing ships or shrinking the force, is the responsibility to "own" the additional inventory when it arrives.
>
> Consistent annual funding in the shipbuilding account is foundational for an efficient industrial base in support of steady growth and long-term maintenance planning, but equally important is the properly phased, additional funding needed for operations and sustainment accounts as each new ship is delivered—the much larger fiscal burden over the life of a ship and the essence of the challenge to remain balanced across the three integral elements of readiness–capability–capacity. Because the Navy [until recently] has been shrinking not growing, and because of the disconnected timespan from purchase to delivery, often five years or more and often beyond the FYDP, there is risk of underestimating the aggregate sustainment costs looming over the horizon that must now be carefully considered in fiscal forecasting.

on page 13.

[30] For additional discussion of how CBO estimates the costs of new Navy ships, see Congressional Budget Office, *How CBO Estimates the Cost of New Ships*, April 2018, 6 pp.

> For a ship, the rough rule of thumb for cost is 30 percent for procurement and 70 percent for operating and sustainment; for example, a ship that costs $1B to buy costs $3.3B to own, amortized over its lifespan. Accordingly, multi-ship deliveries can add hundreds of millions of dollars to a budget year, and then require the same funding per year thereafter, compounded by additional deliveries in subsequent years and only offset by ship retirements, which lag deliveries when growing the force. A similar dynamic occurs when the life of a ship is extended. Sustainment resources programmed to shift from a retiring ship to a new ship must now stay in place – for the duration of the extension. The burden continues to grow until equilibrium is reached at the desired higher inventory, when deliveries match retirements and all resourcing accounts reach steady-state at a higher, enduring sustainment cost.
>
> For perspective, the current budget, among the largest ever, supports a modern fleet of approximately 300 ships, nearly 20 percent fewer than the goal of 355. The battle force inventory… rises from 301 ships in FY2020 to [a projected figure of] 314 ships in FY2024, and then 355 in FY2034. The programmed sustainment cost… is $24B [billion] in FY2020 and rises to $30B [billion in FY2024 in TY$ [then-year dollars]. When the battle force inventory reaches 355 in FY2034, [the] estimated cost to sustain that fleet will approach $40B (TY$), 32% higher than in FY2024. For now, included in this sustainment estimate are only personnel, planned maintenance, and some operations; representing those costs tied directly to owning and operating a ship, easily modeled today, and already line-item accounted for in the budget. Equally important additional costs, but not yet included in the future estimate, are those not easily associated with individual ships and require complex modeling for long-term forecasting (beyond 3 to 5 years), such as the balance of the operations accounts (market and schedule driven), modernization and ordnance (threat and technology driven), infrastructure and training (services spread across many ships), aviation detachments, networks and cyber support, plus others….
>
> Less of a challenge when shrinking the force, the Navy is now working towards developing the complex model needed to capture indirect costs for growing the force. Until then, macro ratios are helpful in estimating rough orders of magnitude beyond the FYDP and for identifying future areas of concern. Similar to procurement, estimates will be less precise deeper into the plan. Recovering from the long-term investment imbalance has proven to be costly, particularly in the readiness accounts. As readiness becomes more accurately defined, the modeling will improve and so will the ability to more accurately forecast. However, no matter the method, the anticipated cost of sustaining the proper mix of 355 ships is anticipated to be substantial, and reform efforts and balanced scalability will continue to be the drivers going forward.[31]

Capacity of Shipbuilding Industry

Areas of particular focus in recent years regarding the capacity of the U.S. shipbuilding industry to execute the Navy's shipbuilding plans include shipyard capacity for building submarines at desired rates, and the capacity of supplier firms to support increased rates of production for both submarines and surface ships.

[31] U.S. Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*, pp. 19-20.

COVID-19 Impact on Execution of Shipbuilding Programs

DOD Point Paper on Impacts from March 15 Through June 15, 2020

A DOD point paper on COVID-19 impacts to DOD acquisition programs from March 15, 2020, through June 20, 2020, stated in part:

> The Acquisition Program Impact Penalty cost is an estimate of the program costs increases realized because of inefficiencies caused by COVID-19. This document covers expected cost incurred between March 15, 2020 and June 15, 2020. Specific reasons for these inefficiencies across the defense programs includes the following;
>
> • Confirmed cases or quarantines.
>
> • Government facility closure/stand down-test delays and Research and Development Center inefficiencies.
>
> • Telework across the Defense Industrial Base
>
> • Closures due to travel restrictions
>
> • Logistic implications caused by travel restrictions requiring commercial freight
>
> • Availability of parts and supplies
>
> • High absentee rates
>
> • Local and state lockdowns
>
> • Foreign Government Lockdowns
>
> • Company/Supplier shutdowns
>
> • Financial distress
>
> • Social distancing across the industrial base (production line implications)
>
> • Added costs for cleaning/Disinfecting and temperature sensors
>
> • Added costs for PPE
>
> • CARES Act Section 3610 costs to pay for contractor/subcontractor employees unable to work due to COVID-19 impacts
>
> The Department closely monitors and tracks approximately 22,000 critical contractors who are most important to modernization and readiness. As of July 8, 2020, 977 of DoD's suppliers have closed since March 15, 2020. The average closure is over two weeks. 943 have reopened with 34 still closed. The biggest sectors affected have been Aviation, Space, Combat Vehicles, Clothing and Textiles and Missiles. Some sectors like Aviation also have significant impacts related to commercial aviation challenges.
>
> The estimate currently does not include potential overhead rate increases due to layoffs, especially if the contractor performs both government and commercial work. The Department is also concerned with a potential loss of critical labor skills (e.g. welders) and continue to work these issues by contract and location as we analyze the impact across the Defense Industrial Base (DIB).
>
> **DoD's Requirements**
>
> The Department currently estimates a potential cost to complete (or Request for Equitable Adjustments) totaling about $10.8 billion and touching more than 106,000 jobs. This estimate is calculated by considering the projected spend over this period for the portfolio, assessment of the percentage of that spend attributed to direct labor, and application of reported inefficiencies in that sector. The data from industry is showing approximately a

> 30-40% inefficiency across the DIB but in certain sectors like shipbuilding we are seeing about a 50-60% inefficiency.
>
> Projected cost overrun/inefficiency risk examples are as follows….
>
> …
>
> • **Navy** [impact:] $4,664.0M (43,214 Jobs)
>
> − Shipbuilding: Significant touch labor; greater facility impact from social distancing; and strong union representation at some yards pushing for paid leave with facility shutdown. Worker attendance rates range from 50% to 70% for blue collar workforce, and much of the white collar workforce is teleworking. At least one of the big seven private shipyards may shutdown. Recovery from a full shutdown would extend inefficiencies well into next year after restart.
>
> − Aircraft Procurement: Moderate touch labor but tends to enable better distancing. No prime production impacts yet, but there are some sub-tier Component impacts. A couple of short term plant shutdowns occurred in early April with possibly more in the near future.
>
> − Other Procurement: Moderate touch labor; greater facility impacts from social distancing, subtiers reporting issues (e.g. BAE York shut down for two days; returned with 50% workforce). Weapons manufacturer's not seeing significant impacts yet as many not located in high COVID impact areas.
>
> − Fragility concerns: The DoN shares the Army's long term fragility concern regarding FLIR , combat vehicle transmissions, and aircraft engines (GE specifically). The DoN also shares Army concerns about short term risk to textile manufacturers; body armor suppliers, and small business electronics suppliers who feed guidance systems (PGK, GMLRS, Excalibur) and wiring harnesses (vehicles, aircraft).
>
> …
>
> • **Missile Defense Agency** [impact:] $593.5M (3,956 Jobs)
>
> …
>
> − Aegis Program delays: SM-3 Block IIA production deliveries; Aegis Ashore Poland construction (further delays); and Aegis Testing delays for Flight Test Missile (FTM)-44 (Aegis), FTM-31, and FTM-33.[32]

The Navy later clarified that the statement in the above passage that "[a]t least one of the big seven private shipyards may shutdown" refers to the possibility of a shipyard closing temporarily due to COVID-19, rather than to the possibility of a shipyard closing permanently.[33]

Past Examples of Assistance to Shipyards and Supplier Firms

Potential options for Congress for providing assistance to shipyards and supplier firms whose operations are impacted by the COVID-19 pandemic could take various forms. Some past instances of assistance relating to shipbuilding include the following:

[32] Department of Defense, "FY 2020 DoD COVID-19 Response and Stimulus & COVID-19 Recovery Acquisition Contract Cost Overrun," undated point paper, 4 pp., posted at InsideDefense.com on August 6, 2020.

[33] See, for example, Paul McLeary, "Shipyards Not At Risk, Despite DoD Warning It Needs $$ To Save Them," *Breaking Defense*, August 12, 2020; Mallory Shelbourne, "Geurts: Navy Modernization At Risk Without COVID-19 Acquisition Relief Funds," *USNI News*, August 12 (updated August 13), 2020.

- Following Hurricane Katrina in August 2005, Congress provided $1.7 billion in reallocated emergency supplemental appropriations to pay estimated higher shipbuilding costs for 11 Navy ships under construction at the Ingalls shipyard in Pascagoula, MS, and the Avondale shipyard upriver from New Orleans, LA.[34]
- The American Recovery and Reinvestment Act (ARRA) of 2009 (H.R. 1/P.L. 111-5 of February 17, 2009), which was enacted in response to the 2008-2009 recession, appropriated $100 million for the Maritime Administration (MARAD) to be used for making supplemental grants to small shipyards as authorized under Section 3508 of the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 (S. 3001/P.L. 110-417 of October 14, 2008) or 46 U.S.C. 54101.[35]
- Following Hurricane Michael in October 2018, the Department of Homeland Security (DHS), of which the Coast Guard is a part, announced on October 11, 2019, that DHS had granted extraordinary contractual relief to Eastern Shipbuilding Group (ESG) of Panama City, FL, the builder of the first of the Coast Guard's new Offshore Patrol Cutters (OPCs), under P.L. 85-804 as amended (50 U.S.C. 1431-1435). P.L. 85-804, originally enacted in 1958, authorizes certain federal agencies to provide certain types of extraordinary relief to contractors who are encountering difficulties in the performance of federal contracts or subcontracts relating to national defense.[36] ESG reportedly submitted

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[34] See CRS Report RS22239, *Emergency Supplemental Appropriations for Hurricane Katrina Relief*, by Keith Bea, August 22, 2006, p. 6. The report states

> Citing the need for "special oversight" of these shipbuilding funds dedicated to cover property damage, cleanup, idle payroll, and business disruption (that may also be covered by shipbuilders' insurance), the appropriators added report language requiring that the Navy or Army, as applicable, submit a report to the Appropriations Committees "certifying" that the costs were related to the hurricanes and would not be paid for by FEMA or the shipbuilders' insurers.
>
> (U.S. House, Conference Committees 2005, *Making Appropriations for the Department of Defense for the Fiscal Year Ending September 30, 2006, and for Other Purposes*, conference report to accompany H.R. 2863, H.Rept. 109-359, 109th Cong., 1st sess. [Washington: GPO, 2005], p. 496.)

See also CRS Report RL33298, *FY2006 Supplemental Appropriations: Iraq and Other International Activities; Additional Hurricane Katrina Relief*, Paul M. Irwin, Coordinator, Larry Nowels, Coordinator, June 15, 2006, pp. 59-66; and CRS Report RL33197, *Reallocation of Hurricane Katrina Emergency Appropriations: Defense and Other Issues*, Coordinated by Amy Belasco, December 15, 2005, pp. 9-14. (These CRS reports are out of print and available for congressional clients from the author of this report.)

[35] Section 3508 of P.L. 110-417 amended the U.S. Code to add Section 54101 to Title 46, which establishes a program for assistance for small shipyards and maritime communities.

