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TESTIMONY

The Navy's 2025 Shipbuilding Plan and Its Implications for the Shipbuilding Industrial Base

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Committee on Armed Services
U.S. House of Representatives

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Chairman Kelly, Ranking Member Courtney, and Members of the Subcommittee, thank you for inviting me to testify about the Navy's 2025 shipbuilding plan. My submitted statement today reprises the Congressional Budget Office's January 2025 report *An Analysis of the Navy's 2025 Shipbuilding Plan* (www.cbo.gov/publication/60732).

Each year, as directed by the Congress, the Department of Defense submits a report with the President's budget describing the Navy's plan for its future fleet for the next 30 years. CBO has analyzed the Navy's 2025 plan and estimated its costs. Overall, the Navy wants to build a larger fleet whose firepower is distributed among more ships than it is today.

- **Cost.** The Navy's 2025 plan would cost 46 percent more annually in real terms (that is, adjusted to remove the effects of inflation) than the average amount appropriated over the past 5 years. CBO estimates that total shipbuilding costs would average $40 billion (in 2024 dollars) over the next 30 years, which is about 17 percent more than the Navy estimates. CBO's estimates for the 2025 plan range from 8 percent to 16 percent higher in real terms than its estimates for the three alternatives in the Navy's 2024 plan. Including the costs of operating and maintaining those ships, buying new aircraft and weapons, and funding the Marine Corps, the Navy's total budget would need to increase from $255 billion today to $340 billion (in 2024 dollars) in 2054 to implement the 2025 plan.
- **Fleet Size.** The number of battle force ships would increase from 295 today to 390 in 2054. Before increasing, however, the fleet would become smaller in the near term, falling to 283 ships in 2027.
- **Purchasing Plan.** The Navy would purchase a total of 364 new combat ships and combat logistics and support ships. Overall, under the 2025 plan, the Navy would buy more current generation ships and more smaller ships than it would have purchased under any of the 2024 plan's three alternatives.
- **Fleet Capabilities.** The fleet's firepower would be reduced over the next decade, but thereafter, as the fleet grew, its firepower would increase and become distributed among more ships.
- **Industrial Base.** Over the next 30 years, the nation's shipyards would need to produce substantially more naval tonnage than they have produced over the past 10 years. The rate of production of nuclear-powered submarines, in particular, would need to increase significantly.

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Notes About This Report

Unless this report indicates otherwise, all years referred to are federal fiscal years, which run from October 1 to September 30 and are designated by the calendar year in which they end.

In this report, "cost" refers to budget authority, the amount that would need to be appropriated to implement the Administration's plans; unless otherwise indicated, all dollar amounts reflect budget authority in 2024 dollars.

All ship tonnage numbers are expressed as long tons, which are also known as imperial tons or displacement tons. A long ton is equal to 2,240 pounds.

On October 31, 2024, the Navy announced that it would extend the service life of 12 older destroyers. It also plans to extend the service life of 3 cruisers. Those changes were incorporated in CBO's analysis of the 2025 shipbuilding plan; thus, this report shows greater inventories for those ships than what the Navy presented in its report.

Numbers in the text, tables, and figures may not add up to totals because of rounding.

Previous editions of this report are available at https://tinyurl.com/mr24mftf.

The Navy's 2025 Shipbuilding Plan and Its Implications for the Shipbuilding Industrial Base

Summary

The Department of Defense (DoD) submitted the Navy's shipbuilding plan for fiscal year 2025 to the Congress on March 18, 2024. The Congressional Budget Office is required by law to analyze that plan and assess its costs.

The Navy's 2025 plan comprises a single official plan and one alternative that could be implemented if budgetary resources were not available to pay for the 2025 plan. (The 2023 and 2024 plans each comprised three alternatives, none of which was favored over the others.) CBO focused its analysis on the official 2025 plan. Like the past two years' plans, the 2025 plan aims at building a larger fleet whose firepower is greater and distributed among more ships than it is today.

The average annual cost of carrying out the 2025 plan, which covers fiscal years 2025 to 2054, is $40.1 billion (in 2024 dollars), including $35.8 billion for new-ship construction, CBO estimates (see Table 1). The Navy's 2025 plan differs from the alternatives in the 2024 plan in several ways. Most notably, it would have the Navy buy fewer next-generation attack submarines and large surface combatants and more current-generation ships. Nevertheless, in real terms (that is, adjusted to remove the effects of inflation), the costs of the 2025 plan are substantially higher than those of the alternatives in the 2024 plan because unit costs would be higher for almost all major shipbuilding programs and because the current plan calls for purchasing more ships.

The Navy Has a Goal of a 381-Ship Fleet

On June 20, 2023, the service sent its classified Battle Force Ship Assessment and Requirement (BFSAR) report to the Congress. In its 2025 shipbuilding plan, the Navy released the details of the goals outlined in that report for its future fleet. The Navy states that its 2025 plan and the BFSAR report align its shipbuilding goals with DoD's most recent national security strategy. Those goals include achieving a fleet of 381 battle force ships and 134 unmanned surface and undersea vessels for a total force of 515 naval platforms.

In this report, CBO analyzes and compares the 2025 plan to the alternatives in the 2024 plan and to the Navy's broad goals of building a larger fleet with more distributed firepower. The Navy wants to put more offensive capability—primarily missiles and unmanned systems—on a greater number of ships than it currently has. Doing so would both provide a task force commander with more ships capable of offensive operations and make it more difficult for an opponent to destroy the fleet's offensive capability. If fully implemented, the plan would eventually result in the fleet's being larger than it has been at any time since 2001. However, if the Navy is unable to reduce the maintenance delays that it has been experiencing for more than a decade, it would not be able to deploy as many ships as achieving its 381-ship goal would suggest.

The 2025 Plan Would Expand the Fleet to 390 Battle Force Ships

On December 1, 2024, the Navy's fleet numbered 296 battle force ships—aircraft carriers, submarines, surface combatants, amphibious ships, combat logistics ships, and some support ships. To achieve its goal of 381 battle force ships, the Navy would buy 364 ships over the next 30 years—293 combat ships and 71 combat logistics and support ships. If the Navy adhered to its schedule for retiring ships, it would have a fleet of over 300 ships by the early 2030s (see Figure 1). In 2054, the fleet would number 390 ships, a little more than the Navy's goal.

In the near term, however, the fleet would become smaller. Over the next three years, the Navy would retire 13 more ships than it would commission, causing the fleet to reach a low of 283 ships in 2027 before growing again. That is 2 fewer ships than the fleet's lowest point in the 2024 plan.

Although the 2025 plan does not include many details about the size or composition of the unmanned vessels that the Navy envisions procuring, the service provided CBO with a notional plan to purchase enough large unmanned surface vessels to build and sustain a force of 40 of those craft.

Table 1.

Comparison of Ship Purchases and Estimated Costs Under the Navy's 2024 and 2025 Shipbuilding Plans

	2024 plan (2024 to 2053)			2025 plan (2025 to 2054)
	Alternative 1	Alternative 2	Alternative 3	
	Number of manned battle force ships purchased over 30 years			
Combat ships				
Aircraft carriers	6	6	7	6
Ballistic missile submarines	11	11	11	10
Large payload submarines	4	6	4	6
Attack submarines				
Virginia class submarines with the Virginia payload module	11	11	11	9
Virginia class submarines	10	37	12	36
SSN(X) next-generation attack submarines	33	18	35	14
Subtotal	54	66	58	59
Large surface combatants				
DDG-51 Flight III destroyers	18	20	18	23
DDG(X) next-generation surface combatants	38	30	46	28
Subtotal	56	50	64	51
Small surface combatants				
FFG-62 frigates	16	10	16	24
FFG-62 Flight II frigates	37	46	42	57
Subtotal	53	56	58	81
Large and midsize amphibious warfare ships				
LHA-6 amphibious assault ships	6	5	4	8
LPD-17 Flight II amphibious transport docks	0	0	0	5
LPD(X) next-generation amphibious ships	5	7	10	12
Subtotal	11	12	14	25
Medium landing ships	42	36	51	55
Total combat ships	**237**	**243**	**267**	**293**
Combat logistics and support ships	53	56	73	71
Total manned battle force ships	**290**	**299**	**340**	**364**
	Costs of new-ship construction (billions of 2024 dollars)[a]			
Total cost over 30 years				
Navy's estimate	794	810	861	903
CBO's estimate	930	926	1,001	1,075
Average annual cost				
Navy's estimate	26.6	27.0	28.7	30.1
CBO's estimate	31.0	30.9	33.4	35.8
Average cost per ship				
Navy's estimate	2.7	2.7	2.5	2.5
CBO's estimate	3.2	3.1	2.9	3.0
Addendum:				
Average annual costs of all activities typically funded from budget accounts for ship construction				
Navy's estimate	29.8	30.3	32.1	34.1
CBO's estimate	34.5	34.4	37.0	40.1

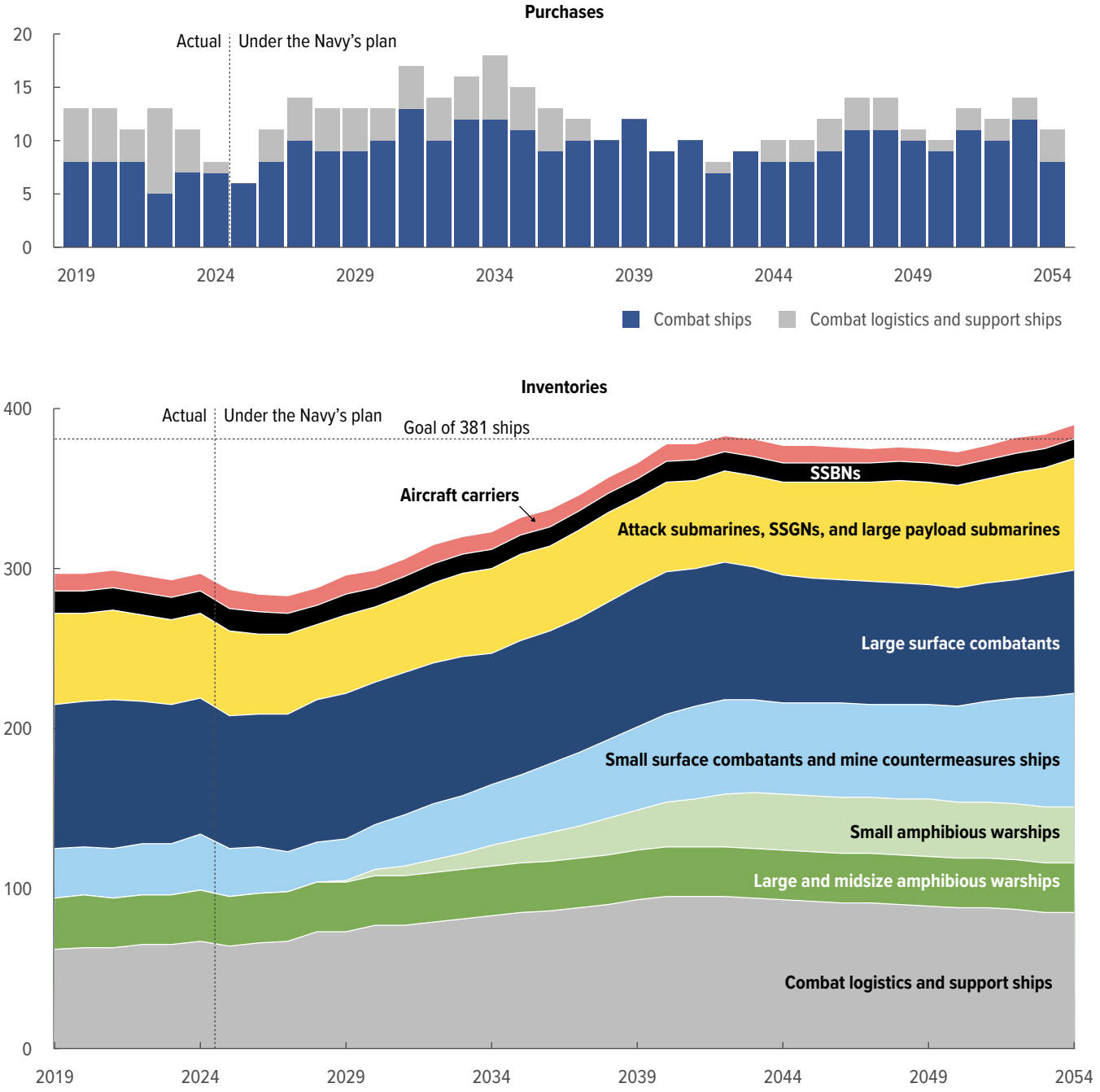
Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

a. Costs of new-ship construction include only the costs for purchasing new battle force ships. Thus, they exclude the costs of unmanned systems and ships that are not counted as part of the battle force (such as oceanographic survey ships and sealift ships). Those costs are included elsewhere, as part of all the activities typically funded from budget accounts for ship construction.

Figure 1.

Annual Ship Purchases and Inventories Under the Navy's 2025 Plan

Number of ships



Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

SSBN = ballistic missile submarine; SSGN = guided missile submarine.

The Costs of New-Ship Construction Under the 2025 Plan Would Average $35.8 Billion per Year

CBO estimates that buying only the new ships specified in the Navy's 2025 plan would cost $1,075 billion (in 2024 dollars)—an average of $35.8 billion per year over 30 years. Those amounts are between 7 percent and 16 percent higher than CBO's estimates for the three alternatives in the 2024 plan.

The Navy's cost estimates for new ships are lower than CBO's: $903 billion (or an average of $30.1 billion per year over 30 years). Those amounts are between 5 percent and 14 percent higher than the service's estimates for the alternatives in its 2024 plan.

In general, CBO's estimates of new-ship construction costs are higher than the Navy's because CBO and the Navy made different assumptions about the design and capabilities of some future ships, used different estimating methods, and treated growth in the costs of labor and materials for shipbuilding differently.

The growth in costs reflected in the Navy's and CBO's estimates for the 2025 plan is attributable to both an increase in the estimated costs of many shipbuilding programs and to the larger number of ships that the Navy would purchase under that plan compared with what it would have purchased under the alternatives in the 2024 plan. The estimated costs have risen for several reasons, but these are the most significant:

- Some ships have taken longer and been more difficult to build than the Navy anticipated,
- Some ships' designs have proved more complicated to complete than expected, and
- The estimated costs of some ships were unrealistically low in earlier shipbuilding plans.