[36] 50 U.S.C. 1431 states in part:

> The President may authorize any department or agency of the Government which exercises functions in connection with the national defense, acting in accordance with regulations prescribed by the President for the protection of the Government, to enter into contracts or into amendments or modifications of contracts heretofore or hereafter made and to make advance payments thereon, without regard to other provisions of law relating to the making, performance, amendment, or modification of contracts, whenever he deems that such action would facilitate the national defense. The authority conferred by this section shall not be utilized to obligate the United States in an amount in excess of $50,000 without approval by an official at or above the level of an Assistant Secretary or his Deputy, or an assistant head or his deputy, of such department or agency, or by a Contract Adjustment Board established therein.

For more on P.L. 85-804 as amended, see CRS Report 76-261, *Extraordinary Contractual Relief Under Public Law 85-804*, April 28, 1976, by Andrew C. Mayer. The report was prepared at the request of the House Armed Services Committee and converted by the committee into a committee print (70-905 O), dated May 10, 1976, that can be viewed

a request for extraordinary relief on June 30, 2019, after ESG's shipbuilding facilities were damaged by Hurricane Michael.[37]

The past instances listed above do not necessarily represent the full range of options available to Congress for assisting shipyards and supplier firms—additional options might be available through the Defense Production Act (DPA) or other federal authorities.[38]

Legislative Activity for FY2022

CRS Reports Tracking Legislation on Specific Navy Shipbuilding Programs

Detailed coverage of legislative activity on certain Navy shipbuilding programs (including funding levels, legislative provisions, and report language) can be found in the following CRS reports:

- CRS Report R41129, *Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report RS20643, *Navy Ford (CVN-78) Class Aircraft Carrier Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS In Focus IF11679, *Navy DDG(X) Future Large Surface Combatant Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R44972, *Navy Constellation (FFG-62) Class Frigate (Previously FFG[X]) Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R43543, *Navy LPD-17 Flight II and LHA Amphibious Ship Programs: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R46374, *Navy Light Amphibious Warship (LAW) Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R43546, *Navy John Lewis (TAO-205) Class Oiler Shipbuilding Program: Background and Issues for Congress*, by Ronald O'Rourke.

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at https://ufdc.ufl.edu/AA00022546/00001/1j. See also David H. Peirez, "Public Law 85-804: Contractual Relief for the Government Contractor," *Administrative Law Review*, vol. 16 (Summer 1964): 248-264, accessed October 11, 2019, at https://www.jstor.org/stable/40708469; and "Presidential Power: Public Law 85-804 (50 U.S.C. §§ 1431-35)," Brennan Center for Justice, undated, accessed October 11, 2019, at https://www.brennancenter.org/sites/default/files/analysis/50%20USC%201431-1435.pdf. (Although it is undated, it appears to have been written no earlier than 2014, as it includes three references to the year 2014, including one that states, "As of 2014….") The text of P.L. 85-804 as originally enacted is posted at https://www.govinfo.gov/content/pkg/STATUTE-72/pdf/STATUTE-72-Pg972.pdf.

[37] For more on the extraordinary contractual relief provided to ESG under P.L. 85-804, see CRS Report R42567, *Coast Guard Cutter Procurement: Background and Issues for Congress*, by Ronald O'Rourke.

[38] For more on the DPA in the context of the COVID-19 situation, see CRS Report R43767, *The Defense Production Act of 1950: History, Authorities, and Considerations for Congress*, by Michael H. Cecire and Heidi M. Peters, and CRS Insight IN11231, *The Defense Production Act (DPA) and COVID-19: Key Authorities and Policy Considerations*, by Michael H. Cecire and Heidi M. Peters. See also Scott F. Roybal and Laura A. Alexander, "Coronavirus and its Implications for Government Contractors," *National Law Review*, March 9, 2020.

- CRS In Focus IF11674, *Navy Next-Generation Logistics Ship (NGLS) Program: Background and Issues for Congress*, by Ronald O'Rourke.
- CRS Report R45757, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*, by Ronald O'Rourke.

Legislative activity on individual Navy shipbuilding programs that are not covered in detail in the above reports is covered below.

FY2022 Funding Request to Be Submitted Later This Year

The Navy's proposed FY2022 budget, including its funding request for shipbuilding, is to be submitted to Congress later this year.

Summary of Congressional Action on FY2021 Funding Request

Table 6 summarizes congressional action on the Navy's FY2021 funding request for Navy shipbuilding. The table shows the amounts requested and congressional changes to those requested amounts. A blank cell in a filled-in column showing congressional changes to requested amounts indicates no change from the requested amount.

Table 6. Summary of Congressional Action on FY2021 Funding Request

Millions of dollars, rounded to nearest tenth; totals may not add due to rounding

Line number	Program	Original Navy FY2021 Budget Submission	Congressional changes to requested amounts					
			Authorization			Appropriation		
			HASC	SASC	Conf.	HAC	SAC	Conf.
Shipbuilding and Conversion, Navy (SCN) appropriation account								
001	Columbia-class SSBN	2,891.5				-29.3		-22.5
002	Columbia-class SSBN (AP)	1,123.2		+175.0	+130.0		+130.0	+130.0
003	CVN 78-80 aircraft carriers	997.5	-90.0		-90.0	-92.7		-38.6
004	CVN-81 aircraft carrier	1,645.6	-180.0		-39.2	-39.2		-39.2
005	Virginia-class SSN	2,334.7	+2,296.0	-74.4	+2,285.8	+2,268.5		+2,268.5
006	Virginia-class SSN (AP)	1,901.2	+272.0	+472.0	+272.0	+272.0	+472.0	+272.0
007	CVN RCOH	1,878.5					-347.3	-347.3
008	CVN RCOH (AP)	17.4						
009	DDG-1000	78.2						
010	DDG-51	3,040.3		-30.0	-30.0	-109.0	+215.0	+179.6
011	DDG-51 (AP)	29.3		+435.0	+305.0		+130.0	+130.0
012	LCS	0						
013	FFG-62	1,053.1	-98.6					
014	LPD-17 Flight II	1,155.8	-37.7	-250.0	-30.0		-30.0	-30.0
015	LPD-17 Flight II (AP)	0		+500.0	+2.0		+1.0	+1.0
015A	LPD-17 Flight II (AP) (LPD-33)	0					+1.0	+1.0
016	Expeditionary Sea Base (ESB)	0						
016A	Expeditionary Sea Base (ESB) (AP)	0					+73.0	+73.0
017	LHA amphibious assault ship	0		+250.0	+500.0		+500.0	+500.0
018	LHA amphibious assault ship (AP)	0						
019	Expeditionary Fast Transport (EPF)	0	+260.0		+260.0		+260.0	+260.0
020	TAO-205 oiler	0				+20.0		+20.0
021	TAO-205 oiler (AP)	0						
022	TATS	168.2				-10.4		-10.4
023	LCU 1700 landing craft	87.4		-17.0				
024	Outfitting and post delivery	825.6		-78.3	-59.3	-19.0	-59.3	-73.6
025	Ship-to-shore connector (SSC)	0						
026	Service craft	249.8		+25.5		-5.6		-5.6
027	LCAC landing craft SLEP	56.5		-56.5				
028	Completion of PY ships	369.1					+38.2	+38.2
XX	COVID recov. 2nd, 3rd, 4th tier suppliers	0				+100.0		
YY	Auxiliary vessels	0					+60.0	+60.0
TOTAL		**19,902.8**	**+2,421.7**	**+1,351.3**	**+3,506.4**	**+2,355.2**	**+1,443.6**	**+3,366.1**

Source: Table prepared by CRS based on original Navy FY2021 budget submission, committee reports, and explanatory statements on the FY2021 National Defense Authorization Act and FY2020 DOD Appropriations Act.

Notes: Millions of dollars, rounded to nearest tenth. A blank cell indicates no change to requested amount. Totals may not add due to rounding. **AP** is advance procurement funding; **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 report.

Appendix A. Earlier Navy Force-Structure Goals Dating Back to 2001

The table below shows earlier Navy force-structure goals dating back to 2001. The 308-ship force-level goal of March 2015, shown in the first column of the table, is the goal that was replaced by the 355-ship force-level goal released in December 2016.

Table A-1. Earlier Navy Force-Structure Goals Dating Back to 2001

Ship type	308-ship goal of March 2015	306-ship goal of January 2013	~310-316 ship goal of March 2012	Revised 313-ship goal of September 2011	Changes to February 2006 313-ship goal announced through mid-2011	February 2006 Navy goal for 313-ship fleet	Early-2005 Navy goal for fleet of 260-325 ships		2002-2004 Navy goal for 375-ship Navy[a]	2001 QDR goal for 310-ship Navy
							260-ships	325-ships		
Ballistic missile submarines (SSBNs)	12[b]	12[b]	12-14[b]	12[b]	12[b]	14	14	14	14	14
Cruise missile submarines (SSGNs)	0[c]	0[c]	0-4[c]	4[c]	0[c]	4	4	4	4	2 or 4[d]
Attack submarines (SSNs)	48	48	~48	48	48	48	37	41	55	55
Aircraft carriers	11[e]	11[e]	11[e]	11[e]	11[e]	11[f]	10	11	12	12
Cruisers and destroyers	88	88	~90	94	94[g]	88	67	92	104	116
Frigates	0	0	0	0	0	0	0	0	0	
Littoral Combat Ships (LCSs)	52	52	~55	55	55	55	63	82	56	0
Amphibious ships	34	33	~32	33	33[h]	31	17	24	37	36
MPF(F) ships[i]	0[i]	0[i]	0[i]	0[i]	0[i]	12[i]	14[i]	20[i]	0[i]	0[i]
Combat logistics (resupply) ships	29	29	~29	30	30	30	24	26	42	34
Dedicated mine warfare ships	0	0	0	0	0	0	0	0	26[k]	16
Joint High Speed Vessels (JHSVs)	10[l]	10[l]	10[l]	10[l]	21[l]	3	0	0	0	0
Other[m]	24	23	~23	16	24[n]	17	10	11	25	25
Total battle force ships	**308**	**306**	**~310-316**	**313**	**328**	**313**	**260**	**325**	**375**	**310 or 312**

Sources: Table prepared by CRS based on U.S. Navy data.

Notes: QDR is Quadrennial Defense Review. The "~" symbol means approximately.

a. Initial composition. Composition was subsequently modified.

b. The Navy plans to replace the 14 current Ohio-class SSBNs with a new class of 12 next-generation SSBNs. For further discussion, see CRS Report R41129, *Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.

c. Although the Navy plans to continue operating its four SSGNs until they reach retirement age in the late 2020s, the Navy does not plan to replace these ships when they retire. This situation can be expressed in a table like this one with either a 4 or a 0.

d. The report on the 2001 QDR did not mention a specific figure for SSGNs. The Administration's proposed FY2001 DOD budget requested funding to support the conversion of two available Trident SSBNs into

SSGNs, and the retirement of two other Trident SSBNs. Congress, in marking up this request, supported a plan to convert all four available SSBNs into SSGNs.

e. With congressional approval, the goal has been temporarily be reduced to 10 carriers for the period between the retirement of the carrier *Enterprise* (CVN-65) in December 2012 and entry into service of the carrier *Gerald R. Ford* (CVN-78), currently scheduled for September 2015.

f. For a time, the Navy characterized the goal as 11 carriers in the nearer term, and eventually 12 carriers.

g. The 94-ship goal was announced by the Navy in an April 2011 report to Congress on naval force structure and missile defense.

h. The Navy acknowledged that meeting a requirement for being able to lift the assault echelons of 2.0 Marine Expeditionary Brigades (MEBs) would require a minimum of 33 amphibious ships rather than the 31 ships shown in the February 2006 plan. For further discussion, see CRS Report RL34476, *Navy LPD-17 Amphibious Ship Procurement: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

i. Today's Maritime Prepositioning Force (MPF) ships are intended primarily to support Marine Corps operations ashore, rather than Navy combat operations, and thus are not counted as Navy battle force ships. The planned MPF (Future) ships, however, would have contributed to Navy combat capabilities (for example, by supporting Navy aircraft operations). For this reason, the ships in the planned MPF(F) squadron were counted by the Navy as battle force ships. The planned MPF(F) squadron was subsequently restructured into a different set of initiatives for enhancing the existing MPF squadrons; the Navy no longer plans to acquire an MPF(F) squadron.

j. The Navy no longer plans to acquire an MPF(F) squadron. The Navy, however, has procured or plans to procure some of the ships that were previously planned for the squadron—specifically, TAKE-1 class cargo ships, and Mobile Landing Platform (MLP)/Afloat Forward Staging Base (AFSB) ships. These ships are included in the total shown for "Other" ships. AFSBs are now called Expeditionary Sea Base ships (ESBs).

k. The figure of 26 dedicated mine warfare ships included 10 ships maintained in a reduced mobilization status called Mobilization Category B. Ships in this status are not readily deployable and thus do not count as battle force ships. The 375-ship proposal thus implied transferring these 10 ships to a higher readiness status.

l. Totals shown include 5 ships transferred from the Army to the Navy and operated by the Navy primarily for the performance of Army missions.

m. This category includes, among other things, command ships and support ships.

n. The increase in this category from 17 ships under the February 2006 313-ship goal to 24 ships under the apparent 328-ship goal included the addition of one TAGOS ocean surveillance ship and the transfer into this category of six ships—three modified TAKE-1 class cargo ships, and three Mobile Landing Platform (MLP) ships—that were previously intended for the planned (but now canceled) MPF(F) squadron.

Appendix B. Comparing Past Ship Force Levels to Current or Potential Future Levels

In assessing the appropriateness of the current or potential future number of ships in the Navy, observers sometimes compare that number to historical figures for total Navy fleet size. Historical figures for total fleet size, however, can be a problematic yardstick for assessing the appropriateness of the current or potential future number of ships in the Navy, particularly if the historical figures are more than a few years old, because

- the missions to be performed by the Navy, the mix of ships that make up the Navy, and the technologies that are available to Navy ships for performing missions all change over time; and
- the number of ships in the fleet in an earlier year might itself have been inappropriate (i.e., not enough or more than enough) for meeting the Navy's mission requirements in that year.

Regarding the first bullet point above, the Navy, for example, reached a late-Cold War peak of 568 battle force ships at the end of FY1987,[39] and as of January 26, 2021, included a total of 297 battle force ships. The FY1987 fleet, however, was intended to meet a set of mission requirements that focused on countering Soviet naval forces at sea during a potential multitheater NATO-Warsaw Pact conflict, while the January 2021 fleet is intended to meet a considerably different set of mission requirements centered on countering China's improving naval capabilities. In addition, the Navy of FY1987 differed substantially from the January 2021 fleet in areas such as profusion of precision-guided air-delivered weapons, numbers of Tomahawk-capable ships, and the sophistication of C4ISR systems and networking capabilities.[40]

In coming years, Navy missions may shift again, and the capabilities of Navy ships will likely have changed further by that time due to developments such as more comprehensive implementation of networking technology, increased use of ship-based unmanned vehicles, and the potential fielding of new types of weapons such as lasers or electromagnetic rail guns.

The 568-ship fleet of FY1987 may or may not have been capable of performing its stated missions; the 297-ship fleet of January 2021 may or may not be capable of performing its stated missions; and a fleet years from now with a certain number of ships may or may not be capable of performing its stated missions. Given changes over time in mission requirements, ship mixes, and technologies, however, these three issues are to a substantial degree independent of one another.

For similar reasons, trends over time in the total number of ships in the Navy are not necessarily a reliable indicator of the direction of change in the fleet's ability to perform its stated missions. An increasing number of ships in the fleet might not necessarily mean that the fleet's ability to

[39] Some publications have stated that the Navy reached a peak of 594 ships at the end of FY1987. This figure, however, is the total number of active ships in the fleet, which is not the same as the total number of battle force ships. The battle force ships figure is the number used in government discussions of the size of the Navy. In recent years, the total number of active ships has been larger than the total number of battle force ships. For example, the Naval History and Heritage Command (formerly the Naval Historical Center) states that as of November 16, 2001, the Navy included a total of 337 active ships, while the Navy states that as of November 19, 2001, the Navy included a total of 317 battle force ships. Comparing the total number of active ships in one year to the total number of battle force ships in another year is thus an apples-to-oranges comparison that in this case overstates the decline since FY1987 in the number of ships in the Navy. As a general rule to avoid potential statistical distortions, comparisons of the number of ships in the Navy over time should use, whenever possible, a single counting method.

[40] C4ISR stands for command and control, communications, computers, intelligence, surveillance, and reconnaissance.

perform its stated missions is increasing, because the fleet's mission requirements might be increasing more rapidly than ship numbers and average ship capability. Similarly, a decreasing number of ships in the fleet might not necessarily mean that the fleet's ability to perform stated missions is decreasing, because the fleet's mission requirements might be declining more rapidly than numbers of ships, or because average ship capability and the percentage of time that ships are in deployed locations might be increasing quickly enough to more than offset reductions in total ship numbers.

Regarding the second of the two bullet points above, it can be noted that comparisons of the size of the fleet today with the size of the fleet in earlier years rarely appear to consider whether the fleet was appropriately sized in those earlier years (and therefore potentially suitable as a yardstick of comparison), even though it is quite possible that the fleet in those earlier years might not have been appropriately sized, and even though there might have been differences of opinion among observers at that time regarding that question. Just as it might not be prudent for observers years from now to tacitly assume that the 290-ship Navy of September 2019 was appropriately sized for meeting the mission requirements of 2019, even though there were differences of opinion among observers on that question, simply because a figure of 290 ships appears in the historical records for 2019, so, too, might it not be prudent for observers today to tacitly assume that the number of ships of the Navy in an earlier year was appropriate for meeting the Navy's mission requirements that year, even though there might have been differences of opinion among observers at that time regarding that question, simply because the size of the Navy in that year appears in a table like **Table G-1**.

Previous Navy force structure plans, such as those shown in **Table A-1**, might provide some insight into the potential adequacy of a proposed new force-structure plan, but changes over time in mission requirements, technologies available to ships for performing missions, and other force-planning factors, as well as the possibility that earlier force-structure plans might not have been appropriate for meeting the mission demands of their times, suggest that some caution should be applied in using past force structure plans for this purpose, particularly if those past force structure plans are more than a few years old. The Reagan-era goal for a 600-ship Navy, for example, was designed for a Cold War set of missions focusing on countering Soviet naval forces at sea, which is not an appropriate basis for planning the Navy today, and there was considerable debate during those years as to the appropriateness of the 600-ship goal.[41]

[41] Navy force structure plans that predate those shown in **Table A-1** include the Reagan-era 600-ship goal of the 1980s, the Base Force fleet of more than 400 ships planned during the final two years of the George H. W. Bush Administration, the 346-ship fleet from the Clinton Administration's 1993 Bottom-Up Review (or BUR, sometimes also called Base Force II), and the 310-ship fleet of the Clinton Administration's 1997 QDR. The table below summarizes some key features of these plans.

Features of Recent Navy Force Structure Plans

Plan	600-ship	Base Force	1993 BUR	1997 QDR
Total ships	~600	~450/416[a]	346	~305/310[b]
Attack submarines	100	80/~55[c]	45-55	50/55[d]
Aircraft carriers	15[e]	12	11+1[f]	11+1[f]
Surface combatants	242/228[g]	~150	~124	116
Amphibious ships	~75[h]	51[i]	41[i]	36[i]

Source: Prepared by CRS based on DOD and U.S. Navy data.

a. Commonly referred to as 450-ship goal, but called for decreasing to 416 ships by end of FY1999.

b. Original total of about 305 ships was increased to about 310 due to increase in number of attack submarines to 55

from 50.
c. Plan originally included 80 attack submarines, but this was later reduced to about 55.
d. Plan originally included 50 attack submarines but this was later increased to 55.
e. Plus one additional aircraft carrier in the service life extension program (SLEP).
f. Eleven active carriers plus one operational reserve carrier.
g. Plan originally included 242 surface combatants but this was later reduced to 228.
h. Number needed to lift assault echelons of one Marine Expeditionary Force (MEF) plus one Marine Expeditionary Brigade (MEB).
i. Number needed to lift assault echelons of 2.5 MEBs. Changing numbers needed to meet this goal reflect in part changes in the design and capabilities of amphibious ships.

Appendix C. Industrial Base and Employment Aspects of Additional Shipbuilding Work

This appendix presents background information on the ability of the industrial base to take on the additional shipbuilding work associated with achieving and maintaining the Navy's 355-ship force-level goal and on the employment impact of additional shipbuilding work.

Industrial Base Ability

The U.S. shipbuilding industrial base has some unused capacity to take on increased Navy shipbuilding work, particularly for certain kinds of surface ships, and its capacity could be increased further over time to support higher Navy shipbuilding rates. Navy shipbuilding rates could not be increased steeply across the board overnight—time (and investment) would be needed to hire and train additional workers and increase production facilities at shipyards and supplier firms, particularly for supporting higher rates of submarine production. Depending on their specialties, newly hired workers could be initially less productive per unit of time worked than more experienced workers.

Some parts of the shipbuilding industrial base, such as the submarine construction industrial base, could face more challenges than others in ramping up to the higher production rates required to build the various parts of the 355-ship fleet. Over a period of a few to several years, with investment and management attention, Navy shipbuilding could ramp up to higher rates for achieving a 355-ship fleet over a period of 20-30 years.

An April 2017 CBO report stated that

> all seven shipyards [currently involved in building the Navy's major ships] would need to increase their workforces and several would need to make improvements to their infrastructure in order to build ships at a faster rate. However, certain sectors face greater obstacles in constructing ships at faster rates than others: Building more submarines to meet the goals of the 2016 force structure assessment would pose the greatest challenge to the shipbuilding industry. Increasing the number of aircraft carriers and surface combatants would pose a small to moderate challenge to builders of those vessels. Finally, building more amphibious ships and combat logistics and support ships would be the least problematic for the shipyards. The workforces across those yards would need to increase by about 40 percent over the next 5 to 10 years. Managing the growth and training of those new workforces while maintaining the current standard of quality and efficiency would represent the most significant industrywide challenge. In addition, industry and Navy sources indicate that as much as $4 billion would need to be invested in the physical infrastructure of the shipyards to achieve the higher production rates required under the [notional] 15-year and 20-year [buildup scenarios examined by CBO]. Less investment would be needed for the [notional] 25-year or 30-year [buildup scenarios examined by CBO].[42]

A January 13, 2017, press report states the following:

> The Navy's production lines are hot and the work to prepare them for the possibility of building out a much larger fleet would be manageable, the service's head of acquisition said Thursday.
>
> From a logistics perspective, building the fleet from its current 274 ships to 355, as recommended in the Navy's newest force structure assessment in December, would be

[42] Congressional Budget Office, *Costs of Building a 355-Ship Navy*, April 2017, pp. 9-10.

> straightforward, Assistant Secretary of the Navy for Research, Development and Acquisition Sean Stackley told reporters at the Surface Navy Association's annual symposium.
>
> "By virtue of maintaining these hot production lines, frankly, over the last eight years, our facilities are in pretty good shape," Stackley said. "In fact, if you talked to industry, they would say we're underutilizing the facilities that we have."
>
> The areas where the Navy would likely have to adjust "tooling" to answer demand for a larger fleet would likely be in Virginia-class attack submarines and large surface combatants, the DDG-51 guided missile destroyers—two ship classes likely to surge if the Navy gets funding to build to 355 ships, he said.
>
> "Industry's going to have to go out and procure special tooling associated with going from current production rates to a higher rate, but I would say that's easily done," he said.
>
> Another key, Stackley said, is maintaining skilled workers—both the builders in the yards and the critical supply-chain vendors who provide major equipment needed for ship construction. And, he suggested, it would help to avoid budget cuts and other events that would force workforce layoffs.
>
> "We're already prepared to ramp up," he said. "In certain cases, that means not laying off the skilled workforce we want to retain."[43]

A January 17, 2017, press report states the following:

> Building stable designs with active production lines is central to the Navy's plan to grow to 355 ships. "if you look at the 355-ship number, and you study the ship classes (desired), the big surge is in attack submarines and large surface combatants, which today are DDG-51 (destroyers)," the Assistant Secretary of the Navy, Sean Stackley, told reporters at last week's Surface Navy Association conference. Those programs have proven themselves reliable performers both at sea and in the shipyards.
>
> From today's fleet of 274 ships, "we're on an irreversible path to 308 by 2021. Those ships are already in construction," said Stackley. "To go from there to 355, virtually all those ships are currently in production, with some exceptions: Ohio Replacement, (we) just got done the Milestone B there (to move from R&D into detailed design); and then upgrades to existing platforms. So we have hot production lines that will take us to that 355-ship Navy."[44]

A January 24, 2017, press report states the following:

> Navy officials say a recently determined plan to increase its fleet size by adding more new submarines, carriers and destroyers is "executable" and that early conceptual work toward this end is already underway....
>
> Although various benchmarks will need to be reached in order for this new plan to come to fruition, such as Congressional budget allocations, Navy officials do tell Scout Warrior that the service is already working—at least in concept—on plans to vastly enlarge the fleet. Findings from this study are expected to inform an upcoming 2018 Navy Shipbuilding Plan, service officials said.[45]

A January 12, 2017, press report states the following:

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[43] Hope Hodge Seck, "Navy Acquisition Chief: Surge to 355 Ships 'Easily Done,'" *DoD Buzz*, January 13, 2017.