In some cases, CBO's estimates increased more than the Navy's. That is because not all of the Navy's estimates reflect changing conditions in the shipbuilding industrial base that have caused costs, particularly the cost of building submarines, to rise.

Average Total Shipbuilding Costs Over the Next 30 Years Would Be 46 Percent More Than Average Appropriations Over the Past 5 Years

The Navy's shipbuilding plan reports only the costs of new-ship construction for battle force ships. It does not report the cost of refueling nuclear-powered ships or other costs, such as those associated with outfitting new ships or purchasing ships that are not considered part of the battle force (for example, used sealift ships), that are typically funded from the Navy's shipbuilding account. When those costs are included, the Navy's average annual shipbuilding costs under the 2025 plan increase by a little more than $4 billion, CBO estimates.

Thus, when funding for all activities supported by the Navy's shipbuilding account is included in the calculation, CBO estimates that the average annual cost of the 2025 plan would be $40.1 billion. That amount is 46 percent higher than the $27.5 billion the Navy has received in annual appropriations, on average, over the past five years. In real terms, CBO's estimate of the average annual cost of this year's plan is between 8 percent and 16 percent higher than its estimates for the alternatives in the Navy's 2024 plan.

The cost of the Navy's 2025 shipbuilding plan is high not only compared with recent funding but also by historical standards. Over the past decade, funding for ship construction reached its highest level since the Reagan Administration's defense buildup in the 1980s. Since 2015, lawmakers have appropriated an average of $2.5 billion more per year for shipbuilding than the President has requested, partly because of concerns that the fleet is too small to perform all of its missions (see Figure 2).

The Navy's Total Budget Would Need to Grow to Operate and Maintain the Larger Fleet Envisioned in the 2025 Plan

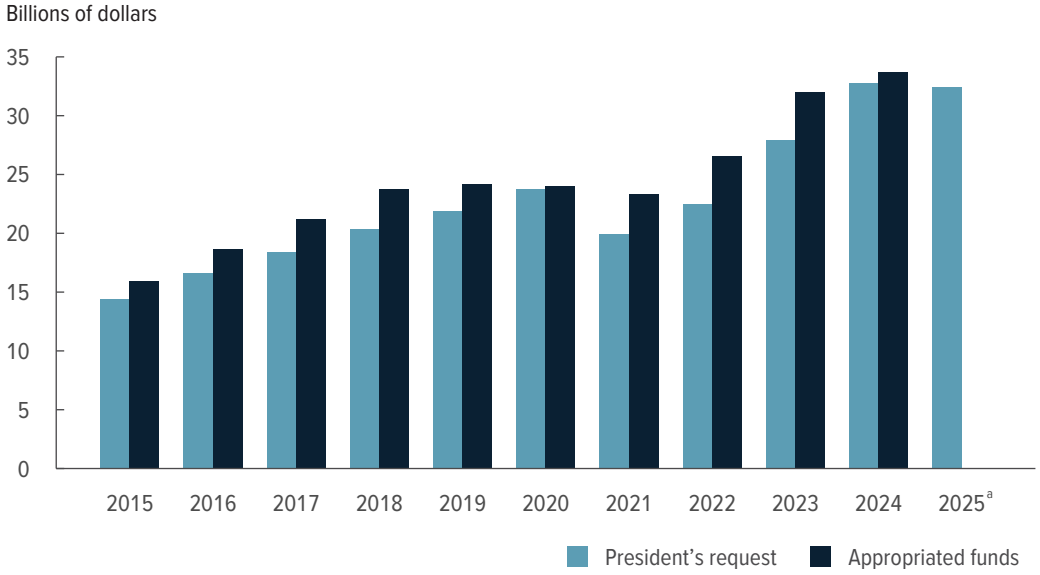
The Department of the Navy's total budget in 2024 is about $255 billion. As the fleet increased in size, various costs in addition to those of shipbuilding would increase. Purchasing, operating, and maintaining the larger fleet envisioned in the 2025 plan would require a total annual budget of about $340 billion (a one-third increase) by the 2050s, CBO estimates. Like shipbuilding costs, operation and support costs have also historically increased faster than the economywide rate of inflation.

The Combat Power of the Fleet Would Decline Before It Increased

Over the next 5 to 10 years, the Navy's 2025 plan would reduce the number of ships that can fire missiles and torpedoes. Starting in the 2030s, however, those capabilities would grow along with the fleet, although not by as much as they would have under some of the alternatives in the 2024 plan. To take full advantage of that capacity, the Navy would also need to build up its inventory of munitions.

Figure 2.

Requested and Appropriated Shipbuilding Budgets, 2015 to 2024



Since 2015, the Congress has appropriated more money for ships than the President has requested.

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

a. The 2025 appropriation had not yet been enacted when this report was published.

The Industrial Base Would Need to Further Increase Ship Construction

Over the past decade, the amount of tonnage under construction at the nation's shipyards increased by 80 percent. Under the 2025 plan, the amount of naval tonnage that the Navy wants to buy would increase further, although demand would be greater for some types of ships than for others. Aircraft carrier construction would remain fairly steady, but the tonnage of submarines, surface combatants, and amphibious warfare ships under construction from 2030 to 2054 would be 50 percent higher, on average, than it is today.

The Navy's Goal of a 381-Ship Fleet

On June 20, 2023, the Navy submitted its analysis of its goals for the future fleet—called the Battle Force Ship Assessment and Requirement report—to the Congress. (See the appendix for a description of the major types of ships in the Navy's fleet.) Most of the details in the BFSAR were classified.[1] The Navy's 2025 plan reveals the details of that report for the various categories of ships and notes that the BFSAR "reflects the tenets of the 2022 National Defense Strategy (NDS) and the aligned Defense Planning Scenarios."[2] In its 2025 plan, the Navy states that it wants to build a fleet of 381 manned battle force ships and 134 unmanned surface and undersea vessels (see Table 2).

Compared with the goals that the Navy set out in its 2016 Force Structure Assessment (FSA)—the last official FSA sent to the Congress—the BFSAR would decrease the number of large surface combatants and increase the number of small surface combatants. The decrease in large surface combatants stems from the Navy's basing more of the ships overseas. As a result of that geographic shift, the service would not need as many large surface combatants as it previously thought to meet its goals for overseas presence. The increase in the number of smaller ships results from the Navy's abandoning a dual-crewing concept for the littoral combat ships and the new class of frigates it is building. A single-crewed ship spends less time operating overseas than a dual-crewed one; thus, to maintain a specified overseas presence, the Navy would need more small combatants.

1. Department of the Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2024* (March 2023), p. 3, https://tinyurl.com/37bkemd9. For more information about the BFSAR, see Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2024 Shipbuilding Plan* (October 2023), www.cbo.gov/publication/59508.

2. Department of the Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2025* (March 2024), p. 3, https://tinyurl.com/mrwdcz35.

Table 2.

The Navy's Inventory Goals, 2016 to 2024

Number of platforms

	2016 Force Structure Assessment	2023 Battle Force Ship Assessment and Requirement	Difference	Addendum: Fleet composition as of December 1, 2024
Manned battle force ships				
Combat ships				
Aircraft carriers	12	12	0	11
Submarines				
Ballistic missile	12	12	0	14
Guided missile and large payload	0	0	0	4
Attack	66	66	0	48
Surface combatants				
Large: CGs and DDGs	104	87	-17	85
Small				
MCMs and LCSs	28	15	-13	34
FFGs	24	58	34	0
Subtotal, small surface combatants	52	73	21	34
Amphibious ships				
Large: LHAs and LHDs	12	10	-2	9
Midsize: LPDs and LSDs	26	21	-5	23
Small: LSMs[a]	n.a.	18	18	0
Total combat ships	284	299	15	228
Combat logistics and support ships				
Combat logistics ships				
Large: T-AKEs and T-AOs	34	33	-1	33
Small: T-AOLs	n.a.	13	13	0
Support ships				
Large	12	10	-2	11
Small	25	26	1	23
Total combat logistics and support ships	71	82	11	67[b]
Total manned battle force ships	355	381	26	295[b]
Unmanned vessels				
Surface	n.a.	78	78	0[c]
Undersea	n.a.	56	56	0[c]
Total unmanned vessels	n.a.	134	134	0
Total manned battle force ships and unmanned vessels	**355**	**515**	**160**	**295[b]**
Addendum:				
Year in which force structure objective would be achieved	After 2030	2045	n.a.	n.a.

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

CG = guided missile cruiser; DDG = guided missile destroyer; FFG = guided missile frigate; LCS = littoral combat ship; LHA and LHD = amphibious assault ship; LPD = amphibious transport dock; LSD = dock landing ship; LSM = medium landing ship; MCM = mine countermeasures ship; T-AKE = dry cargo ship; T-AO = oiler; T-AOL = next-generation logistics ship; n.a. = not applicable.

a. The Navy previously called this ship the light amphibious warship.

b. The Navy is planning to temporarily take 17 combat logistics and support ships out of service because it does not have the civilian crews to operate the ships. (Combat logistics and support ships are operated by the Military Sealift Command and mostly use civilian crews.) Thus, although the Navy officially has 67 of those ships in commission and 295 battle force ships, if that plan was implemented, the service would effectively have only 50 combat logistics and support ships and 278 battle force ships.

c. The Navy is currently experimenting with prototype versions of these vessels.

The number of large and midsize amphibious ships is set at 31 in the BFSAR, which is consistent with the number specified by the Congress in the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 (Public Law 117-263). The number of small amphibious ships—the new class of medium landing ships—is set at an "initial capacity goal" of 18. The Navy wants those ships to achieve the objectives outlined in the Marine Corps' *Force Design 2030*, including distributing small units of Marines armed with missile batteries over a theater of operations.[3]

Compared with the 2016 FSA, the numbers of combat logistics and support ships in the BFSAR are similar, but the 2023 report includes a new class of light oilers. The Navy proposes a force of 13 of those ships.

The goals for aircraft carriers and submarines remained the same in the 2023 BFSAR as they were in the 2016 FSA.

The 2016 FSA did not include a category for unmanned surface and undersea vessels. Rapid advances in the underlying technology as well as the proven utility of unmanned systems in combat—demonstrated by their use in the war in Ukraine and by the Houthis in the Red Sea—have since led the Navy to discuss such craft in its force structure assessments. The Navy called for more than 130 unmanned vessels in the BFSAR, all relatively large, ranging from several hundred tons to perhaps as much as 2,000 tons. That number does not include potentially thousands of much smaller systems that could play a role in the future of naval warfare.

Ship Inventories and Purchases

The Navy's fleet numbered 295 battle force ships on December 1, 2024.[4] The service's broad goal is to build a larger fleet whose firepower is greater and distributed among more platforms than it is in today's fleet. The ship purchases and inventories described in the 2025 plan would, by 2054, increase the fleet to 390 ships, CBO estimates—a little more than the Navy's goal.[5] However, over the next five years, both the size of the fleet and its firepower would decrease.

The Navy proposes buying 6 ships in 2025 and 51 ships from 2026 to 2029. From 2030 to 2054, the Navy would buy an additional 307 ships, for a total of 364 over the next 30 years (or an average of about 12 ships per year). The pace of shipbuilding would be fastest in the early 2030s, reflecting the service's desire to increase the size of the fleet as quickly as feasible. It would slow in the early 2040s, before construction ramped up again in the late 2040s and 2050s. The Navy plans to purchase ships at the following average annual rates over the next three decades: 13.5 ships from 2025 to 2034, 10.8 ships from 2035 to 2044, and 12.1 ships from 2045 to 2054.

Those purchases do not include any unmanned systems, which are accounted for separately. In information provided to CBO, the Navy stated that it would purchase large unmanned surface vessels at a steady rate of 2 per year in its shipbuilding account throughout most of the next 30 years. The service would use other accounts to purchase additional unmanned systems, including medium unmanned surface vessels and extra-large undersea vessels, to reach its goal of 134 unmanned ships.

Overall, the 2025 plan would build a fleet of manned ships larger in both quantity and full-load displacement than any of the alternatives in the 2024 plan (see Figure 3). Full-load displacement measures the amount of water that a ship displaces when carrying its crew, stores, cargo, ammunition, fuel, and other liquids. Displacement is commonly used as a general proxy for the capability of a ship. Thus, a fleet that totals two million tons in displacement is considered to be more capable than one with a similar composition of ships that totals half that amount.

This report assesses the costs of implementing the 2025 plan, its effects on the Navy's force structure, the extent to which it would satisfy the Navy's specific goals for major components of the U.S. fleet, and the capabilities that the plan would bring to the fleet. CBO did not evaluate the Navy's analysis of its future force structure or of the fleet's ability to fulfill its missions in the national military strategy.