[44] Sydney J. Freedberg Jr., "Build More Ships, But Not New Designs: CNO Richardson To McCain," *Breaking Defense*, January 17, 2017.

[45] Kris Osborn, "Navy: Larger 355-Ship Fleet—'Executable,'" *Scout Warrior*, January 24, 2017.

> Brian Cuccias, president of Ingalls Shipbuilding [a shipyard owned by Huntington Ingalls Industries (HII) that builds Navy destroyers and amphibious ships as well as Coast Guard cutters], said Ingalls, which is currently building 10 ships for four Navy and Coast Guard programs at its 800-acre facility in Pascagoula, Miss., could build more because it is using only 70 to 75 percent of its capacity.[46]

A March 2017 press report states the following:

> As the Navy calls for a larger fleet, shipbuilders are looking toward new contracts and ramping up their yards to full capacity....
>
> The Navy is confident that U.S. shipbuilders will be able to meet an increased demand, said Ray Mabus, then-secretary of the Navy, during a speech at the Surface Navy Association's annual conference in Arlington, Virginia.
>
> They have the capacity to "get there because of the ships we are building today," Mabus said. "I don't think we could have seven years ago."
>
> Shipbuilders around the United States have "hot" production lines and are manufacturing vessels on multi-year or block buy contracts, he added. The yards have made investments in infrastructure and in the training of their workers.
>
> "We now have the basis ... [to] get to that much larger fleet," he said....
>
> Shipbuilders have said they are prepared for more work.
>
> At Ingalls Shipbuilding—a subsidiary of Huntington Ingalls Industries—10 ships are under construction at its Pascagoula, Mississippi, yard, but it is under capacity, said Brian Cuccias, the company's president.
>
> The shipbuilder is currently constructing five guided-missile destroyers, the latest San Antonio-class amphibious transport dock ship, and two national security cutters for the Coast Guard.
>
> "Ingalls is a very successful production line right now, but it has the ability to actually produce a lot more in the future," he said during a briefing with reporters in January.
>
> The company's facility is currently operating at 75 percent capacity, he noted....
>
> Austal USA—the builder of the Independence-variant of the littoral combat ship and the expeditionary fast transport vessel—is also ready to increase its capacity should the Navy require it, said Craig Perciavalle, the company's president.
>
> The latest discussions are "certainly something that a shipbuilder wants to hear," he said. "We do have the capability of increasing throughput if the need and demand were to arise, and then we also have the ability with the present workforce and facility to meet a different mix that could arise as well."
>
> Austal could build fewer expeditionary fast transport vessels and more littoral combat ships, or vice versa, he added.
>
> "The key thing for us is to keep the manufacturing lines hot and really leverage the momentum that we've gained on both of the programs," he said.
>
> The company—which has a 164-acre yard in Mobile, Alabama—is focused on the extension of the LCS and expeditionary fast transport ship program, but Perciavalle noted that it could look into manufacturing other types of vessels.

[46] Marc Selinger, "Navy Needs More Aircraft to Match Ship Increase, Secretary [of the Navy] Says," *Defense Daily*, January 12, 2017. See also Lee Hudson, "Ingalls Operating at About 75 Percent Capacity, Provided Info to Trump Team," *Inside the Navy*, January 16, 2017.

> "We do have excess capacity to even build smaller vessels … if that opportunity were to arise and we're pursuing that," he said.
>
> Bryan Clark, a naval analyst at the Center for Strategic and Budgetary Assessments, a Washington, D.C.-based think tank, said shipbuilders are on average running between 70 and 80 percent capacity. While they may be ready to meet an increased demand for ships, it would take time to ramp up their workforces.
>
> However, the bigger challenge is the supplier industrial base, he said.
>
> "Shipyards may be able to build ships but the supplier base that builds the pumps … and the radars and the radios and all those other things, they don't necessarily have that ability to ramp up," he said. "You would need to put some money into building up their capacity."
>
> That has to happen now, he added.
>
> Rear Adm. William Gallinis, program manager for program executive office ships, said what the Navy must be "mindful of is probably our vendor base that support the shipyards."
>
> Smaller companies that supply power electronics and switchboards could be challenged, he said.
>
> "Do we need to re-sequence some of the funding to provide some of the facility improvements for some of the vendors that may be challenged? My sense is that the industrial base will size to the demand signal. We just need to be mindful of how we transition to that increased demand signal," he said.
>
> The acquisition workforce may also see an increased amount of stress, Gallinis noted. "It takes a fair amount of experience and training to get a good contracting officer to the point to be [able to] manage contracts or procure contracts."
>
> "But I don't see anything that is insurmountable," he added.[47]

At a May 24, 2017, hearing before the Seapower subcommittee of the Senate Armed Services Committee on the industrial-base aspects of the Navy's 355-ship goal, John P. Casey, executive vice president–marine systems, General Dynamics Corporation (one of the country's two principal builders of Navy ships) stated the following:

> It is our belief that the Nation's shipbuilding industrial base can scale-up hot production lines for existing ships and mobilize additional resources to accomplish the significant challenge of achieving the 355-ship Navy as quickly as possible....
>
> Supporting a plan to achieve a 355-ship Navy will be the most challenging for the nuclear submarine enterprise. Much of the shipyard and industrial base capacity was eliminated following the steep drop-off in submarine production that occurred with the cancellation of the Seawolf Program in 1992. The entire submarine industrial base at all levels of the supply chain will likely need to recapitalize some portion of its facilities, workforce, and supply chain just to support the current plan to build the Columbia Class SSBN program, while concurrently building Virginia Class SSNs. Additional SSN procurement will require industry to expand its plans and associated investment beyond the level today....
>
> Shipyard labor resources include the skilled trades needed to fabricate, build and outfit major modules, perform assembly, test and launch of submarines, and associated support organizations that include planning, material procurement, inspection, quality assurance, and ship certification. Since there is no commercial equivalency for Naval nuclear submarine shipbuilding, these trade resources cannot be easily acquired in large numbers from other industries. Rather, these shipyard resources must be acquired and developed over time to ensure the unique knowledge and know-how associated with nuclear

[47] Yasmin Tadjdeh, "Navy Shipbuilders Prepared for Proposed Fleet Buildup," *National Defense*, March 2017.

submarine shipbuilding is passed on to the next generation of shipbuilders. The mechanisms of knowledge transfer require sufficient lead time to create the proficient, skilled craftsmen in each key trade including welding, electrical, machining, shipfitting, pipe welding, painting, and carpentry, which are among the largest trades that would need to grow to support increased demand. These trades will need to be hired in the numbers required to support the increased workload. Both shipyards have scalable processes in place to acquire, train, and develop the skilled workforce they need to build nuclear ships. These processes and associated training facilities need to be expanded to support the increased demand. As with the shipyards, the same limiting factors associated with facilities, workforce, and supply chain also limit the submarine unique first tier suppliers and sub-tiers in the industrial base for which there is no commercial equivalency....

The supply base is the third resource that will need to be expanded to meet the increased demand over the next 20 years. During the OHIO, 688 and SEAWOLF construction programs, there were over 17,000 suppliers supporting submarine construction programs. That resource base was "rationalized" during submarine low rate production over the last 20 years. The current submarine industrial base reflects about 5,000 suppliers, of which about 3,000 are currently active (i.e., orders placed within the last 5 years), 80% of which are single or sole source (based on $). It will take roughly 20 years to build the 12 Columbia Class submarines that starts construction in FY21. The shipyards are expanding strategic sourcing of appropriate non-core products (e.g., decks, tanks, etc.) in order to focus on core work at each shipyard facility (e.g., module outfitting and assembly). Strategic sourcing will move demand into the supply base where capacity may exist or where it can be developed more easily. This approach could offer the potential for cost savings by competition or shifting work to lower cost work centers throughout the country. Each shipyard has a process to assess their current supply base capacity and capability and to determine where it would be most advantageous to perform work in the supply base....

Achieving the increased rate of production and reducing the cost of submarines will require the Shipbuilders to rely on the supply base for more non-core products such as structural fabrication, sheet metal, machining, electrical, and standard parts. The supply base must be made ready to execute work with submarine-specific requirements at a rate and volume that they are not currently prepared to perform. Preparing the supply base to execute increased demand requires early non-recurring funding to support cross-program construction readiness and EOQ funding to procure material in a manner that does not hold up existing ship construction schedules should problems arise in supplier qualification programs. This requires longer lead times (estimates of three years to create a new qualified, critical supplier) than the current funding profile supports....

We need to rely on market principles to allow suppliers, the shipyards and GFE material providers to sort through the complicated demand equation across the multiple ship programs. Supplier development funding previously mentioned would support non-recurring efforts which are needed to place increased orders for material in multiple market spaces. Examples would include valves, build-to-print fabrication work, commodities, specialty material, engineering components, etc. We are engaging our marine industry associations to help foster innovative approaches that could reduce costs and gain efficiency for this increased volume....

Supporting the 355-ship Navy will require Industry to add capability and capacity across the entire Navy Shipbuilding value chain. Industry will need to make investment decisions for additional capital spend starting now in order to meet a step change in demand that would begin in FY19 or FY20. For the submarine enterprise, the step change was already envisioned and investment plans that embraced a growth trajectory were already being formulated. Increasing demand by adding additional submarines will require scaling facility and workforce development plans to operate at a higher rate of production. The nuclear shipyards would also look to increase material procurement proportionally to the increased demand. In some cases, the shipyard facilities may be constrained with existing

capacity and may look to source additional work in the supply base where capacity exists or where there are competitive business advantages to be realized. Creating additional capacity in the supply base will require non-recurring investment in supplier qualification, facilities, capital equipment and workforce training and development.

Industry is more likely to increase investment in new capability and capacity if there is certainty that the Navy will proceed with a stable shipbuilding plan. Positive signals of commitment from the Government must go beyond a published 30-year Navy Shipbuilding Plan and line items in the Future Years Defense Plan (FYDP) and should include

- Multi-year contracting for Block procurement which provides stability in the industrial base and encourages investment in facilities and workforce development
- Funding for supplier development to support training, qualification, and facilitization efforts—Electric Boat and Newport News have recommended to the Navy funding of $400M over a three-year period starting in 2018 to support supplier development for the Submarine Industrial Base as part of an Integrated Enterprise Plan Extended Enterprise initiative
- Acceleration of Advance Procurement and/or Economic Order Quantities (EOQ) procurement from FY19 to FY18 for Virginia Block V
- Government incentives for construction readiness and facilities / special tooling for shipyard and supplier facilities, which help cash flow capital investment ahead of construction contract awards
- Procurement of additional production back-up (PBU) material to help ensure a ready supply of material to mitigate construction schedule risk....

So far, this testimony has focused on the Submarine Industrial Base, but the General Dynamics Marine Systems portfolio also includes surface ship construction. Unlike Electric Boat, Bath Iron Works and NASSCO are able to support increased demand without a significant increase in resources.....

Bath Iron Works is well positioned to support the Administration's announced goal of increasing the size of the Navy fleet to 355 ships. For BIW that would mean increasing the total current procurement rate of two DDG 51s per year to as many as four DDGs per year, allocated equally between BIW and HII. This is the same rate that the surface combatant industrial base sustained over the first decade of full rate production of the DDG 51 Class (1989-1999)....

No significant capital investment in new facilities is required to accommodate delivering two DDGs per year. However, additional funding will be required to train future shipbuilders and maintain equipment. Current hiring and training processes support the projected need, and have proven to be successful in the recent past. BIW has invested significantly in its training programs since 2014 with the restart of the DDG 51 program and given these investments and the current market in Maine, there is little concern of meeting the increase in resources required under the projected plans.

A predictable and sustainable Navy workload is essential to justify expanding hiring/training programs. BIW would need the Navy's commitment that the Navy's plan will not change before it would proceed with additional hiring and training to support increased production.

BIW's supply chain is prepared to support a procurement rate increase of up to four DDG 51s per year for the DDG 51 Program. BIW has long-term purchasing agreements in place for all major equipment and material for the DDG 51 Program. These agreements provide for material lead time and pricing, and are not constrained by the number of ships ordered

> in a year. BIW confirmed with all of its critical suppliers that they can support this increased procurement rate....
>
> The Navy's Force Structure Assessment calls for three additional ESBs. Additionally, NASSCO has been asked by the Navy and the Congressional Budget Office (CBO) to evaluate its ability to increase the production rate of T-AOs to two ships per year. NASSCO has the capacity to build three more ESBs at a rate of one ship per year while building two T-AOs per year. The most cost effective funding profile requires funding ESB 6 in FY18 and the following ships in subsequent fiscal years to avoid increased cost resulting from a break in the production line. The most cost effective funding profile to enable a production rate of two T-AO ships per year requires funding an additional long lead time equipment set beginning in FY19 and an additional ship each year beginning in FY20.
>
> NASSCO must now reduce its employment levels due to completion of a series of commercial programs which resulted in the delivery of six ships in 2016. The proposed increase in Navy shipbuilding stabilizes NASSCO's workload and workforce to levels that were readily demonstrated over the last several years.
>
> Some moderate investment in the NASSCO shipyard will be needed to reach this level of production. The recent CBO report on the costs of building a 355-ship Navy accurately summarized NASSCO's ability to reach the above production rate stating, "building more … combat logistics and support ships would be the least problematic for the shipyards."[48]

At the same hearing, Brian Cuccias, president, Ingalls Shipbuilding, Huntington Ingalls Industries (the country's other principal builder of Navy ships) stated the following:

> Qualifying to be a supplier is a difficult process. Depending on the commodity, it may take up to 36 months. That is a big burden on some of these small businesses. This is why creating sufficient volume and exercising early contractual authorization and advance procurement funding is necessary to grow the supplier base, and not just for traditional long-lead time components; that effort needs to expand to critical components and commodities that today are controlling the build rate of submarines and carriers alike. Many of our suppliers are small businesses and can only make decisions to invest in people, plant and tooling when they are awarded a purchase order. We need to consider how we can make commitments to suppliers early enough to ensure material readiness and availability when construction schedules demand it.
>
> With questions about the industry's ability to support an increase in shipbuilding, both Newport News and Ingalls have undertaken an extensive inventory of our suppliers and assessed their ability to ramp up their capacity. We have engaged many of our key suppliers to assess their ability to respond to an increase in production.
>
> The fortunes of related industries also impact our suppliers, and an increase in demand from the oil and gas industry may stretch our supply base. Although some low to moderate risk remains, I am convinced that our suppliers will be able to meet the forecasted Navy demand....
>
> I strongly believe that the fastest results can come from leveraging successful platforms on current hot production lines. We commend the Navy's decision in 2014 to use the existing LPD 17 hull form for the LX(R), which will replace the LSD-class amphibious dock landing ships scheduled to retire in the coming years. However, we also recommend that the concept of commonality be taken even further to best optimize efficiency, affordability and capability. Specifically, rather than continuing with a new design for LX(R) within the "walls" of the LPD hull, we can leverage our hot production line and supply chain and

[48] John P. Casey, Executive Vice President – Marine Systems, General Dynamics Corporation, Testimony before the Senate Armed Services Committee, Subcommittee on Seapower, 115th Congress, Supporting the 355-Ship Navy with Focus on Submarine Industrial Base, Washington, DC, May 24, 2017, pp. 3-18. See also Marjorie Censer, "BWX Technologies Weighs When To Ready for Additional Submarines," *Inside the Navy*, May 29, 2017.

> offer the Navy a variant of the existing LPD design that satisfies the aggressive cost targets of the LX(R) program while delivering more capability and survivability to the fleet at a significantly faster pace than the current program. As much as 10-15 percent material savings can be realized across the LX(R) program by purchasing respective blocks of at least five ships each under a multi-year procurement (MYP) approach. In the aggregate, continuing production with LPD 30 in FY18, coupled with successive MYP contracts for the balance of ships, may yield savings greater than $1 billion across an 11-ship LX(R) program. Additionally, we can deliver five LX(R)s to the Navy and Marine Corps in the same timeframe that the current plan would deliver two, helping to reduce the shortfall in amphibious warships against the stated force requirement of 38 ships.
>
> Multi-ship procurements, whether a formal MYP or a block-buy, are a proven way to reduce the price of ships. The Navy took advantage of these tools on both Virginia-class submarines and Arleigh Burke-class destroyers. In addition to the LX(R) program mentioned above, expanding multi-ship procurements to other ship classes makes sense....
>
> The most efficient approach to lower the cost of the Ford class and meet the goal of an increased CVN fleet size is also to employ a multi-ship procurement strategy and construct these ships at three-year intervals. This approach would maximize the material procurement savings benefit through economic order quantities procurement and provide labor efficiencies to enable rapid acquisition of a 12-ship CVN fleet. This three-ship approach would save at least $1.5 billion, not including additional savings that could be achieved from government-furnished equipment. As part of its Integrated Enterprise Plan, we commend the Navy's efforts to explore the prospect of material economic order quantity purchasing across carrier and submarine programs.[49]

At the same hearing, Matthew O. Paxton, president, Shipbuilders Council of America (SCA)—a trade association representing shipbuilders, suppliers, and associated firms—stated the following:

> To increase the Navy's Fleet to 355 ships, a substantial and sustained investment is required in both procurement and readiness. However, let me be clear: building and sustaining the larger required Fleet is achievable and our industry stands ready to help achieve that important national security objective.
>
> To meet the demand for increased vessel construction while sustaining the vessels we currently have will require U.S. shipyards to expand their work forces and improve their infrastructure in varying degrees depending on ship type and ship mix – a requirement our Nation's shipyards are eager to meet. But first, in order to build these ships in as timely and affordable manner as possible, stable and robust funding is necessary to sustain those industrial capabilities which support Navy shipbuilding and ship maintenance and modernization....
>
> Beyond providing for the building of a 355-ship Navy, there must also be provision to fund the "tail," the maintenance of the current and new ships entering the fleet. Target fleet size cannot be reached if existing ships are not maintained to their full service lives, while building those new ships. Maintenance has been deferred in the last few years because of across-the-board budget cuts....
>
> The domestic shipyard industry certainly has the capability and know-how to build and maintain a 355-ship Navy. The Maritime Administration determined in a recent study on the Economic Benefits of the U.S. Shipyard Industry that there are nearly 110,000 skilled men and women in the Nation's private shipyards building, repairing and maintaining America's military and commercial fleets.1 The report found the U.S. shipbuilding industry supports nearly 400,000 jobs across the country and generates $25.1 billion in income and $37.3 billion worth of goods and services each year. In fact, the MARAD

[49] Statement of Brian Cuccias, President, Ingalls Shipbuilding, Huntington Ingalls Industries, Subcommittee on Seapower, Senate Armed Services Committee, May 24, 2017, pp. 4-11.

> report found that the shipyard industry creates direct and induced employment in every State and Congressional District and each job in the private shipbuilding and repairing industry supports another 2.6 jobs nationally.
>
> This data confirms the significant economic impact of this manufacturing sector, but also that the skilled workforce and industrial base exists domestically to build these ships. Long-term, there needs to be a workforce expansion and some shipyards will need to reconfigure or expand production lines. This can and will be done as required to meet the need if adequate, stable budgets and procurement plans are established and sustained for the long-term. Funding predictability and sustainability will allow industry to invest in facilities and more effectively grow its skilled workforce. The development of that critical workforce will take time and a concerted effort in a partnership between industry and the federal government.
>
> U.S. shipyards pride themselves on implementing state of the art training and apprenticeship programs to develop skilled men and women that can cut, weld, and bend steel and aluminum and who can design, build and maintain the best Navy in the world. However, the shipbuilding industry, like so many other manufacturing sectors, faces an aging workforce. Attracting and retaining the next generation shipyard worker for an industry career is critical. Working together with the Navy, and local and state resources, our association is committed to building a robust training and development pipeline for skilled shipyard workers. In addition to repealing sequestration and stabilizing funding the continued development of a skilled workforce also needs to be included in our national maritime strategy....
>
> In conclusion, the U.S. shipyard industry is certainly up to the task of building a 355-ship Navy and has the expertise, the capability, the critical capacity and the unmatched skilled workforce to build these national assets. Meeting the Navy's goal of a 355-ship fleet and securing America's naval dominance for the decades ahead will require sustained investment by Congress and Navy's partnership with a defense industrial base that can further attract and retain a highly-skilled workforce with critical skill sets. Again, I would like to thank this Subcommittee for inviting me to testify alongside such distinguished witnesses. As a representative of our nation's private shipyards, I can say, with confidence and certainty, that our domestic shipyards and skilled workers are ready, willing and able to build and maintain the Navy's 355-ship Fleet.[50]

Employment Impact

Building the additional ships that would be needed to achieve and maintain the 355-ship fleet could create many additional manufacturing and other jobs at shipyards, associated supplier firms, and elsewhere in the U.S. economy. A 2015 Maritime Administration (MARAD) report states

> Considering the indirect and induced impacts, each direct job in the shipbuilding and repairing industry is associated with another 2.6 jobs in other parts of the US economy; each dollar of direct labor income and GDP in the shipbuilding and repairing industry is associated with another $1.74 in labor income and $2.49 in GDP, respectively, in other parts of the US economy.[51]

[50] Testimony of Matthew O. Paxton, President, Shipbuilders Council of America, before the United States Senate Committee on Armed Services, Subcommittee on Seapower, [on] Industry Perspectives on Options and Considerations for Achieving a 355-Ship Navy, May 24, 2017, pp. 3-8.

[51] MARAD, *The Economic Importance of the U.S. Shipbuilding and Repairing Industry*, November 2015, pp. E-3, E-4. For another perspective on the issue of the impact of shipbuilding on the broader economy, see Edward G. Keating et al., *The Economic Consequences of Investing in Shipbuilding, Case Studies in the United States and Sweden*, RAND

A March 2017 press report states, "Based on a 2015 economic impact study, the Shipbuilders Council of America [a trade association for U.S. shipbuilders and associated supplier firms] believes that a 355-ship Navy could add more than 50,000 jobs nationwide."[52] The 2015 economic impact study referred to in that quote might be the 2015 MARAD study discussed in the previous paragraph. An estimate of more than 50,000 additional jobs nationwide might be viewed as a higher-end estimate; other estimates might be lower. A June 14, 2017, press report states the following: "The shipbuilding industry will need to add between 18,000 and 25,000 jobs to build to a 350-ship Navy, according to Matthew Paxton, president of the Shipbuilders Council of America, a trade association representing the shipbuilding industrial base. Including indirect jobs like suppliers, the ramp-up may require a boost of 50,000 workers."[53]

Corporation, 2015.