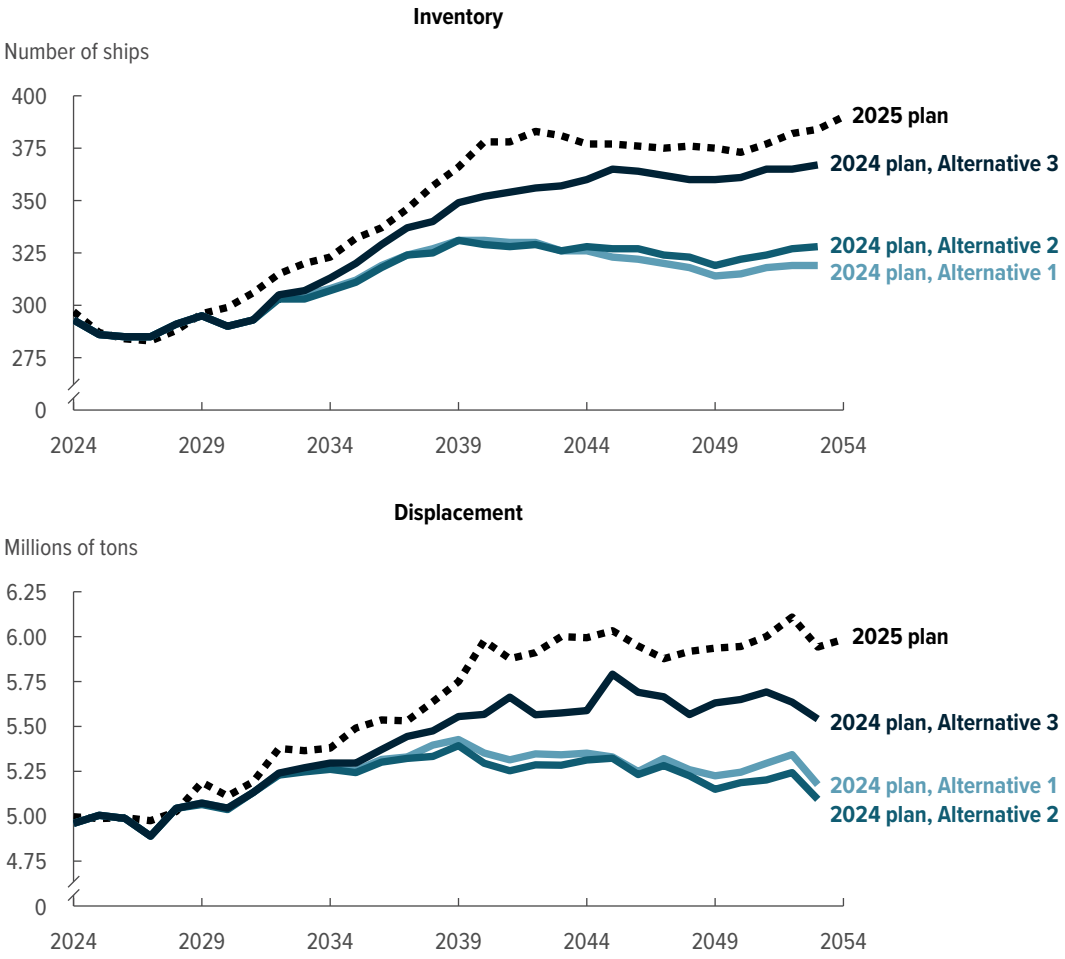
3. General David H. Berger, Commandant of the Marine Corps, *Force Design 2030: Annual Update* (June 2023), https://tinyurl.com/y9u4hyzy. See also Marine Corps, *Force Design: A Snapshot* (May 2024), https://tinyurl.com/2jne9huv.

4. The Navy is considering a plan to take 17 combat logistics and support ships operated by the Military Sealift Command out of service. If that plan was implemented, the Navy would officially have 295 battle force ships, but operationally, it would have only 278. See Sam LaGrone, "Navy Could Sideline 17 Support Ships Due to Manpower Issues," *USNI News* (August 22, 2024, updated August 26, 2024), https://tinyurl.com/4mutfyb8.

5. CBO's estimate for the number ships in 2054 is slightly different from the Navy's plan because the Navy did not account for the delays outlined in its 45-day shipbuilding review. See Justin Katz, "Navy Lays Out Major Shipbuilding Delays, in Rare Public Accounting," *Breaking Defense* (April 2, 2024), https://tinyurl.com/3c6mh5z7.

Figure 3.

Inventory and Fleetwide Displacement Under the Navy's 2024 and 2025 Plans



The Navy's 2025 plan would increase the size of the fleet, in terms of both number of ships and total displacement, above what it would have been under any of the three alternatives in the 2024 plan.

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

Combat Ships

Under its 2025 plan, the Navy would buy 293 combat ships—aircraft carriers, submarines, large and small surface combatants, and amphibious warfare ships—over the next 30 years. Those purchases would leave the Navy with fewer carriers and large surface combatants than it currently has, but the number of attack submarines (including guided missile submarines and large payload submarines), small surface combatants, small amphibious warfare ships, and combat logistics and support ships would increase. The number of large and midsize amphibious warfare ships would remain about the same as it is today (see Figure 4).

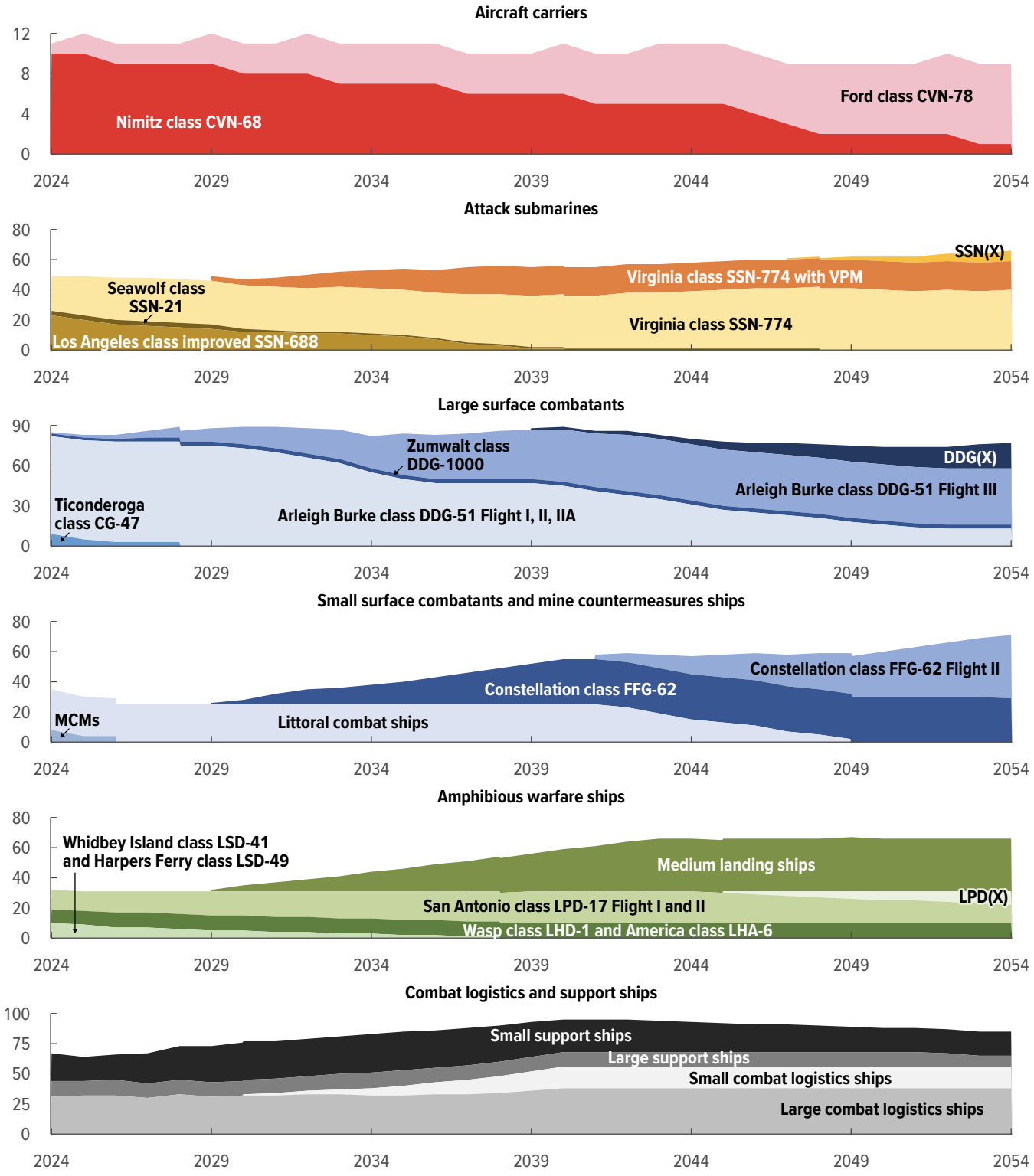
Aircraft Carriers. Currently, the Navy's carrier force consists of 10 Nimitz class carriers and 1 Ford class ship. Under the 2025 plan, the Navy would purchase 6 Ford class aircraft carriers over the next 30 years—1 every 4 or 5 years, starting in 2030 (see Figure 5). Following that schedule would allow the Navy to maintain the size of its existing force of 11 aircraft carriers through 2036, as new Ford class carriers replaced Nimitz class ships. From 2037 to 2046, the force would fluctuate between 10 and 11 carriers. In most years thereafter, it would consist of 9 carriers (see Figure 4).

To maintain a force of 11 carriers, the Navy would need to buy a new carrier every 4 years and extend the service life of some existing Nimitz class ships to 55 years. To reach the BFSAR goal of 12 carriers, the Navy would need to purchase a new carrier every 3 years and extend the service life of some Nimitz class ships to 55 years.

Figure 4.

Inventories of Selected Categories of Ships Under the Navy's 2025 Plan

Number of ships

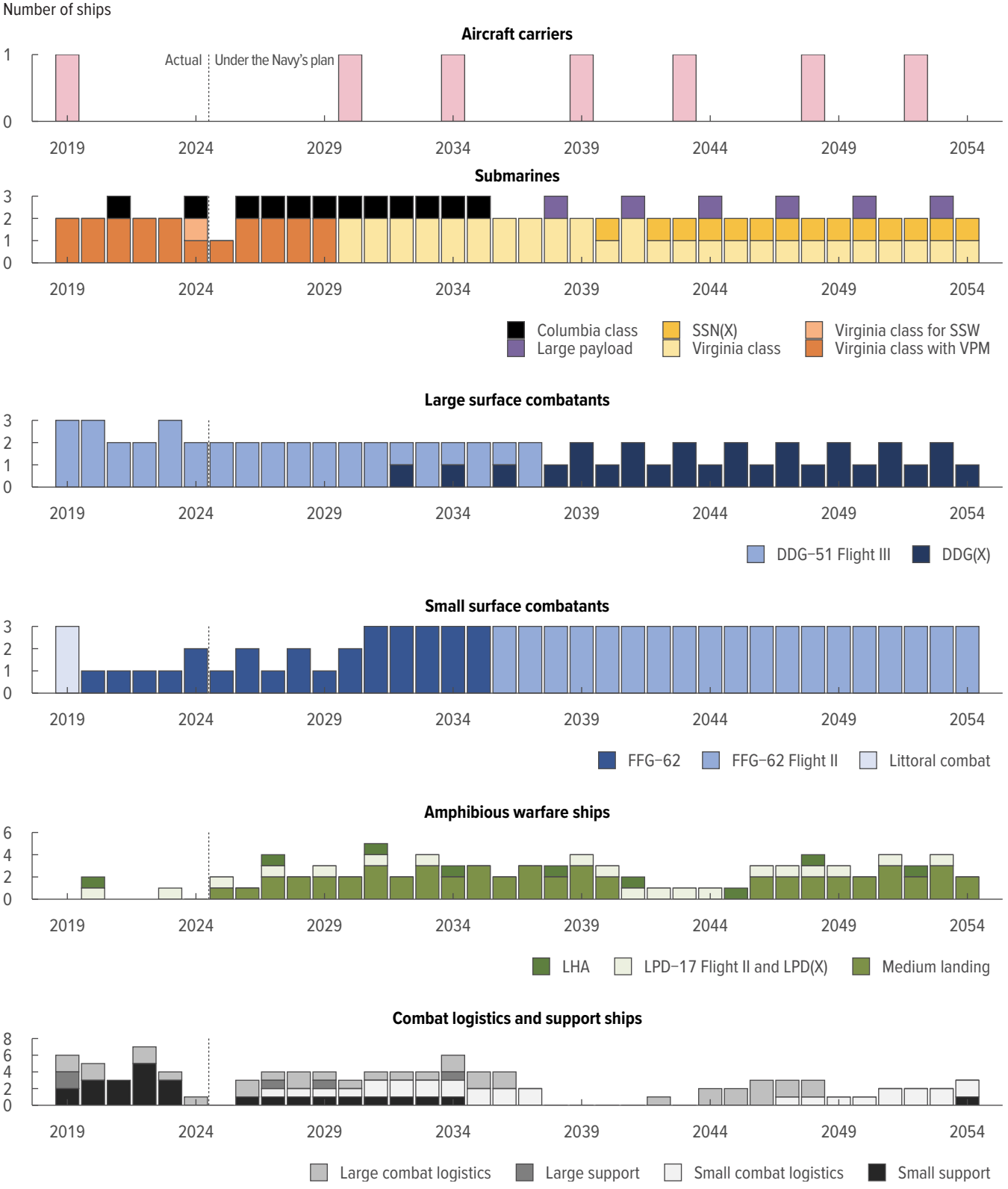


Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

CG = guided missile cruiser; CVN = nuclear-powered aircraft carrier; DDG = guided missile destroyer; DDG(X) = next-generation guided missile destroyer; FFG = guided missile frigate; LHD and LHA = amphibious assault ship; LPD = amphibious transport dock; LPD(X) = next-generation amphibious transport dock; LSD = dock landing ship; MCM = mine countermeasures ship; SSN = attack submarine; SSN(X) = next-generation attack submarine; VPM = Virginia payload module.

Figure 5.

Purchases of Selected Categories of Ships Under the Navy's 2025 Plan



Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

DDG = guided missile destroyer; DDG(X) = next-generation guided missile destroyer; FFG = guided missile frigate; LHA = amphibious assault ship; LPD = amphibious transport dock; LPD(X) = next-generation amphibious transport dock; SSN(X) = next-generation attack submarine; SSW = subsea and seabed warfare; VPM = Virginia payload module.

Ballistic Missile Submarines. The plan for the new Columbia class ballistic missile submarines (SSBNs), which are slated to replace the Navy's 14 Ohio class submarines as they retire, is the same as it was under the 2024 plan. The Navy ordered the first of the Columbia class ships in 2021 and the second in 2024. The 2025 plan calls for purchasing 10 more, at a rate of 1 per year, from 2026 to 2035 (see Figure 5). Unlike the goals for other categories of ships, force goals for SSBNs are not determined by the Navy's force structure assessments but rather by requirements that stem from the number of submarines needed on station by DoD's Strategic Command and, secondarily, by the operational availability of those ships. Therefore, the Navy's requirement to replace its 14 Ohio class SSBNs with 12 Columbia class ships has been set for many years and remains unchanged in the service's latest shipbuilding plan.

The Navy currently estimates that the lead Columbia class submarine will take eight to nine years to build. (A lead ship is the first ship of its class.) In April 2024, the Navy completed a 45-day shipbuilding review, which the Secretary of the Navy had ordered when he became concerned with the state of the Navy's shipbuilding programs. That review found that the lead ship was 12 to 16 months behind schedule, although the service hopes to recover some of that time in the coming years through investments in the submarine industrial base—especially those elements of the base that are heavily involved in Columbia class production.