[52] Yasmin Tadjdeh, "Navy Shipbuilders Prepared for Proposed Fleet Buildup," *National Defense*, March 2017. Similarly, another press report states the following: "The Navy envisioned by Trump could create more than 50,000 jobs, the Shipbuilders Council of America, a trade group representing U.S. shipbuilders, repairers and suppliers, told Reuters." (Mike Stone, "Missing from Trump's Grand Navy Plan: Skilled Workers to Build the Fleet," *Reuters*, March 17, 2017.)

[53] Jaqueline Klimas, "Growing Shipbuilding Workforce Seen as Major Challenge for Trump's Navy Buildup," *Politico*, June 14, 2017.

Appendix D. A Summary of Some Acquisition Lessons Learned for Navy Shipbuilding

This appendix presents a general summary of lessons learned in Navy shipbuilding, reflecting comments made repeatedly by various sources over the years. These lessons learned include the following:

- **At the outset, get the operational requirements for the program right.** Properly identify the program's operational requirements at the outset. Manage risk by not trying to do too much in terms of the program's operational requirements, and perhaps seek a so-called 70%-to-80% solution (i.e., a design that is intended to provide 70%-80% of desired or ideal capabilities). Achieve a realistic balance up front between operational requirements, risks, and estimated costs.
- **Use mature technologies.** Use land-based prototyping and testing to bring new technologies to a high state of maturity before incorporating them into ship designs, and limit the number of major new technologies to be incorporated into a new ship design.
- **Impose cost discipline up front.** Use realistic price estimates, and consider not only development and procurement costs, but life-cycle operation and support (O&S) costs.
- **Employ competition** where possible in the awarding of design and construction contracts.
- **Use a contract type that is appropriate for the amount of risk involved**, and structure its terms to align incentives with desired outcomes.
- **Minimize design/construction concurrency** by developing the design to a high level of completion before starting construction and by resisting changes in requirements (and consequent design changes) during construction.
- **Properly supervise construction work.** Maintain an adequate number of properly trained Supervisor of Shipbuilding (SUPSHIP) personnel.
- **Provide stability for industry**, in part by using, where possible, multiyear procurement (MYP) or block buy contracting.
- **Maintain a capable government acquisition workforce** that understands what it is buying, as well as the above points.

Identifying these lessons is arguably not the hard part—most if not all these points have been cited for years. The hard part, arguably, is living up to them without letting circumstances lead program-execution efforts away from these guidelines.

Appendix E. Some Considerations Relating to Warranties in Shipbuilding Contracts

This appendix presents some considerations relating to warranties in shipbuilding contracts and other defense acquisition.

In discussions of Navy (and also Coast Guard) shipbuilding, one question that sometimes arises is whether including a warranty in a shipbuilding contract is preferable to not including one. The question can arise, for example, in connection with a GAO finding that "the Navy structures shipbuilding contracts so that it pays shipbuilders to build ships as part of the construction process and then pays the same shipbuilders a second time to repair the ship when construction defects are discovered."[54]

Including a warranty in a shipbuilding contract (or a contract for building some other kind of defense end item), while potentially valuable, might not always be preferable to not including one—it depends on the circumstances of the acquisition, and it is not necessarily a valid criticism of an acquisition program to state that it is using a contract that does not include a warranty (or a weaker form of a warranty rather than a stronger one).

Including a warranty generally shifts to the contractor the risk of having to pay for fixing problems with earlier work. Although that in itself could be deemed desirable from the government's standpoint, a contractor negotiating a contract that will have a warranty will incorporate that risk into its price, and depending on how much the contractor might charge for doing that, it is possible that the government could wind up paying more in total for acquiring the item (including fixing problems with earlier work on that item) than it would have under a contract without a warranty.

When a warranty is not included in the contract and the government pays later on to fix problems with earlier work, those payments can be very visible, which can invite critical comments from observers. But that does not mean that including a warranty in the contract somehow frees the government from paying to fix problems with earlier work. In a contract that includes a warranty, the government will indeed pay something to fix problems with earlier work—but it will make the payment in the less-visible (but still very real) form of the up-front charge for including the warranty, and that charge might be more than what it would have cost the government, under a contract without a warranty, to pay later on for fixing those problems.

From a cost standpoint, including a warranty in the contract might or might not be preferable, depending on the risk that there will be problems with earlier work that need fixing, the potential cost of fixing such problems, and the cost of including the warranty in the contract. The point is that the goal of avoiding highly visible payments for fixing problems with earlier work and the goal of minimizing the cost to the government of fixing problems with earlier work are separate and different goals, and that pursuing the first goal can sometimes work against achieving the second goal.[55]

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[54] See Government Accountability Office, *Navy Shipbuilding[:] Past Performance Provides Valuable Lessons for Future Investments*, GAO-18-238SP, June 2018, p. 21. A graphic on page 21 shows a GAO finding that the government was financially responsible for shipbuilder deficiencies in 96% of the cases examined by GAO, and that the shipbuilder was financially responsible for shipbuilder deficiencies in 4% of the cases.

[55] It can also be noted that the country's two largest builders of Navy ships—General Dynamics (GD) and Huntington Ingalls Industries (HII)—derive about 60% and 96%, respectively, of their revenues from U.S. government work. (See General Dynamics, *2016 Annual Report*, page 9 of Form 10-K [PDF page 15 of 88]) and Huntington Ingalls Industries,

The Department of Defense's guide on the use of warranties states the following:

> Federal Acquisition Regulation (FAR) 46.7 states that "the use of warranties is not mandatory." However, if the benefits to be derived from the warranty are commensurate with the cost of the warranty, the CO [contracting officer] should consider placing it in the contract. In determining whether a warranty is appropriate for a specific acquisition, FAR Subpart 46.703 requires the CO to consider the nature and use of the supplies and services, the cost, the administration and enforcement, trade practices, and reduced requirements. The rationale for using a warranty should be documented in the contract file....
>
> In determining the value of a warranty, a CBA [cost-benefit analysis] is used to measure the life cycle costs of the system with and without the warranty. A CBA is required to determine if the warranty will be cost beneficial. CBA is an economic analysis, which basically compares the Life Cycle Costs (LCC) of the system with and without the warranty to determine if warranty coverage will improve the LCCs. In general, five key factors will drive the results of the CBA: cost of the warranty + cost of warranty administration + compatibility with total program efforts + cost of overlap with Contractor support + intangible savings. Effective warranties integrate reliability, maintainability, supportability, availability, and life-cycle costs. Decision factors that must be evaluated include the state of the weapon system technology, the size of the warranted population, the likelihood that field performance requirements can be achieved, and the warranty period of performance.[56]

2016 Annual Report, page 5 of Form 10-K [PDF page 19 of 134]). These two shipbuilders operate the only U.S. shipyards currently capable of building several major types of Navy ships, including submarines, aircraft carriers, large surface combatants, and amphibious ships. Thus, even if a warranty in a shipbuilding contract with one of these firms were to somehow mean that the government did not have pay under the terms of that contract—either up front or later on—for fixing problems with earlier work done under that contract, there would still be a question as to whether the government would nevertheless wind up eventually paying much of that cost as part of the price of one or more future contracts the government may have that firm.

[56] Department of Defense, *Department of Defense Warranty Guide*, Version 1.0, September 2009, accessed July 13, 2017, at https://www.acq.osd.mil/dpap/pdi/uid/docs/departmentofdefensewarrantyguide[1].doc.

Appendix F. Avoiding Procurement Cost Growth vs. Minimizing Procurement Costs

This appendix presents some considerations relating to avoiding procurement cost growth vs. minimizing procurement costs in shipbuilding and other defense acquisition.

The affordability challenge posed by the Navy's shipbuilding plans can reinforce the strong oversight focus on preventing or minimizing procurement cost growth in Navy shipbuilding programs, which is one expression of a strong oversight focus on preventing or minimizing cost growth in DOD acquisition programs in general. This oversight focus may reflect in part an assumption that avoiding or minimizing procurement cost growth is always synonymous with minimizing procurement cost. It is important to note, however, that as paradoxical as it may seem, avoiding or minimizing procurement cost growth is not always synonymous with minimizing procurement cost, and that a sustained, singular focus on avoiding or minimizing procurement cost growth might sometimes lead to higher procurement costs for the government.

How could this be? Consider the example of a design for the lead ship of a new class of Navy ships. The construction cost of this new design is uncertain, but is estimated to be likely somewhere between Point A (a minimum possible figure) and Point D (a maximum possible figure). (Point D, in other words, would represent a cost estimate with a 100% confidence factor, meaning there is a 100% chance that the cost would come in at or below that level.) If the Navy wanted to avoid cost growth on this ship, it could simply set the ship's procurement cost at Point D. Industry would likely be happy with this arrangement, and there likely would be no cost growth on the ship.

The alternative strategy open to the Navy is to set the ship's target procurement cost at some figure between Points A and D—call it Point B—and then use that more challenging target cost to place pressure on industry to sharpen its pencils so as to find ways to produce the ship at that lower cost. (Navy officials sometimes refer to this as "pressurizing" industry.) In this example, it might turn out that industry efforts to reduce production costs are not successful enough to build the ship at the Point B cost. As a result, the ship experiences one or more rounds of procurement cost growth, and the ship's procurement cost rises over time from Point B to some higher figure—call it Point C.

Here is the rub: Point C, in spite of incorporating one or more rounds of cost growth, might nevertheless turn out to be lower than Point D, because Point C reflected efforts by the shipbuilder to find ways to reduce production costs that the shipbuilder might have put less energy into pursuing if the Navy had simply set the ship's procurement cost initially at Point D.

Setting the ship's cost at Point D, in other words, may eliminate the risk of cost growth on the ship, but does so at the expense of creating a risk of the government paying more for the ship than was actually necessary. DOD could avoid cost growth on new procurement programs starting tomorrow by simply setting costs for those programs at each program's equivalent of Point D. But as a result of this strategy, DOD could well wind up leaving money on the table in some instances—of not, in other words, minimizing procurement costs.

DOD does not have to set a cost precisely at Point D to create a potential risk in this regard. A risk of leaving money on the table, for example, is a possible downside of requiring DOD to budget for its acquisition programs at something like an 80% confidence factor—an approach that some observers have recommended—because a cost at the 80% confidence factor is a cost that is likely fairly close to Point D.

Procurement cost growth is often embarrassing for DOD and industry, and can damage their credibility in connection with future procurement efforts. Procurement cost growth can also disrupt congressional budgeting by requiring additional appropriations to pay for something Congress thought it had fully funded in a prior year. For this reason, there is a legitimate public policy value to pursuing a goal of having less rather than more procurement cost growth.

Procurement cost growth, however, can sometimes be in part the result of DOD efforts to use lower initial cost targets as a means of pressuring industry to reduce production costs—efforts that, notwithstanding the cost growth, might be partially successful. A sustained, singular focus on avoiding or minimizing cost growth, and of punishing DOD for all instances of cost growth, could discourage DOD from using lower initial cost targets as a means of pressurizing industry, which could deprive DOD of a tool for controlling procurement costs.

The point here is not to excuse away cost growth, because cost growth can occur in a program for reasons other than DOD's attempt to pressurize industry. Nor is the point to abandon the goal of seeking lower rather than higher procurement cost growth, because, as noted above, there is a legitimate public policy value in pursuing this goal. The point, rather, is to recognize that this goal is not always synonymous with minimizing procurement cost, and that a possibility of some amount of cost growth might be expected as part of an optimal government strategy for minimizing procurement cost. Recognizing that the goals of seeking lower rather than higher cost growth and of minimizing procurement cost can sometimes be in tension with one another can lead to an approach that takes both goals into consideration. In contrast, an approach that is instead characterized by a sustained, singular focus on avoiding and minimizing cost growth may appear virtuous, but in the end may wind up costing the government more.

Appendix G. Size of the Navy and Navy Shipbuilding Rate

Size of the Navy

Table G-1 shows the size of the Navy in terms of total number of ships since FY1948; the numbers shown in the table reflect changes over time in the rules specifying which ships count toward the total. Differing counting rules result in differing totals, and for certain years, figures reflecting more than one set of counting rules are available. Figures in the table for FY1978 and subsequent years reflect the battle force ships counting method, which is the set of counting rules established in the early 1980s for public policy discussions of the size of the Navy.

As shown in the table, the total number of battle force ships in the Navy reached a late-Cold War peak of 568 at the end of FY1987 and began declining thereafter.[57] The Navy fell below 300 battle force ships in August 2003 and remained below 300 ships for the next 16 years. The Navy briefly returned to a level of 300 ships in early July 2020, for the first time in almost 17 years, and has since fallen back below 300 ships. As of January 26, 2021, the Navy had 297 battle force ships.

As discussed in **Appendix B**, historical figures for total fleet size might not be a reliable yardstick for assessing the appropriateness of proposals for the future size and structure of the Navy, particularly if the historical figures are more than a few years old, because the missions to be performed by the Navy, the mix of ships that make up the Navy, and the technologies that are available to Navy ships for performing missions all change over time, and because the number of ships in the fleet in an earlier year might itself have been inappropriate (i.e., not enough or more than enough) for meeting the Navy's mission requirements in that year.

For similar reasons, trends over time in the total number of ships in the Navy are not necessarily a reliable indicator of the direction of change in the fleet's ability to perform its stated missions. An increasing number of ships in the fleet might not necessarily mean that the fleet's ability to perform its stated missions is increasing, because the fleet's mission requirements might be increasing more rapidly than ship numbers and average ship capability. Similarly, a decreasing number of ships in the fleet might not necessarily mean that the fleet's ability to perform stated missions is decreasing, because the fleet's mission requirements might be declining more rapidly than numbers of ships, or because average ship capability and the percentage of time that ships are in deployed locations might be increasing quickly enough to more than offset reductions in total ship numbers.

[57] Some publications have stated that the Navy reached a peak of 594 ships at the end of FY1987. This figure, however, is the total number of active ships in the fleet, which is not the same as the total number of battle force ships. The battle force ships figure is the number used in government discussions of the size of the Navy. In recent years, the total number of active ships has been larger than the total number of battle force ships. For example, the Naval History and Heritage Command (formerly the Naval Historical Center) states that as of November 16, 2001, the Navy included a total of 337 active ships, while the Navy states that as of November 19, 2001, the Navy included a total of 317 battle force ships. Comparing the total number of active ships in one year to the total number of battle force ships in another year is thus an apples-to-oranges comparison that in this case overstates the decline since FY1987 in the number of ships in the Navy. As a general rule to avoid potential statistical distortions, comparisons of the number of ships in the Navy over time should use, whenever possible, a single counting method.

Table G-1. Total Number of Ships in Navy Since FY1948

FY[a]	Number	FY[a]	Number	FY[a]	Number	FY[a]	Number
1948	737	1970	769	1992	466	2014	289
1949	690	1971	702	1993	435	2015	271
1950	634	1972	654	1994	391	2016	275
1951	980	1973	584	1995	372	2017	279
1952	1,097	1974	512	1996	356	2018	286
1953	1,122	1975	496	1997	354	2019	290
1954	1,113	1976	476	1998	333	2020	296
1955	1,030	1977	464	1999	317		
1956	973	1978	468	2000	318		
1957	967	1979	471	2001	316		
1958	890	1980	477	2002	313		
1959	860	1981	490	2003	297		
1960	812	1982	513	2004	292		
1961	897	1983	514	2005	281		
1962	959	1984	524	2006	281		
1963	916	1985	541	2007	279		
1964	917	1986	556	2008	282		
1965	936	1987	568	2009	285		
1966	947	1988	565	2010	288		
1967	973	1989	566	2011	284		
1968	976	1990	546	2012	287		
1969	926	1991	526	2013	285		

Source: Compiled by CRS using U.S. Navy data. Numbers shown reflect changes over time in the rules specifying which ships count toward the total. Figures for FY1978 and subsequent years reflect the battle force ships counting method, which is the set of counting rules established in the early 1980s for public policy discussions of the size of the Navy.

a. Data for earlier years in the table may be for the end of the calendar year (or for some other point during the year), rather than for the end of the fiscal year.

Shipbuilding Rate

Table G-2 shows past (FY1982-FY2019) and requested or programmed (FY2020-FY2024) rates of Navy ship procurement.

Table G-2. Battle Force Ships Procured or Requested, FY1982-FY2024

(Procured in FY1982-FY2019; *requested for FY2020, and programmed for FY2021-FY2024*)

82	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**00**
17	14	16	19	20	17	15	19	15	11	11	7	4	4	5	4	5	5	6
01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	***18***	***19***
6	6	5	7	8	4	5	3	8	7	10	11	11	8	8	9	9	*9*	*13*
20	***21***	**22**	***23***	***24***	***25***													
13	*7*	*7*	*8*	*11*	*9*													

Source: CRS compilation based on Navy budget data and examination of defense authorization and appropriation committee and conference reports for each fiscal year. The table excludes nonbattle force ships that do not count toward the 355-ship goal, such as certain sealift and prepositioning ships operated by the Military Sealift Command and oceanographic ships operated by agencies such as the National Oceanic and Atmospheric Administration (NOAA).

Notes: (1) **The totals shown for FY2006, FY2007, and FY2008**, reflect the cancellation two LCSs funded in FY2006, another two LCSs funded in FY2007, and an LCS funded in FY2008.

(2) **The total shown for FY2012** includes two JHSVs—one that was included in the Navy's FY2012 budget submission, and one that was included in the Army's FY2012 budget submission. Until FY2012, JHSVs were being procured by both the Navy and the Army. The Army was to procure its fifth and final JHSV in FY2012, and this ship was included in the Army's FY2012 budget submission. In May 2011, the Navy and Army signed a Memorandum of Agreement (MOA) transferring the Army's JHSVs to the Navy. In the FY2012 DOD Appropriations Act (Division A of H.R. 2055/P.L. 112-74 of December 23, 2011), the JHSV that was in the Army's FY2012 budget submission was funded through the Shipbuilding and Conversion, Navy (SCN) appropriation account, along with the JHSV that the Navy had included in its FY0212 budget submission. The four JHSVs that were procured through the Army's budget prior to FY2012, however, are not included in the annual totals shown in this table.

(3) **The figures shown for FY2019 and FY2020** reflect a Navy decision to show the aircraft carrier CVN-81 as a ship to be procured in FY2020 rather than a ship that was procured in FY2019. Congress, as part of its action on the Navy's proposed FY2019 budget, authorized the procurement of CVN-81 in FY2019.

Appendix H. Effort in 2019 and 2020 to Develop New Navy Force-Level Goal

This appendix presents additional background information on the effort in 2019 and 2020 to develop a new Navy force level goal.[58]

Navy's Initial Effort Was Called the Integrated Naval FSA (INFSA)

The effort to develop a new Navy force-level goal began in the Navy with a new FSA that Navy and Marine Corps officials called the Integrated Naval FSA (INFSA), with the words *integrated naval* intended to signal that this FSA would integrate Marine Corps requirements into the analytical process more fully than previous FSAs did. Department of the Navy (DON) officials stated that the INFSA would take into account the Trump Administration's December 2017 National Security Strategy document and its January 2018 National Defense Strategy document, both of which put an emphasis on renewed great power competition with China and Russia,[59] as well as updated information on Chinese and Russian naval and other military capabilities and recent developments in new technologies, including those related to UVs.[60]

INFSA May Have Called for a 390/435-Ship Force-level Goal

Press reports and statements from Navy officials suggested that the INFSA was completed in late 2019 or early 2020, and that it may have resulted in a new Navy force-level goal for a fleet of about 390 manned ships plus about 45 unmanned or optionally manned ships, for a total of about 435 manned and unmanned/optionally manned ships. Navy officials provided few additional details about the composition of this 390/435-ship force-level goal.[61]

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[58] See also Megan Eckstein, "After 9 Months of Study, Pentagon's Fleet Architecture Similar to Original Navy Plan," *USNI News*, November 4, 2020; Mallory Shelbourne and Sam LaGrone, "SECDEF Esper's 'Battle Force 2045' Plan Still Awaiting White House Approval," *USNI News*, October 231, 2020; John R. Kroger, "Esper's Fantasy Fleet, The SecDef's 500-Ship Plan Is an Exercise in Wishful Thinking That Avoids Hard Choices," *Defense One*, October 13, 2020; Gina Harkins, "The Navy Really Does Need 500 Ships, Experts Say. But Paying for Them Won't Be Easy," *Military.com*, October 8, 2020. For a series of additional reaction and commentary articles on the Battle Force 2045 plan, see Dmitry Filipoff, "Fleet Force Structure Series," Center for International Maritime Security (CIMSEC), undated, with the linked reaction and commentary pieces dated October 26 to November 2, 2020.

[59] For additional discussion of the defense implications of great power competition, see CRS Report R43838, *Renewed Great Power Competition: Implications for Defense—Issues for Congress*, by Ronald O'Rourke.

[60] See, for example, Marcus Weisgerber, "US Navy Re-Evaluating 355-Ship Goal," *Defense One*, February 1, 2019; Paul McLeary, "Navy Rethinks 355-Ship Fleet: CNO Richardson," *Breaking Defense*, February 1, 2019; Mallory Shelbourne, "CNO: Navy Expects New Force-Structure Assessment 'Later This Year,'" *Inside the Navy*, February 4, 2019.

[61] See, for example, Ben Werner, "SECNAV Modly Says Nation Needs Larger, Distributed Fleet of 390 Hulls," USNI News, February 28, 2020; Mallory Shelbourne, "Modly Sketches Out Potential Navy Force Structure Changes, Anticipates 390-Ship Fleet," *Inside Defense*, February 28, 2020; Rich Abott, "Modly Reveals Next Force Structure Assessment Details, Working Toward 390-Ship Fleet," *Defense Daily*, February 28, 2020; Patrick Tucker, "Acting Navy Secretary: We Need More than 355 Ships, and That's Not Even Counting Robot Vessels," *Defense One*, February 28, 2020; Connor O'Brien, "Acting Navy Secretary Hints At Larger Fleet Goal," *Politico Pro*, February 28, 2020.

INFSA Results and Associated FY2021 30-Year Shipbuilding Plan Withheld from Congress

The release to Congress of the new Navy force-level goal resulting from the INFSA was postponed repeatedly in late 2019 and early 2020.[62] Remarks from DOD officials and press reports indicated that then-Secretary of Defense Mark Esper and officials within the Office of the Secretary of Defense (OSD) disagreed with some of the INFSA's assumptions and resulting conclusions. Coincident with this, OSD reportedly also withheld the release to Congress of the Navy's associated FY2021 30-year shipbuilding plan, because Esper and OSD officials reportedly believed that it did not present a "credible pathway" for achieving a fleet of at least 355 ships in a timely manner.[63]

INFSA Superseded by DOD's Future Naval Force Study (FNFS)

The INFSA reportedly was superseded in early 2020 by an OSD-led effort called the Future Naval Force Study (FNFS) that reportedly involves OSD and the Joint Staff and is being overseen by Deputy Defense Secretary David Norquist.[64] As part of the FNFS, OSD reportedly has used war games to assess the merits of three candidate fleet plans prepared by the Navy, the Joint Staff, and the Cost Assessment and Program Evaluation (CAPE) office within OSD. The Hudson Institute, a private defense and foreign policy think tank, provided an additional study to help

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[62] Through much of 2019, Navy officials stated that the INFSA was to be completed by the end of 2019. A September 27, 2019, press report stated that an interim version was to be completed by September 2019, in time to inform programmatic decisions on the FY2022 Program Objective Memorandum (POM), meaning the in-house DOD planning document that will guide the development of DOD's FY2022 budget submission. (Mallory Shelbourne, "Navy, Marine Corps Conducting Integrated Force-Structure Assessment," *Inside Defense*, September 27, 2019. See also Otto Kreisher, "New Force Structure Assessment Will Address Needs of 'Great Power Competition,' Two Top Requirements Officers Say," *Seapower*, October 22, 2019, and the section under the subheader "Naval Integrated Force Structure Assessment" in Megan Eckstein, "Navy Marines Wargaming New Gear to Support Emerging Warfare Concepts," *USNI News*, October 23, 2019.)