The Navy still hopes to commission the ship into the fleet in 2028.[6] But an additional two or three years of testing, training, and preparing the ship for deployment would elapse before it would be ready to go on its first deterrent patrol. Subsequent submarines in the class would take about seven years to build and test. Over the past two years, the Navy has determined that it could extend the service life of 5 Ohio class submarines by three years each so that the SSBN force would remain at 12 ships or more throughout the 2025 to 2054 period of the plan. Thus far, the Navy has included a service-life extension for 1 of those submarines in its long-term plan; it will assess whether it needs to extend the service life of the other 4 Ohio class submarines in the future.

6. Megan Eckstein, "US Navy Ship Programs Face Years-Long Delays Amid Labor, Supply Woes," *Defense News* (April 2, 2024), https://tinyurl.com/mr38sy32. In CBO's inventory model, the agency assumes that the commissioning of the first Columbia class boat would occur a year later than the Navy's projection.

Attack and Large Payload Submarines. The Navy currently has 48 nuclear-powered attack submarines (SSNs): 22 Los Angeles class, 3 Seawolf class, and 23 Virginia class ships.[7] The fleet also includes 4 guided missile submarines (SSGNs), which are converted Ohio class ballistic missile submarines that can carry large numbers of conventional missiles and special-operations forces. According to the 2025 shipbuilding plan, after an initial decline to 47 SSNs in 2028, the SSN force would grow larger and become more capable than it is today. Under the 2025 plan, the Navy would buy 59 SSNs (see Figure 5). By 2054, it would have 66 in the fleet (see Figure 4 on page 9).

The composition of those purchases most resembles Alternative 2 in the Navy's 2024 plan. The Navy would invest in fewer next-generation SSN(X) submarines than it would have bought under any of the alternatives in the 2024 plan, and it would buy almost as many Virginia class submarines as it would have purchased under Alternative 2 in that plan. It would continue production of the Virginia class submarines without the Virginia payload module (VPM) through 2054.[8] In the most significant departure from the production schedules for the alternatives in the 2024 plan, the 2025 plan would delay the start of construction of the SSN(X) by five years, to 2040. The plan also calls for the service to refuel the third Seawolf class submarine, SSN-23, in addition to refueling 7 Los Angeles class submarines, which the service had announced it would do in previous years' plans.

Under the 2025 plan, the Navy would also build 6 new large payload submarines starting in the late 2030s. That new ship would be a large-capacity submarine, perhaps

7. For an overview of those programs, see Ronald O'Rourke, *Navy Virginia-Class Submarine Program and AUKUS Submarine (Pillar 1) Project: Background and Issues for Congress*, Report RL32418, version 285 (Congressional Research Service, October 10, 2024), https://tinyurl.com/vbhy77ax, and *Navy Next-Generation Attack Submarine (SSN[X]) Program: Background and Issues for Congress*, Report IF11826, version 33 (Congressional Research Service, December 12, 2024), https://tinyurl.com/2p8asnmm.

8. The Virginia payload module adds four large-diameter payload tubes to the existing Virginia class submarine; each tube can carry seven Tomahawk missiles or other payloads, such as unmanned underwater vessels. That modification would increase the submerged displacement of the submarine by nearly 30 percent and would increase the number of the Virginia class submarine's Tomahawk-sized vertical-launch weapons from 12 to 40. The submarines would be armed with approximately 25 additional weapons—torpedoes and Tomahawks—in the torpedo room.

built on a Columbia class hull in much the same way the Navy's existing SSGNs are converted Ohio class SSBNs. The new ships would be bought in small numbers: 1 ship would be built every three years starting in 2038.

Large Surface Combatants. The Navy currently has 85 cruisers and destroyers in its fleet. Under the 2025 plan, all 12 of its remaining CG-47 Ticonderoga class cruisers would be retired over the next three years; 1 was retired earlier this year. The 2025 plan would leave the number of large surface combatants between 5 and 10 ships short of the Navy's goal of 87 ships for the force for most years from 2025 to 2054. In 2034, the large surface combatant force would fall to 77 ships. It would then increase to 89 ships by 2040 before declining to the mid-70s for most of the 2050s.

However, on October 31, 2024, months after it released the 2025 shipbuilding plan, the Navy announced that it would extend the service life of 12 of its oldest destroyers by 1 to 5 years, adding a total of 48 years of service from them between 2028 and 2036. (The Navy already extended the service life of 5 other destroyers in 2023.) CBO incorporated that most recent development into this analysis, which resulted in a larger force in some years than would have been achieved under the 2025 plan. Specifically, with those service-life extensions, the Navy's large surface combatant force would meet or exceed the service's goal of 87 ships from 2029 to 2033 and would then be within 5 ships of that goal until 2044, when it would number 80 ships. Thereafter, the force would decline to the mid-70s, as specified by the 2025 plan (see Figure 4 on page 9).

On November 4, the Navy stated that it would also extend the service life of 3 cruisers by 3 to 4 years, which would add a total of 10 years of service from those ships from 2026 to 2029. That development was also incorporated into this analysis.

Under the 2025 plan, the Navy would buy 51 destroyers over the next 30 years at an average rate of slightly less than 2 ships per year. It would buy 2 ships per year through 2037 and then alternate between 1 and 2 ships per year from 2038 to 2054 (see Figure 5 on page 10). Purchases of the next-generation DDG(X) destroyer, which would replace the Navy's existing DDG-51 class ships, would begin in 2032. However, the Navy indicated in a briefing to CBO and the Congressional Research Service that the start date of the DDG(X) would likely slip to 2034 or later. Nevertheless, CBO estimated the cost of the destroyer component of the Navy's plan as submitted. The number of destroyers purchased and the composition of those purchases is most similar to Alternative 2 in the Navy's 2024 plan, which called for purchasing 50 ships.

Small Surface Combatants. The Navy now has 26 littoral combat ships (LCSs), which are categorized as small surface combatants, in its fleet. In addition, it operates 8 mine countermeasures ships, which it sometimes includes in that category. (CBO does not include mine countermeasures ships in its tally of small surface combatants.) Another LCS and 6 FFG-62 Constellation class frigates are currently being built. Under the 2025 plan, the Navy would maintain a steady force of 25 LCSs through 2041 before it started to retire those ships (see Figure 4 on page 9). That is more than the 21 LCSs that would have been maintained under the alternatives in the 2024 plan. All 8 mine countermeasures ships would be retired in the next three years under the 2025 plan.

The 2025 plan calls for the number of small surface combatants to more than double to a force of 68 ships by 2054. The Navy would purchase more small surface combatants than any other category of ships—81, or roughly 50 percent more than it would have purchased under the 2024 plan's alternatives (see Figure 5 on page 10).

The composition of the small surface combatant force would be similar to what it would have been under the alternatives in the previous plan. The Navy would purchase 24 FFG-62s through 2035 (in addition to the 6 frigates already under construction) before switching to an upgraded design of that ship, designated as the FFG-62 Flight II. The Navy would then buy 57 of those ships. Through 2030, the Navy would purchase frigates at a rate of 1 to 2 ships per year; it would then increase the rate to 3 ships per year in 2031.

Amphibious Warfare Ships. The Navy's current amphibious warfare force comprises 32 ships: 9 large amphibious assault ships, designated as LHAs or LHDs; 13 midsize amphibious transport docks, or LPDs; and 10 midsize dock landing ships, or LSDs. Under the 2025 plan, the Navy would maintain 31 of those ships after 2026 to comply with the Congressional mandate to do so and to meet the force goal for those ships set forth in the BFSAR (see Figure 4 on page 9). In

addition, a major building program for small amphibious ships—called medium landing ships (LSMs), which were previously known as light amphibious warships—would begin.[9] Under the 2025 plan, that force would grow steadily to 35 ships in 2043. That number is almost double the Navy's "initial capacity" goal, as stated in the BFSAR, of 18 ships but is consistent with the Marine Corps' objective for the program.[10]

Under the 2025 plan, the Navy would buy a total of 25 large and midsize amphibious warfare ships—roughly twice the number called for by the alternatives in the 2024 plan (see Table 1 on page 2). The Navy would buy the first LSM in 2025 and then 2 to 3 per year from 2027 to 2040 (see Figure 5 on page 10). But because the LSMs would have only a 20-year service life, the Navy would need to start buying replacements for the first class of ships in the mid-2040s. Overall, the Navy would buy 55 LSMs.

Combat Logistics and Support Ships

The Navy's combat logistics and support ships include large ships, such as T-AO oilers and T-AKE dry cargo ships (which resupply vessels at sea), as well as smaller ships, such as tug and salvage ships, surveillance craft, and expeditionary fast transports. Under the alternatives in the 2024 plan, the Navy would have increased the number of large oilers and begun buying a smaller logistics ship called the next-generation logistics ship (NGLS)—which, referred to as a light oiler in the past, is currently designated as a T-AOL—to help resupply a larger fleet with a greater number of smaller warships. Overall, the Navy would buy 71 combat logistics and support ships under the 2025 plan (see Figure 5 on page 10).

Superficially, the 2025 plan's call for 71 new combat logistics and support ships looks similar to Alternative 3 in the 2024 plan, which would have had the Navy purchase 73 such ships, the most of the three alternatives (see Table 1 on page 2). However, the composition of those purchases is very different. Under Alternative 3 in the 2024 plan, the Navy would have bought 14 replacements for its current force of expeditionary fast transports. By contrast, under the 2025 plan, the service would not buy any. Instead, it would purchase 4 more fleet oilers and 6 more NGLS ships than it would have purchased under the 2024 plan's Alternative 3.

Unmanned Surface and Undersea Vessels

In the BFSAR, the Navy set a goal of adding 134 unmanned vessels to the fleet, but the 2025 plan does not include any estimated costs for them. In its 2023 shipbuilding plan, the Navy discussed the potential of unmanned systems to contribute to its overall capabilities. Specifically, it mentioned the possibility of using medium unmanned surface vessels (MUSVs) as sensor platforms, large unmanned surface vessels (LUSVs) as "adjunct missile magazines teamed with larger manned multi-mission platforms," and extra-large unmanned undersea vessels "to deliver multiple payloads at extended ranges."[11] Those unmanned vessels are all much larger than the single-use, expendable drones used in the war in Ukraine and would be a permanent part of the service's fleet.[12]

Because the unmanned surface and undersea vessels are still being developed and their technological success is not completely assured, the future quantities of vessels and costs associated with them have not yet been determined. The Navy still has not announced how many MUSVs it would purchase (other than the first prototype), and it is not clear whether the service would purchase those vessels using its shipbuilding account or some other account. Thus far, it has purchased unmanned undersea vessels using its account for "other procurement" instead of its shipbuilding account.

Like its 2024 plan, the Navy's 2025 plan does not repeat the specific language from the 2023 plan about

9. In the 2024 and 2025 plans, for reasons that are unclear, the Navy characterizes the LSMs as support ships rather than as small amphibious ships; it had characterized them as amphibious warfare ships in its 2023 plan. CBO continues to categorize those ships as amphibious warfare ships, as does the Congressional Research Service, to more accurately reflect the missions they would perform.

10. General David H. Berger, Commandant of the Marine Corps, *Force Design 2030: Annual Update* (June 2023), p. 4, https://tinyurl.com/y9u4hyzy.

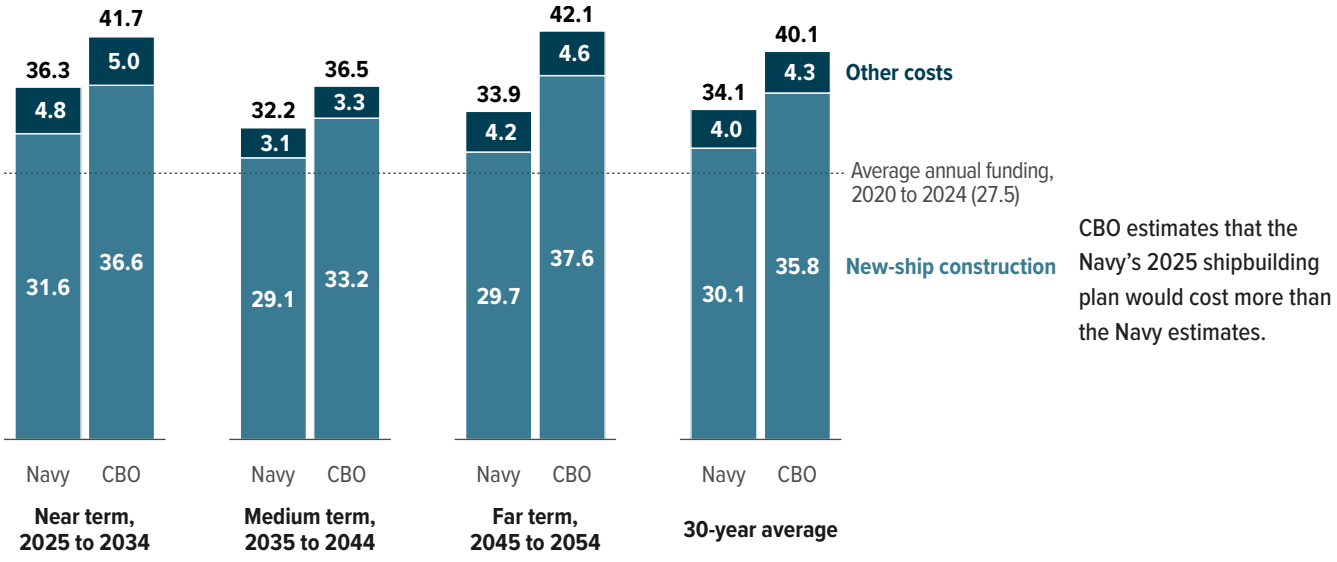
11. Department of the Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2023* (April 2022), p. 6, https://go.usa.gov/xJtjj.

12. Nathan Rennolds, "Ukraine's Hi-Tech Naval Attack Drones Have Paralyzed Russia's Black Sea Fleet, Spy Chief Says," *Business Insider* (August 26, 2023), https://tinyurl.com/3cv4f6r4; and Emmanuel Grynszpan and Marie Jégo, "In the Black Sea, Ukraine Attacks the Russian Fleet With Naval Suicide Drones," *Le Monde* (August 5, 2023), https://tinyurl.com/2x52bp8v.

Figure 6.

Average Annual Total Shipbuilding Costs Under the Navy's 2025 Plan, as Estimated by CBO and the Navy

Billions of 2024 dollars



Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

New-ship construction excludes the costs of refueling nuclear-powered aircraft carriers, purchasing ships that are not part of the battle force (such as oceanographic survey ships and sealift ships), constructing large unmanned surface vessels, conducting outfitting and postdelivery activities (including purchasing the equipment and many small tools that are needed to operate a ship but that are not necessarily provided by the shipyard when the ship is built), and other smaller items. Other costs include all of those things that are excluded from new-ship construction.

unmanned systems. Rather, it discusses various technologies that the Navy is actively investing in to ultimately build a "hybrid fleet." Such a force would combine large numbers of manned and unmanned ships to "build a more lethal and distributed naval force."[13] Information provided to CBO by the Navy included the assumption that the service would buy 2 LUSVs per year in most years under the 2025 plan. However, whereas under the 2024 plan, the first LUSV was slated to be purchased in 2025, the 2025 plan would delay that purchase until 2027. Because those vessels have a 20-year service life, those purchases would result in a force of 31 LUSVs by 2045 and the total force of 40 LUSVs beginning in 2050.

The 2025 report included no information on the number of MUSVs or extra-large undersea unmanned vessels the service would purchase. But the 2025 plan states that the service could have between 89 and 143 unmanned platforms by 2045, which, after the LUSVs are accounted for, suggests that the number of MUSVs and undersea craft combined could be between 58 and 112 vessels.

Shipbuilding Costs

According to the Navy's estimates, even if the service received annual funding for shipbuilding from 2025 to 2054 that equaled the amount of such funding that it received in each of the past five years—a half-decade during which that funding was at its highest level since the 1980s—the service still could not afford to buy all the ships in its 2025 shipbuilding plan. The Navy's planned purchases of new ships from 2025 to 2054 would cost (that is, require appropriations of) an average of $30.1 billion per year in 2024 dollars (see Figure 6). That amount represents an increase over the service's estimates of the alternatives in the 2024 plan of between 5 percent and 14 percent after the effects of inflation have been removed. That increase is attributable in about equal measure to the higher estimated costs of

13. Department of the Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2024* (March 2023), p. 8, https://tinyurl.com/37bkemd9.

shipbuilding programs in the service's latest plan and to increases in the quantity of ships that the Navy would purchase.

CBO estimated the costs of the Navy's 2025 plan using its own models and assumptions.[14] On average, CBO's estimates of annual costs for new-ship construction over the 30-year period are higher than the Navy's estimates by $5.7 billion, or 19 percent. Other activities that the Navy would need to fund from its budget account for ship construction add $4.0 billion per year to projected costs. Thus, using the service's estimates for new-ship construction costs and the agency's own estimates for other costs, CBO estimates that the total average annual cost for all activities typically funded from the Navy's shipbuilding account would be $34.1 billion, or between 6 percent and 14 more percent than the estimated total average annual costs under the alternatives in the 2024 plan. CBO's estimates for all items in the shipbuilding account are 17 percent more than the Navy's estimates.

The Navy's Estimates

The Navy's 2025 plan delineates projected shipbuilding procurements, retirements, and inventories. The plan also emphasizes (as have recent shipbuilding plans) the importance of providing steady work to the shipbuilding industry as a way to prevent boom-and-bust cycles, which could jeopardize the financial health of some shipyards and secondary suppliers and create uncertainty about the cost of shipbuilding in the future.[15] The quantities of new ships purchased and the delivery times laid out in the Navy's 2025 plan are predicated on the assumption that the production delays that several shipyards are currently experiencing will be resolved in the next decade, leading to the steady and on-time delivery of new ships in the future.

Nevertheless, the Navy's shipbuilding plan continues to be affected by cost growth in shipbuilding programs already underway. The Navy has substantially increased the amount of money that it has budgeted to complete ships that were authorized in previous years. In the President's 2024 budget request, cost overruns for 2024 to 2028 totaled $3.4 billion in nominal dollars. In the 2025 request, cost overruns for those years increased to $10.4 billion and an additional $1.0 billion was requested for cost overruns anticipated in 2029 (see Table 3, top panel).[16] The Navy has also increased its cost estimates for several major shipbuilding programs: Unit cost estimates for attack submarines and destroyers are more than 20 percent higher than they were over the past five years (see Table 3, bottom panel). Increased costs in the Virginia and Arleigh Burke class programs appear to have contributed to higher cost estimates for the SSN(X) next-generation attack submarines and the DDG(X) next-generation destroyer. Those higher costs are likely to affect the Navy's estimates for Columbia class ballistic missile submarines as well, although the 2025 plan does not yet reflect them.

New-Ship Construction Costs. According to estimates in the Navy's 2025 plan, submarine construction would consume the lion's share of shipbuilding funds over the next 30 years—about half of the amount needed for new-ship construction. Other than aircraft carriers, submarines are the most expensive ships that the Navy buys, and it plans to buy many of them for its future fleet. The shift in the 2025 plan to buying fewer future next-generation SSN(X) submarines and more Virginia class submarines did not significantly change the allocation of resources from what it was under the 2024 plan. The focus on submarines reflects the importance of undersea warfare in the service's evolving naval strategy and vision for its future fleet.

According to the Navy, submarines would account for 49 percent of the cost of new-ship construction under the 2025 plan, or an average of about $14.7 billion per year. That amount is comparable to the amounts under Alternatives 2 and 3 in the Navy's 2024 plan. The second largest category of spending would be surface combatants at 26 percent of the total amount for new-ship

14. For more information about how the agency estimates shipbuilding costs, see Congressional Budget Office, *How CBO Estimates the Costs of New Ships* (April 2018), www.cbo.gov/publication/53785.

15. Department of the Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2025* (March 2024), pp. 12–13, https://tinyurl.com/mrwdcz35. Detailed cost projections are provided in Appendix 6 of the report; that appendix is a limited-distribution document that the Navy provides to CBO.

16. The 2025 request amount includes an additional $1.95 billion for the Virginia class submarines authorized in 2024 and $1.53 billion for the one requested in 2025 that the administration has asked for as an anomaly in the 2025 continuing resolution; that money was not included in 2025 budget request submitted in March 2024.

Table 3.

Cost Overruns and Unit Cost Growth in Selected Navy Shipbuilding Programs

Cost overruns under the 2024 and 2025 budget requests for ships authorized in previous years (millions of dollars)

	Funding for 2024 to 2028 under the 2024 budget request	Funding for 2024 to 2028 under the 2025 budget request	Funding for 2029 under the 2025 budget request
Ford class CVN-78 aircraft carrier	625	861	0
Nimitz class CVN-68 nuclear refueling and overhaul	212	944	0
Virginia class SSN-774 attack submarine	967	4,644[a]	849
Arleigh Burke class DDG-51 guided missile destroyer	780	2,629[b]	113
Freedom class LCS-1 littoral combat ship	23	71	0
Constellation class FFG-62 guided missile frigate	0	43	0
San Antonio class LPD-17 amphibious transport dock	60	126	0
America class LHA-6 amphibious assault ship	72	129	0
John Lewis class T-AO-205 oiler	168	373	0
Navajo T-ATS-6 towing, salvage, and rescue ship	36	52	0
T-AGOS SURTASS ocean surveillance ship	355	355	0
LCAC ship-to-shore connector	107	107	0
T-AGS oceanographic survey ship	12	23	0
Total	**3,416**	**10,357**	**962**

Percentage increase in unit price for selected programs over the past five years[c]

Nimitz class CVN-68 nuclear refueling and overhaul	25
Virginia class SSN-774 attack submarine	22
Arleigh Burke class DDG-51 guided missile destroyer	26
John Lewis class T-AO-205 oiler	34
Navajo T-ATS-6 towing, salvage, and rescue ship	22

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

LCAC = landing craft air cushion; SURTASS = surveillance towed array sensor system.

a. For the Virginia class SSN-774, CBO included $3.48 billion in the Administration's request for an anomaly in the fiscal year 2025 continuing resolution, which represents further cost growth in the submarines requested for fiscal year 2024 and 2025 after the President's 2025 budget was submitted.

b. For the Arleigh Burke class DDG-51, CBO included $1.68 billion that the Navy requested as "subsequent full-year funding" but that it is using to pay to complete ships authorized before 2025.

c. Unit price increases are shown for programs whose unit prices in the 2025 Future Years Defense Program are substantially higher than they were over the past five years after the effects of inflation were removed.

construction—an average of $8 billion per year. Aircraft carriers account for 11 percent of total shipbuilding costs; amphibious ships, 9 percent; and combat logistics and support ships, 5 percent.

Total Shipbuilding Costs. As in all the Navy's previous shipbuilding plans, estimates in its 2025 plan do not include certain costs that would need to be paid from its budget account for shipbuilding. Specifically, the estimates exclude the costs of refueling nuclear-powered aircraft carriers, purchasing ships that are not part of the battle force (such as oceanographic survey ships or sealift ships), constructing large unmanned surface vessels, conducting outfitting and postdelivery activities (including purchasing the equipment and many small tools that are needed to operate a ship but that are not necessarily provided by the shipyard when the ship is built), and other smaller items. In addition, the Navy's estimates do not include the $5.7 billion needed (because of cost overruns or other increased expenses) to complete ships that were authorized before 2025. Including all those costs, as estimated by CBO, would add an average of $4.0 billion annually to the Navy's estimates. Combining the estimates in the Navy's 2025 shipbuilding plan with the agency's own estimates of the additional costs that the service did not account for, CBO projects that the total costs for all activities funded through the Navy's shipbuilding account would average $34.1 billion per year under the service's latest plan.

CBO's Estimates

According to CBO's estimates, the full cost of the 2025 shipbuilding plan (including new-ship construction, refueling of aircraft carriers, and other items) would average $40.1 billion per year over the 2025–2054 period. That amount is 17 percent (or $6.0 billion) more than the Navy's estimate as adjusted by CBO to include the additional costs beyond new-ship construction. It is also 46 percent more than the average annual funding that the Navy has received over the past five years (see Figure 7).[17]

CBO's estimates for the 2025 plan are 8 percent to 16 percent greater than its estimates for each of the three alternatives in the 2024 plan after the effects of inflation have been removed. CBO's estimates (like the Navy's) reflect the expectation that the production delays that several shipyards are currently experiencing would be resolved over the next 15 years, leading to the steady and on-time delivery of new ships. If that did not happen, costs for new ships could be higher than the Navy and CBO estimate, and the delivery of new ships would take longer than anticipated in the 2025 plan.

The gap between CBO's and the Navy's estimates widens over time. CBO's estimate of total shipbuilding costs over the 2025–2034 period is 15 percent higher than the Navy's, and the agency's estimate for the 2045–2054 period is 24 percent higher (see Table 4). The two sets of estimates are closer in the near term because most of the ships that the Navy plans to buy then are already under construction and their costs are reasonably well known. In the medium term, the Navy would still buy many of the same classes of ships that it would buy in the near term, so the difference between the estimates remains about the same. But CBO and the Navy made different assumptions about the size and capabilities of future ships, which led to divergent cost estimates for the far term. Over the entire 30-year period, two large programs, in particular—the new attack submarine and the next-generation destroyer—account for about one-third of the difference between the Navy's and CBO's cost estimates.

A portion of the difference in estimates over time is attributable to CBO's treatment of the cost growth in shipbuilding in excess of inflation in the economy as a whole. When estimating the cost to build a ship in the future that is identical to one already built, the Navy reports the future cost of capabilities purchased as being the same as the cost today. By contrast, when CBO projects the cost to build the same ship in the future, it accounts for the growth in the costs of labor and materials used in building naval ships (that is, shipbuilding inflation) as well as the growth in the costs of other goods and services in the economy. CBO regards the difference between shipbuilding inflation and overall inflation as real growth in the constant-dollar cost of building naval ships.[18]

For this report, CBO used the historical difference between shipbuilding inflation and inflation in the overall economy, as measured by the gross domestic product price index, to calculate the growth in its constant-dollar estimates of shipbuilding programs. From 1994 to 2023, annual shipbuilding inflation outpaced annual inflation in the economy by an average of about 1 percentage point. CBO's projections of shipbuilding costs reflect the assumption that that difference in rates would continue from 2025 to 2054. As a result, the agency estimated that a ship that costs $2.5 billion to build in 2024 would cost $3.4 billion (in 2024 dollars) in 2054. (Shipbuilding costs cannot, however, continue to grow faster than the costs of goods and services in the overall economy indefinitely. If that occurred, the price of ships would eventually outstrip the Navy's ability to pay for even a small number of them unless its shipbuilding budget grew commensurately with shipbuilding costs.)