A December 6, 2019, memorandum from then-Acting Secretary of the Navy Thomas Modly stated that he expected the final INFSA to be published no later than January 15, 2020. (Memorandum for distribution from Acting Secretary of the Navy Thomas B. Modly, subject "SecNav Vector !," dated December 6, 2019. See also David B. Larter, "Acting US Navy Secretary: Deliver Me a 355-Ship Fleet by 2030," Defense News, December 9, 2019.)

A January 23, 2020, press report quoted Modly as saying that the January 15 date was an internal Navy deadline, and that the Navy expected the INFSA to be released to outside audiences sometime during the spring of 2020. (Mallory Shelbourne, "Modly: Navy Expects to Release FSA by Spring," *Inside Defense*, January 23, 2020.)

[63] See, for example, Sam LaGrone, "SECDEF Esper Holds Back 30-Year Shipbuilding Outlook, New 355-Ship Plan Ahead of HASC Testimony," *USNI News*, February 25, 2020; Paul McLeary, "Esper To Navy: Rethink Your Shipbuilding Plan," *Breaking Defense*, February 25, 2020; Ben Werner, "SECDEF Esper Blames Failures of Optimized Fleet Response Plan for Delay of New 355-Ship Fleet Outlook," *USNI News*, February 26, 2020; Paul McLeary, "EXCLUSIVE: SecDef Esper Seeks Détente With HASC; New Navy Plan This Summer," *Breaking Defense*, February 28, 2020; Paul McLeary, "SecNav Details Gaps Between Navy & Pentagon Shipbuilding Plans," *Breaking Defense*, March 11, 2020; Mallory Shelbourne, "CAPE Nominee: SECDEF Esper Blocked Shipbuilding Plan to Congress Because it Lacked 'Credible Pathway' to 355-Ship Fleet," USNI News, August 4, 2020; David B. Larter and Joe Gould, "Pentagon Nominee Slams the US Navy's Fleet Plans as 'Not a Credible Document,'" *Defense News*, August 4, 2020.

[64] See, for example, David B. Later, "Defense Department Study Calls for Cutting 2 of the US Navy's Aircraft Carriers," *Defense News*, April 20, 2020; Jack Detsch, "Trump's Navy Pick Would Have Limited Sway on Ship Goal," *Foreign Policy*, May 7, 2020; Paul McLeary, "Navy Scraps Big Carrier Study, Clears Deck For OSD Effort," *Breaking Defense*, May 12, 2020; Megan Eckstein, "Pentagon Leaders Have Taken Lead in Crafting Future Fleet from Navy," *USNI News*, June 24, 2020.

inform DOD's work.[65] With the INFSA having been superseded by the FNFS, the Navy reportedly "has lost much of its power on deciding what its future fleet will look like…."[66] No release date for the result of the FNFS has been announced, but press reports suggest that much of the analytical work on the FNFS has now been completed, and that the results of the FNFS could be released in coming days or weeks.[67]

Distributed Maritime Operations (DMO) and Expeditionary Advanced Base Operations (EABO)

Shifting to a more distributed force architecture, Navy and Marine Corps officials have suggested, will support the implementation of the Navy and Marine Corps' new overarching operational concept, called Distributed Maritime Operations (DMO), and a supporting Marine Corps operational concept called Expeditionary Advanced Base Operations (EABO).

April and June 2020 Press Reports About FNFS Results

April and June 2020 press reports stated that FNFS as of April 2020 was moving toward recommending a fleet with, among other things, 68 or 69 nuclear-powered attack submarines (SSNs), 9 aircraft carriers, 80 to 90 large surface combatants (i.e., cruisers and destroyers), 55 to 70 small surface combatants (i.e., frigates and Littoral Combat Ships [LCSs]), 65 unmanned or lightly manned surface vehicles, and 50 extra-large unmanned underwater vehicles (XLUUVs).[68]

September 2020 Press Reports About FNFS Studies

A September 24, 2020, press report about studies done in April in support of the FNFS stated

> The Pentagon's upcoming recommendation for a future Navy is expected to call for a significant increase in the number of ships, with officials discussing a fleet as large as 530 hulls, according to documents obtained by Defense News.
>
> Supporting documents to the forthcoming Future Navy Force Study reviewed by Defense News show the Navy moving towards a lighter force with many more ships but fewer aircraft carriers and large surface combatants. Instead, the fleet would include more small surface combatants, unmanned ships and submarines and an expanded logistics force.
>
> Two groups commissioned by Secretary of Defense Mark Esper to design what a future Navy should look like suggested fleets of anywhere from 480 to 534 ships, when manned and unmanned platforms are accounted for—at least a 35 percent increase in fleet size from the current target of 355 manned ships by 2030.
>
> The numbers all come from an April draft of inputs to the Future Navy Force Study conducted by the Office of the Secretary of Defense. While the number will likely have changed somewhat in final recommendations recently sent to Esper, the plans being

[65] Megan Eckstein, "Pentagon Leaders Have Taken Lead in Crafting Future Fleet from Navy," *USNI News*, June 24, 2020.

[66] Megan Eckstein, "Pentagon Leaders Have Taken Lead in Crafting Future Fleet from Navy," *USNI News*, June 24, 2020.

[67] David B. Larter, "US Navy's Long-Delayed Plan for Its Future Force is Nearing the Finish Line … Sort of," *Defense News*, September 10, 2020. See also Paul McLeary, "New Navy Ships Plan Finally Ready; On Esper's Desk Next Week," *Breaking Defense*, September 10, 2020.

[68] David B. Larter, "Defense Department Study Calls for Cutting 2 of the US Navy's Aircraft Carriers," *Defense News*, April 20, 2020; David B. Larter, "To Compete with China, An Internal Pentagon Study Looks to Pour Money into Robot Submarines," *Defense News*, June 1, 2020.

discussed in April are notable as they reflect what will likely be major shift in the Navy's future—and the expectation is that a larger-than-planned Navy based on the concepts laid out in the documents will remain intact in the final analysis….

The Future Naval Force Study, overseen by Deputy Secretary of Defense David Norquist, kicked off in January after Esper decided he wanted an outside take on the Navy's self-review of its future force structure. The OSD-led review tasked three groups to provide their version of an ideal fleet construction for the year 2045, one each by the Pentagon's Cost Assessment & Program Evaluation office, the Joint Staff, the Navy and a group from the Hudson Institute.

Those fleets were war-gamed and the results were compiled into the Future Naval Force Study, which was briefed to Esper earlier this month….

The April documents viewed by Defense News included notional fleets designed by CAPE and the Hudson Institute….

The fleets designed by the CAPE and Hudson teams agreed on the need to increase the number and diversity of ships while boosting vertical launch system capacity—while also holding the operations and sustainment cost of the fleet as steady as possible and avoid adding to the number of sailors required to operate it.

As of the April drafts, both the CAPE and Hudson Institute teams were supportive of shrinking the number of supercarriers to nine from the current 11, which would effectively give the country eight active carriers, with one carrier always in midlife overhaul and refueling. The Hudson study also called for investing in four light carriers.

The CAPE fleet called for between 80 and 90 large surface combatants, about the same level as today's 89 cruisers and destroyers. Hudson looked to reduce the number slightly and instead fund more lightly manned corvettes, something Hudson has called for in the past.

The reports called for between 65 and 87 large unmanned surface vessels or optionally unmanned corvettes, which the Navy hopes will boost vertical launch system capacity to offset the loss over time of the Arleigh Burke-class destroyers and the four guided missile submarines.

Both fleets called for increased small surface combatants, with the CAPE study putting the upper limit at 70 ships. Hudson recommended a maximum of 56. The Navy's 2016 Force Structure Assessment called for 52 small surface combatants.

Both fleets also favored a slight increase in attack submarines over the current 66-ship requirement but reflected a big boost in large unmanned submarines, anywhere between 40 and 60 total. The idea would be to get the Extra Large Unmanned Underwater Vehicle to do monotonous surveillance missions or highly dangerous missions, freeing up the more complex manned platforms for other tasking.

On the amphibious side, both fleets reduced the overall number of traditional dock landing ships, such as the LPD-17, from the current 23 to between 15 and 19. As for the big-deck amphibious ships, CAPE favored holding at the current level of 10, while Hudson favored cutting to five, with the savings reinvested towards four light carriers.

The studies called for between 20 and 26 of the Marines' light amphibious warships, which they need for ferrying Marines and gear around islands in the Pacific.

Both fleets significantly expanded the logistics force, with big increases coming from smaller ships similar to offshore or oil platform support-type vessels. The fleets called for anywhere from 19 to 30 "future small logistics" ships. The CAPE and Hudon fleets increased the number of fleet oilers anywhere from 21 to 31, up from today's 17….

> The Hudson fleet called for a significant boost to the command and support ship infrastructure from today's 33 ships to 52 ships. CAPE called for the fleet to remain about the same. Those ships include dry cargo ships, the expeditionary fast transports, expeditionary transfer docks and expeditionary sea bases.
>
> All told, the fleets posited between 316 and 358 "traditional" ships, but when new classes and unmanned ships were lumped in, the fleet designs contained upwards of 500 ships or more.[69]

A September 25, 2020, press report similarly stated that the Hudson Institute study called for a Navy with 434 manned ships and 139 large UVs, including, among other things, 60 nuclear-powered attack submarines (SSNs), 9 aircraft carriers, 80 corvettes, 26 Light Amphibious Warships (LAWs), 99 medium unmanned surface vessels (MUSVs), and 40 extra-large unmanned underwater vehicles (XLUUVs).[70]

June 2020 Testimony from Hudson Institute

At a June 4, 2020, hearing on hearing on future force structure requirements for the Navy before the Seapower and Projection Forces subcommittee of the House Armed Services Committee, one of the witnesses, Bryan Clark of the Hudson Institute, presented testimony that proposed a fleet of 473 manned ships and 152 large UVs, including 12 ballistic missile submarines; 61 SSNs; 10 large-deck, nuclear-powered aircraft carriers (CVNs); 77 large surface combatants (i.e., cruisers and destroyers); 52 small surface combatants (i.e., frigates and Littoral Combat Ships); 91 corvettes; 33 larger amphibious ships, including 9 large-deck (LHD/LHA-type) ships and 24 small-deck (LPD-type) ships; 27 smaller Light Amphibious Warships (LAWs); 39 larger resupply ships (including 20 oilers); 20 smaller oilers; 51 command and support ships; 112 MUSVs; and 40 XLUUVs.[71]

October 2020 Report from Hudson Institute

An October 2020 report by the Hudson Institute on future Navy force structure presented a revised set of force-level goals, recommending a fleet of 442 manned ships and 139 large UVs, including 12 ballistic missile submarines; 60 SSNs; 9 large-deck, nuclear-powered aircraft carriers (CVNs); 64 large surface combatants (i.e., cruisers and destroyers); 52 small surface combatants (i.e., frigates and Littoral Combat Ships); 80 corvettes; 30 larger amphibious ships, including 8 large-deck (LHD/LHA-type) ships and 22 small-deck (LPD-type) ships; 26 smaller Light Amphibious Warships (LAWs); 38 larger resupply ships; 18 smaller oilers; 53 command and support ships; 99 MUSVs; and 40 XLUUVs.[72]

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[69] David B. Larter and Aaron Mehta, "The Pentagon Is Eyeing a 500-Ship Navy, Documents Reveal," *Defense News*, September 24, 2020.

[70] Justin Katz, "Enlisted by DEPSECDEF, Hudson Proposes Fleet Lighter on Carriers, Roughly 140 Unmanned Vessels," *Inside Defense*, September 25, 2020.

[71] Prepared statement by Bryan Clark, Senior Fellow, Hudson Institute, to Seapower and Projection Forces subcommittee, House Armed Services Committee, hearing on future force structure requirements for the United States Navy, June 4, 2020, p. 4.

[72] Bryan Clark, Timothy A. Walton, and Seth Cropsey, *American Sea Power at a Crossroads: A Plan to Restore the US Navy's Maritime Advantage*, Hudson Institute, September 2020, Table 1 on p. 9. The report was released on September 30, 2020.

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