Growth in the Navy's Total Annual Budget

The larger fleet envisioned in the 2025 plan would increase costs of other parts of the Navy's budget as the fleet grew. Fully purchasing, operating, and maintaining that larger fleet would, in CBO's estimation, increase the Navy's total annual budget by about one-third over the next three decades, from $255 billion today to about $340 billion (in 2024 dollars) in 2054. Shipbuilding

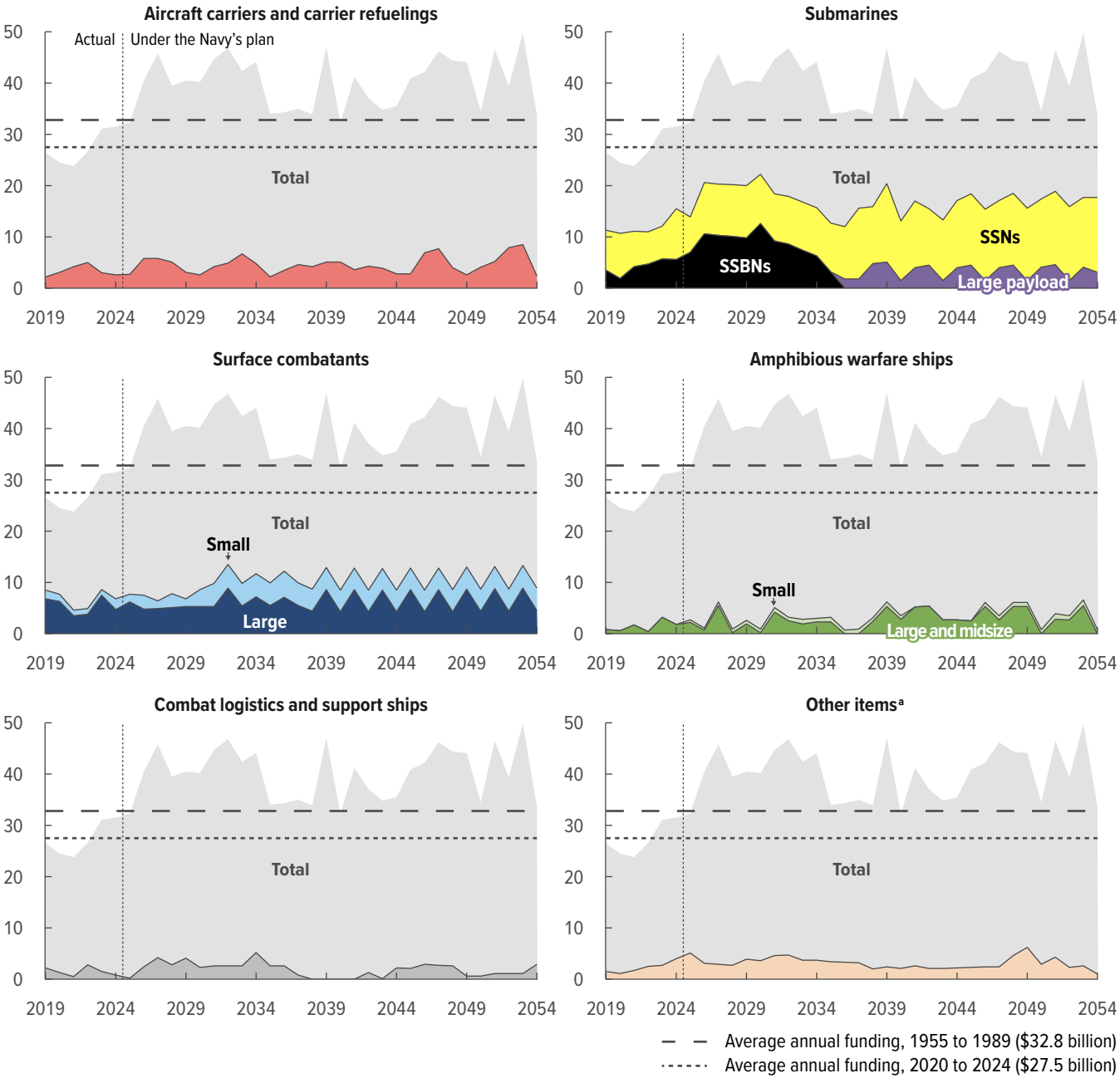
17. The Navy's shipbuilding costs over the last 5 years have been significantly higher than the average over the past 30 years ($20.9 billion in 2024 dollars), when the Navy reduced its fleet after the end of the Cold War. As another point of comparison, shipbuilding appropriations averaged $32.8 billion (in 2024 dollars) during the Cold War years of 1955 to 1989, a period of intense competition between the United States and the Soviet Union in which the Navy faced challenges that look increasingly similar to those it expects to face over the next two decades. CBO's historical data for shipbuilding budgets begins with 1955, and 1989, the year the Berlin Wall fell, is widely regarded as the end of the Cold War.

18. For more information, see Congressional Budget Office, *How CBO Estimates the Cost of New Ships* (April 2018), www.cbo.gov/publication/53785, and *The Shipbuilding Composite Index and Its Rates of Change Compared With Economywide Inflation Rates* (April 2024), www.cbo.gov/publication/59026.

Figure 7.

CBO's Estimates of Annual Shipbuilding Costs Under the Navy's 2025 Plan

Billions of 2024 dollars



Over the next three decades, CBO estimates, the Navy's annual shipbuilding budget would need to be an average of more than 40 percent larger than the average amount of annual funding from 2020 to 2024.

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

SSBN = ballistic missile submarine; SSN = attack submarine.

a. Includes funding for purchasing ships that are not part of the battle force (such as oceanographic survey ships or sealift ships), constructing large unmanned surface vessels, conducting outfitting and postdelivery activities (including purchasing the equipment and many small tools that are needed to operate a ship but that are not necessarily provided by the shipyard when the ship is built), and other smaller items.

Table 4.

Average Annual Shipbuilding Costs Under the Navy's 2025 Plan

Billions of 2024 dollars

	Near term, 2025 to 2034	Medium term, 2035 to 2044	Far term, 2045 to 2054	30-year average
		Navy's estimates		
New-ship construction	31.6	29.1	29.7	30.1
New-ship construction and all other items in the Navy's shipbuilding accounts[a]	36.3	32.2	33.9	34.1
		CBO's estimates		
New-ship construction	36.6	33.2	37.6	35.8
New-ship construction and all other items in the Navy's shipbuilding accounts	41.7	36.5	42.1	40.1
		Difference between CBO's and the Navy's estimates (percent)		
New-ship construction	16	14	27	19
New-ship construction and all other items in the Navy's shipbuilding accounts	15	14	24	17

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

a. These amounts reflect the Navy's estimates of the cost of new-ship construction and of the amounts needed to complete ships authorized in previous years, as well as CBO's estimates of the costs of refueling nuclear-powered aircraft carriers, purchasing ships that are not part of the battle force (such as oceanographic survey ships and sealift ships), constructing large unmanned surface vessels, conducting outfitting and postdelivery activities (including purchasing the equipment and many small tools that are needed to operate a ship but that are not necessarily provided by the shipyard when the ship is built), and other smaller items.

costs would account for about 11 percent of the Navy's total budget for 2054.[19] By contrast, operating and manning the larger fleet under the 2025 plan would represent the largest components of the Navy's budget, together accounting for about 50 percent of the total.

Costs would remain relatively flat in the 2020s as the number of ships in the fleet declined and as the Navy retired ships that were more expensive to operate than the new ones it would commission. But in the 2030s and beyond, costs would increase, and in most years, those costs would be higher than they would have been under the alternatives in the 2024 plan because the 2025 plan calls for a larger fleet (see Figure 8).

To estimate growth in the Navy's total budget, CBO independently developed estimates for each of the service's budget accounts. Specifically, to estimate the costs associated with the shipbuilding and aircraft procurement accounts, CBO first estimated the cost of each ship and aircraft procurement program.[20] The agency then developed estimates for other items purchased and activities funded through those accounts—and through the remaining procurement accounts—on the basis of historical relationships between the shipbuilding and aircraft procurement accounts and those other procurement accounts.

CBO estimated costs for operation and maintenance accounts on the basis of historical relationships between those costs and the size of the Navy's fleet, as measured by its total full-load displacement for surface ships and submerged displacement for submarines. Estimates for the Navy's military personnel accounts were based on the historical relationship between the total number of sailors serving on ships and the total number of service members. Estimates for Marine Corps military personnel were based on historical averages adjusted for the size of the Corps, which is set by law. Estimates for the remaining accounts, such as the one for military construction, were based on historical averages.

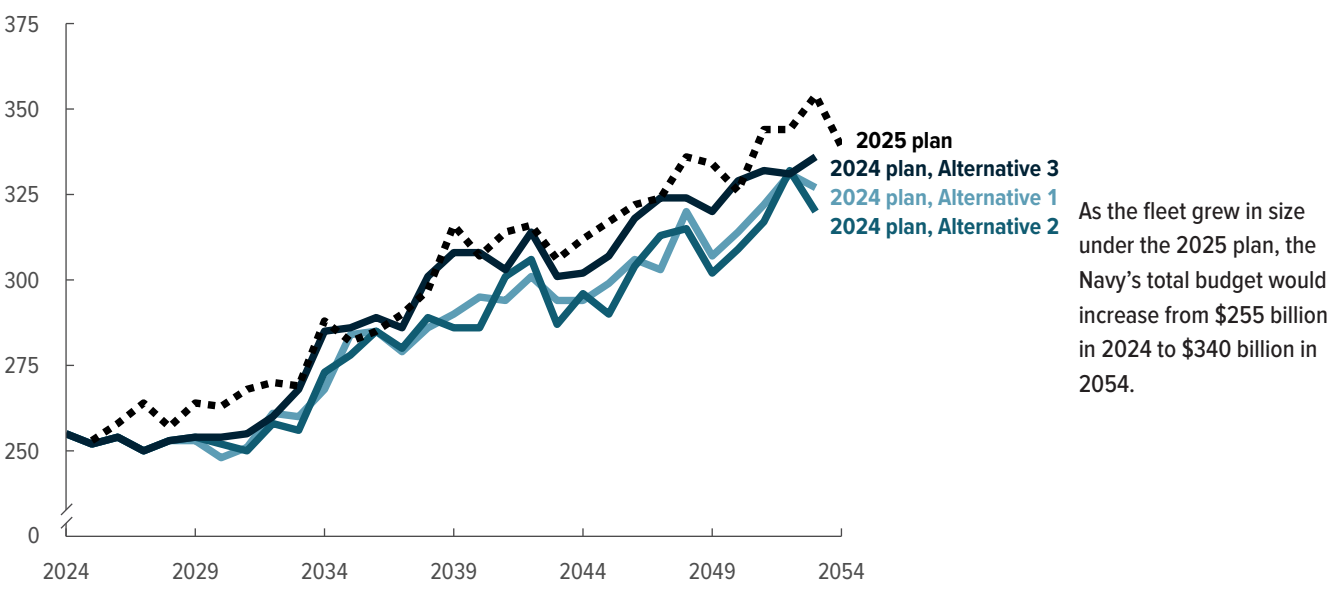
CBO adjusted its estimates to vary with changes in the Navy's fleet over time (specifically, changes in ship and aircraft procurements, displacements, and crew sizes). In addition, costs paid from most of the Navy's accounts have grown faster than inflation in the economy as a whole; those differences are included as real growth in the estimates.

19. Shipbuilding budgets can vary from year to year. In 2053, for example, shipbuilding would account for 14 percent of the Navy's total budget.

20. The estimates for the cost of new aircraft are drawn from and consistent with those published in Congressional Budget Office, *The Cost of Replacing Today's Naval Aviation Fleet* (January 2020), www.cbo.gov/publication/55949.

Figure 8.

CBO's Estimate of the Navy's Total Budget Under Its 2024 and 2025 Plans



Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

Measures of Capability

Separate from its new force structure assessment, the Navy assessed its shipbuilding plan using several measures of capability. Specifically, it counted the number of each of the following:

- Vertical launch missile cells on surface ships,
- Vertical launch missile cells on submarines,
- Torpedoes on attack submarines, and
- Tactical aircraft sorties capable of being launched from the carrier force per day.

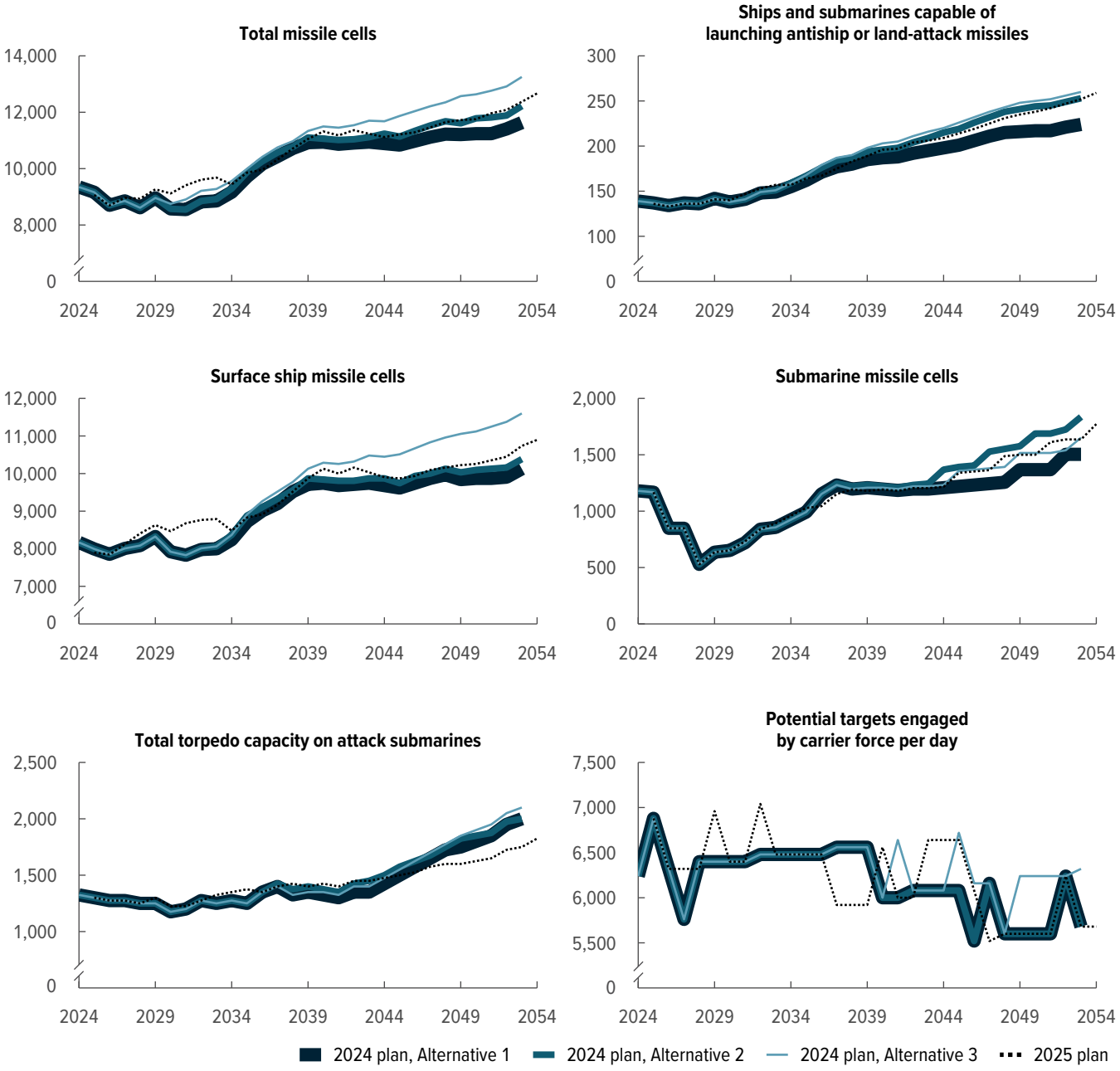
Although those four metrics measure the *lethality* of the fleet, none of them address the *distribution* of its firepower—an important element of the Navy's Distributed Maritime Operations concept. Thus, to compare the Navy's 2025 plan with the alternatives in the 2024 plan, CBO also counted the number of ships capable of firing antiship or land-attack missiles. The agency calculated the total missile capability of the Navy's fleet by combining the vertical launch capability of surface ships and that of submarines.

Compared with the three alternatives in the 2024 plan, the 2025 plan would reduce both the lethality of the fleet (as measured in part by the total number of missile cells) and the distribution of its firepower (as measured by the number of ships capable of firing antiship and antiair missiles) through 2040. Those reductions are largely due to delays across several shipbuilding programs—most notably in the construction of the Navy's new frigate—and to the service's buying fewer LUSVs than it would have purchased under Alternative 2 or Alternative 3 in the 2024 plan. However, with the service-life extensions of 3 cruisers and 12 destroyers that were announced in October and November, the Navy can offset the reductions, at least temporarily. Indeed, from 2027 to 2033, the Navy would now carry more missile cells than it would have carried under any of the 2024 plan's alternatives, though it would then have fewer missile cells than it would have had under one or more of the 2024 alternatives through the end of the 2030s (see Figure 9).[21] By the 2040s, the 2025 plan would produce a fleet with more missile cells than the 2024 plan's Alternative 1 or, to a lesser extent, Alternative 2. Compared with

21. Missile cells refer to the vertical launch system (VLS) cells carried by the Navy's surface combatants, submarines, or unmanned systems. Using the number of VLS cells in the fleet as a measure of lethality reflects an assumption that the Navy has sufficient munitions to fill those cells and that the ships carrying them have a reasonable prospect of being effective in performing their missions. In fact, the Navy is planning to increase its missile purchases. For a more thorough discussion of the advantages and disadvantages of using VLS cells as a measure of capability, see Congressional Budget Office, *Comparing a 355-Ship Fleet With Smaller Naval Forces* (March 2018), p. 11, www.cbo.gov/publication/53637.

Figure 9.

Measures of Naval Capability Under the Navy's 2024 and 2025 Plans



Including the service life extensions that the Navy announced in October and November 2024, the Navy's 2025 plan provides capability that is similar to what it would have been under some of the alternatives in the Navy's 2024 plan. Starting in the mid-2040s, the 2025 plan provides less torpedo capacity than the 2024 plan.

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

Alternative 3, the 2025 plan calls for fewer missile cells after 2034. The Navy would also have fewer ships capable of firing missiles under the 2025 plan than it would have had under Alternative 2 or Alternative 3, because the current plan calls for 20 fewer LUSVs than those alternatives.

Like several previous plans, the 2025 plan would reduce some capabilities in the near term. Specifically, the missile capacity on the Navy's surface ships would decline slightly over the next three years, although it would have declined much more without the aforementioned service-life extensions. In addition, undersea missile capacity would decline as the Navy's 4 guided missile submarines, each of which can carry up to 154 land-attack missiles, were retired in the mid-2020s. That capability is set to be replaced by the larger missile complement of Virginia class attack submarines modified to carry up to 40 missiles each. (The Virginia class submarines in the fleet today carry 12 missiles.) However, the first of those submarines would not enter the fleet until November 2028. By 2054, the fleet would have 19 modified Virginia class submarines. Overall, after 2030, the missile capacity of the fleet would grow again.

The other metrics illustrate more specific capabilities of the fleet. Under the 2025 plan, the number of missile cells on surface ships in 2054 would be substantially less than it would have been under Alternative 3 in the 2024 plan, but the number of missile cells on submarines that year would be only slightly less than it would have been under Alternative 2. The torpedo room capacity in 2054 under the 2025 plan would, however, be substantially less than it would have been under any of the 2024 plan's alternatives. That is largely the result of the 2025 plan's delaying the SSN(X) by five years and reducing the purchases of those ships. (The SSN(X) is intended to have about double the torpedo room capacity of the Virginia class submarines.) Still, torpedo room capacity in 2054 under the 2025 plan would be about 40 percent greater than it is today.

Finally, the number of targets that the carrier force could attack each day is not much different under the 2025 plan than it would have been under the alternatives in the 2024 plan. The differences over the next 15 years are the result of some carriers' having a longer service life under the 2025 plan. In the later years of the plan, the 2025 plan would provide a capability similar to what would have been provided under the alternatives in the 2024 plan. Although the Ford class carriers are expected to be capable of launching more daily aircraft sorties than Nimitz class carriers can, the carrier force would decline to 9 or 10 ships under the 2025 plan by the 2040s, as it would have under the 2024 plan. As a result, the overall capability of the carrier force would not change much or would decline only slightly by 2054.

The Navy's and CBO's metrics reflect actual capability only to the extent that the Navy—and the Department of Defense more broadly—has sufficient munition inventories to fully arm its ships and planes. The Navy and the other services recognize that and are spending more to increase munition production. Conflicts in Ukraine and the Red Sea have shown that modern military operations consume large quantities of offensive and defensive weapons.

Implications for the Shipbuilding Industrial Base

The Navy's 2025 shipbuilding plan poses a challenge to the nation's shipbuilders. Although hundreds, if not thousands, of companies are involved in building ships and components for ships, the Navy's ships are built primarily by seven shipyards:

- Austal Shipbuilding in Mobile, Alabama, which is owned by Austal Limited of Henderson, Western Australia, and builds littoral combat ships, Coast Guard cutters, small support ships, and parts of submarines.
- Bath Iron Works in Bath, Maine, which is owned by General Dynamics of Reston, Virginia, and builds destroyers.
- Fincantieri Marinette Marine in Marinette, Wisconsin, which is owned by Fincantieri of Trieste, Italy, and builds the Navy's new Constellation class frigate; and previously built littoral combat ships.
- General Dynamics Electric Boat in Groton, Connecticut, which is owned by General Dynamics and builds nuclear-powered ballistic missile and attack submarines.
- Ingalls Shipbuilding of Pascagoula, Mississippi, which is owned by Huntington Ingalls Industries of Newport News, Virginia, and builds large and medium-sized amphibious warfare ships and destroyers.
- National Steel and Shipbuilding Company, or NASSCO, in San Diego, California, which is owned by General Dynamics and builds large combat logistics and support ships.

- Newport News Shipbuilding in Newport News, Virginia, which is owned by Huntington Ingalls Industries and builds nuclear-powered aircraft carriers, ballistic missile submarines, and attack submarines.

Currently, many Navy shipbuilding programs are experiencing schedule delays and cost growth. In early 2024, the Navy conducted a shipbuilding review that showed many programs were behind schedule. The review specifically highlighted the following ships, which have been delayed by varying amounts:

- The Ford class aircraft carrier CVN-80, the *Enterprise*, 18 to 26 months;
- The first Columbia class ballistic missile submarine, 12 to 16 months;
- The Virginia class attack submarines, 24 to 36 months; and
- The first Constellation class frigate, 36 months.

The lead T-AGOS ocean surveillance ship is also delayed, but the Navy did not specify for how long. The ship was first authorized by the Congress in 2022, and its design is not yet complete, nor has construction begun.

The review indicated that although amphibious ships and DDG-51 destroyers were also "late to contract," the construction programs for those ships were considered stable and in line with their program managers' current estimates of their schedules. Nevertheless, according to CBO's analysis of the Navy's budget documents, delays in the DDG-51 class destroyers have grown by 18 months over the past two years.

From a broader perspective, whereas the shipbuilding industry took 5 to 6 years to build destroyers and submarines in the 2000s, under current schedules, the shipyards now need 8 to 9 years, on average, to build those ships. Nimitz class aircraft carriers took 7 to 8 years to build; Ford class carriers, by comparison, are taking 10 to 11 years to build on their current schedules. Similar, though less pronounced, comparisons could be made for the production schedules of amphibious warfare and combat logistics.

Of the many reasons for the increase in the amount of time it takes to build naval ships—including incomplete designs, changes sought by the Navy after construction begins, and, for more recent ships, effects of the pandemic—work force challenges probably loom the largest. Nearly all the major shipyards are having difficulty hiring and retaining workers, and a generation of longtime shipyard workers has retired or soon will. As a result, the workforces in many of those yards are, overall, less experienced than they were in the past.

Furthermore, fewer suppliers produce parts and components for naval ships today than in the past. For some ships, such as the Navy's submarines, approximately 70 percent of the suppliers of critical components have no competitors. In such cases, a single supplier of a critical component could disrupt ship construction if it encountered difficulties in production. Also, if the Navy wanted to purchase more ships than it currently plans to purchase, it could be hard for the supplier to increase production.

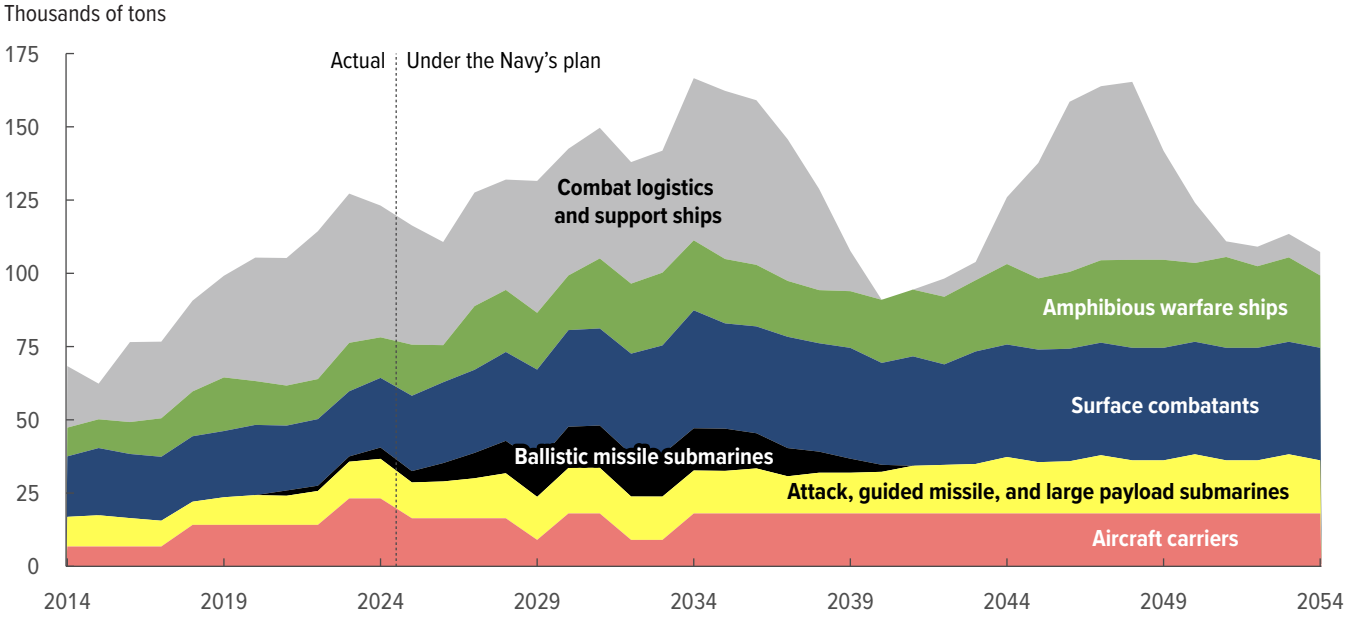
In addition to those challenges, the amount of naval tonnage that is under construction has increased substantially (see Figure 10). Since 2014, that amount has grown by 80 percent, from 68,000 tons to 123,000 tons. Excluding combat logistics and support ships, which tend to be large but not necessarily difficult to build, combat ship tonnage has increased by 65 percent, from 47,000 tons to 78,000 tons. Combined with the conditions in the shipbuilding industry, those increases have left the nation's shipyards struggling to build the ships that the Navy has ordered.

Under the Navy's 2025 plan, the amount of naval tonnage under construction over the next three decades would increase further. Not all shipyards would be affected in the same way because the Navy's demand for different types of ships would vary over the next three decades. Carrier construction would be fairly consistent and steady through the Navy's planning horizon. But construction at shipyards that build the remaining categories of combat ships—submarines, surface combatants, and amphibious warfare ships—would increase significantly: The average amount of tonnage under construction from 2030 to 2054 would be 50 percent greater than the amount being built today.

The yards that build combat logistics and support ships would face a particularly uneven workload. Under the 2025 plan, they would have a substantial amount of work through the mid-2030s as the Navy built out its large T-AO fleet oiler program and began construction

Figure 10.

Amount of Displacement Tonnage Under Construction Under the Navy's 2025 Plan



Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

of a new class of next-generation logistics ships. But then, for a period of about six years, the Navy would order very few of those types of ships. After that lull, the shipyards would experience a steep ramp-up as the Navy began replacing its class of T-AKE dry cargo ships.

Smoothing out the building profile of the combat logistics and support ships could eliminate the boom-and-bust cycle that that sector faces—and it could be accomplished relatively easily. But addressing the growth in and sustained level of combat ship production would be more challenging.

Contracting with additional shipyards to build the Navy's combat ships might help the service manage the increase in production, but doing so would come with its own concerns. For example, to increase the rate of frigate production to 3 ships per year, as the Navy plans to do by 2031, the service would need to contract with a second shipbuilder. The current builder, Fincantieri Marinette Marine, is running three years or more behind on the delivery of the first ship and does not yet have a workforce large enough to build more than 1 ship per year. Even if it could overcome its current problems in recruiting and retaining its workforce to build the ships that the Navy has already ordered, the shipyard does not have the physical infrastructure to build more than 2 ships per year.[22] New to the program and faced with the difficult challenge of building a ship it has never built before, a second shipyard would need time to learn how to build the frigate. Any new shipyard engaged to build ships for the Navy would face a similarly steep learning curve, so delays could be widespread if the Navy contracted with new shipyards for some of its shipbuilding programs.

The increases in workload and complexity implied by the Navy's 2025 plan for the submarine industrial base, in particular, are considerable. Not only would the shipyards produce a greater amount of submarine tonnage than they do today, but they would also produce a wider variety of submarines. The amount of submarine tonnage under construction has grown by more than 70 percent since 2014. Under the 2025 plan, it would grow by an

22. Tony Capaccio, "Worker Shortage Hobbles Construction of U.S. Navy Frigates," gCaptain.com (April 12, 2024), https://tinyurl.com/4zm9ssky; Megan Eckstein, "Frigate Program Delayed as Shipyard Is a 'Few Hundred' Workers Short," *Defense News* (January 11, 2024), https://tinyurl.com/ypm5mma2. For an overview of the FFG-62 program, see Ronald O'Rourke, *Navy Constellation (FFG-62) Class Frigate Program: Background and Issues for Congress,* Report R44972, version 125 (Congressional Research Service, November 20, 2024), https://tinyurl.com/4xyk6rkn.

additional 70 percent by 2031—in other words, it would have tripled in 17 years.

Moreover, the Navy currently takes about 9 years to build a new submarine. That means that for 10 years in the 2030s and 2040s, four types of submarines (including ballistic missile submarines and large payload submarines) would be in production. The Navy is currently experiencing substantial cost overruns, construction delays, and missed delivery dates with three types of submarines in production (Columbia class ballistic missile submarines, Virginia class attack submarines, and Virginia class attack submarines with Virginia payload modules). Adding new classes of ships to the pipeline could tax the ability of the shipyards and the Navy to manage production even more.[23]

To address those challenges, the Navy plans to invest a total of about $10 billion (some of which it has already invested) in the new-construction portion of the submarine industrial base. (The service intends to invest an additional $8 billion to support the maintenance portion.) That money will go to almost every activity associated with building submarines: the recruitment, retention, and training of shipyard workers; infrastructure development; supplier development; improvement of manufacturing methods; and support for outsourcing parts of submarine construction to other shipyards that have the ability and capacity to do the work. (The Navy has also provided some money to the nation's surface combatant builders, though that amount represents just a fraction of the amounts it plans to invest in submarine construction.)

Whether those efforts will lead to an increase in the production of attack submarines remains to be seen. For the past two years, the rate of production has averaged only 1.2 submarines per year, even though the Navy has been purchasing them at a rate of 2.0 per year for the past decade.

In addition, a larger fleet would also place greater demands on the shipyards that conduct maintenance on the Navy's ships. The nation's four public shipyards perform nearly all the maintenance on the Navy's nuclear-powered aircraft carriers and submarines, and they have struggled to meet the Navy's goals, particularly those for the attack submarine force. The Navy would like to have no more than 20 percent of its SSNs in maintenance or awaiting maintenance. Currently, 33 percent of the service's SSN fleet is undergoing or awaiting maintenance—the largest portion in any year since 2008 other than 2021, when it was 37 percent.[24] Surface ship maintenance has also experienced delays and cost growth in recent years, and the Navy will also need to address those issues as it seeks to build up its surface combatant force.[25] Unless the Navy reduces those maintenance delays, the number of ships that it will be able to deploy will be smaller than the number suggested by the size of the future fleet. Put another way, reducing maintenance delays would increase the effective size of the fleet.

Plans for Specific Ship Programs

To project the costs of implementing the Navy's 2025 shipbuilding plan, CBO estimated the cost of each ship the Navy intends to purchase from 2025 to 2054. For ships under construction, the estimates were based in part on the Navy's data about actual costs. For ships yet to be built, CBO based the estimates primarily on information about the cost-to-weight ratio of similar ships acquired in the past.

Specifically, the agency used the cost per thousand tons of lightship displacement, which is the weight of the water a ship displaces without its crew, stores, ammunition, fuel, or other liquids. CBO then adjusted its estimates to reflect the effects of rate and learning. Rate is the reduction in average overhead costs per ship that occurs as a shipyard builds multiple ships of the same type simultaneously; learning refers to the efficiencies

23. For further background, see Anthony Capaccio, "New U.S. Nuclear-Missile Submarines Hobbled by Billions in Growing Costs and Delays," *Bloomberg* (June 8, 2022), https://tinyurl.com/bddkjtdj; Megan Eckstein, "Submarine Industrial Base Under Strain as Virginia-Class Parts Wearing Out Early; Implications for Columbia-Class," *USNI News* (April 20, 2021), https://tinyurl.com/ycf2hfz2; and Congressional Budget Office, *The Capacity of the Navy's Shipyards to Maintain Its Submarines* (March 2021), www.cbo.gov/publication/57026.

24. Ronald O'Rourke, *Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress*, Report R41129, version 277 (Congressional Research Service, September 30, 2024), p. 7, https://go.usa.gov/xSvDe. See also Congressional Budget Office, *The Capacity of the Nation's Shipyards to Maintain Its Submarines* (March 2021), www.cbo.gov/publication/57026.

25. CBO is currently working on a report about maintenance delays and labor overruns for conventional ships that it expects to release in 2025.

that shipyards gain as they produce additional ships of a given type. CBO applied those effects to the estimated cost of the first ship of a class to estimate the costs for all subsequent ships of that class. Thus, CBO's estimate of the cost of the lead ship of a class drove its estimate of the costs of subsequent ships of that class.[26]

For ships that have yet to be designed, CBO developed its estimates on the basis of the ships' likely size and capabilities. All cost estimates for specific ships exclude outfitting and postdelivery costs (included as "other items" in estimates of total costs), which typically add about 3 percent to a ship's cost. CBO's estimates also reflect the expectation that costs of labor and materials in the naval shipbuilding industry would continue to grow at a rate that is 1 percentage point faster than prices in the economy as a whole, as they have for the past several decades.

Aircraft Carriers

Over the 2025–2054 period, the Navy would buy 6 CVN-78 Ford class aircraft carriers under the 2025 plan. To project the costs of those ships, CBO considered the costs of the first 4 carriers of the class, which have already received some or all of their funding.

The first ship of the class, the USS *Gerald R. Ford* (CVN-78), cost $13.3 billion in nominal dollars appropriated from 2001 to 2021.[27] CBO used the Navy's inflation index for naval shipbuilding to convert that amount to $19.6 billion (in 2024 dollars)—which is 27 percent more than the Navy's corresponding estimate when the ship was first authorized in 2008.[28] Neither the Navy's nor CBO's estimate includes the $6 billion in research and development costs that apply to the entire class of ships. Because construction of the lead ship is finished, CBO used the final cost for that ship to estimate the cost of successive ships of the class.

The next carrier slated for delivery, the *John F. Kennedy* (CVN-79), is expected to be completed in 2025—one year later than scheduled under the 2024 plan—and deployed in 2027 or later. The Congress first appropriated advance procurement funding for the ship in 2007 and officially authorized its construction in 2013. As a result of cost overruns, the planned appropriations for the ship are expected to be completed in 2025. The Navy estimates that the ship will cost $15.7 billion (in 2024 dollars, or $12.9 billion in nominal dollars). CBO's estimate for the ship is almost the same: $15.7 billion (in 2024 dollars).[29]

In 2018, the Congress authorized the third carrier of the class, the *Enterprise* (CVN-80). Appropriations for that ship began in 2016 and are expected to be complete by 2027. In 2019, the Congress authorized the Navy to purchase materials jointly for the CVN-80 and the next ship, the CVN-81, to reduce costs by buying in greater quantities. It also authorized the Navy to change the sequencing involved in building the ships to gain greater efficiencies in their construction. Although that legislative action is known as a two-carrier buy, the ships will not be built at exactly the same time. Purchasing the two ships together rather than buying them separately accelerated the CVN-81's construction schedule by only one year.

In its 2025 budget documents, the Navy estimated that under the two-carrier buy, the CVN-80 would cost $14.0 billion (in 2024 dollars, or $13.5 billion in nominal dollars)—7 percent more than the service's estimate in the 2024 budget. CBO is less certain than the Navy is about the savings the two-carrier purchase will generate. On the basis of the costs of the two previous ships, CBO estimates that the CVN-80 will cost $14.8 billion (in 2024 dollars), about 6 percent more than the Navy's estimate. The Navy estimates that the CVN-81 will cost $13.4 billion (in 2024 dollars, or $14.0 billion in nominal dollars). By contrast, CBO estimates that the CVN-81 will cost $14.2 billion (in 2024 dollars), which is also about 6 percent more than the Navy's estimate. In its

26. For an explanation of how CBO combines the different factors in its cost model, as well as a detailed example of that process applied to a particular ship, see Congressional Budget Office, *How CBO Estimates the Costs of New Ships* (April 2018), www.cbo.gov/publication/53785.

27. That amount does not include costs paid from other Navy accounts to make the ship operational after it was commissioned.

28. For more information about calculating the costs of aircraft carriers, see Congressional Budget Office, *Inflation in the Costs of Building Aircraft Carriers* (April 2016), www.cbo.gov/publication/51469.

29. CBO's estimate is $75 million less than the Navy's, but both estimates round to $15.7 billion. Those two estimates are much closer to each other than they have been in years past, primarily because of cost growth in the carrier program. In the past, CBO's estimate was much higher than the Navy's. In its report on the fiscal year 2020 shipbuilding plan, for example, CBO's estimate was 9 percent higher than the Navy's. See Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2020 Shipbuilding Plan* (October 2019), p. 18, www.cbo.gov/publication/55685.

Table 5.

Comparison of the Navy's and CBO's Estimates of the Construction Costs of Major New Ships Under the Navy's 2025 Plan

Billion of 2024 dollars

Ship class	Number of ships purchased	Total costs per class over the 2025–2054 period		Average cost per ship over the 2025–2054 period	
		Navy's estimates	CBO's estimates	Navy's estimates	CBO's estimates
Ford class CVN-78 aircraft carriers[a]	6	96	103	15.3	16.5
Columbia class SSBN-826 ballistic missile submarines[b]	10	79	95	7.9	9.4
Large payload submarines	6	51	62	8.5	10.4
Virginia class SSN-774 attack submarines with VPMs	9	39	46	4.3	5.1
Virginia class SSN-774 attack submarines	36	168	185	4.7	5.1
SSN(X) next-generation attack submarines	14	99	122	7.1	8.7
Arleigh Burke class DDG-51 Flight III guided missile destroyers	23	61	61	2.7	2.7
DDG(X) next-generation guided missile destroyers	28	92	123	3.3	4.4
Constellation class FFG-62 guided missile frigates	24	24	35	1.0	1.4
Constellation class FFG-62 Flight II guided missile frigates	57	61	82	1.1	1.4
America class LHA-6 amphibious assault ships	8	35	39	4.4	4.8
San Antonio class LPD-17 Flight II amphibious transport docks	5	10	11	2.0	2.2
LPD(X) next-generation amphibious ships	12	27	34	2.3	2.8
LSM medium landing ships[c]	55	10	19	0.2	0.4
John Lewis class T-AO-205 oilers	16	12	14	0.8	0.9
T-AOL next-generation logistics ships[c]	30	14	14	0.5	0.5
T-AKE(X) next-generation dry cargo ships	12	9	13	0.7	1.1
T-AGOS(X) next-generation ocean surveillance ships[d]	9	5	8	0.5	0.9

Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

Amounts shown exclude funding for research and development.

VPM = Virginia payload module.

a. In CBO's and the Navy's estimates for aircraft carriers, total costs per class include the remaining funding for the CVN-80 and CVN-81 that was authorized before 2025 but exclude some funding for the carrier that the Navy would purchase in 2052 because that money would not be budgeted until 2055 or later. Estimates for the average cost per ship exclude the CVN-80 and CVN-81 but include all funding for the carrier that would be bought in 2052.

b. In CBO's and the Navy's estimates for ballistic missile submarines, total costs include funding that would be appropriated in 2025 for the second ship of the class. Average costs per ship exclude any funding for the first or second ships of the class, which were authorized in 2021 and 2024, respectively.

c. Ship quantity and costs include the cost of replacement ships because both the medium landing ships and next-generation logistics ships would have a service life of 20 years.

d. Ship quantity and costs exclude a replacement ship that would be purchased in 2054.

analysis of the 2024 plan, CBO's estimates were 13 percent higher than the Navy's, but the cost growth reflected in the Navy's estimates for the CVN-80 and CVN-81 has brought the service's estimates closer to CBO's.

In the 2025 plan, the Navy estimates that the 6 carriers it would purchase over the next 30 years would cost an average of about $15.3 billion (in 2024 dollars) each (see Table 5). The difference between the Navy's estimates under the 2024 and 2025 plans is that when preparing the 2025 plan, the Navy assumed it would use a two-carrier buy strategy, similar to what it used for the CVN-80 and CVN-81, for future carriers. That assumption resulted in substantial savings compared with the estimates in its 2024 plan, which were based on the assumption that the ships would be purchased separately.

In a report it submitted to the Congress in July 2023, the Navy estimated that a two-carrier buy strategy would save about 7 percent if the ships were purchased every five years.[30] If, instead, those ships were purchased every four years, the estimated savings would double, to about 14 percent. The 2025 plan would purchase new carriers on a schedule that alternated between four- and five-year

30. Department of the Navy, *Report to the Congress: Report on Advance Procurement for CVN 82 and CVN 83* (undated). The undated report was sent to the Congress in July 2023 by the Under Secretary of the Navy.

intervals. Compared with its estimates for Alternatives 1 and 2 under the 2024 plan, under which it would buy carriers every five years as single-ship purchases, the Navy's estimates for the 2025 plan are 12 percent less. Even so, the Navy's estimates suggest that the industry is experiencing growth in real costs. In the 2025 plan, the service's estimates for future carriers are between $1.5 billion and $2.0 billion more per ship than its estimates for the CVN-80 and CVN-81.

CBO estimates that the 6 carriers in the Navy's 2025 plan would, on average, cost $16.5 billion—8 percent more than the Navy's estimate. Although using the two-carrier buy strategy should generate some savings, it is not clear that those savings would be as large as the Navy anticipates. The magnitude of the savings that could be realized with two-carrier buys will be better understood once the CVN-80 and CVN-81 are complete. The rest of the difference between the Navy's and CBO's estimates is attributable to CBO's expectation that real cost growth in the shipbuilding industry will continue to outpace economywide inflation.

Submarines

Under the 2025 plan, the Navy would buy 10 new Columbia class submarines over the next 15 years. (The first Columbia class ship was ordered in 2021 and the second in 2024.) In addition, the service plans to purchase 6 large payload submarines that would have the flexibility to carry a large number of smaller missiles, a smaller number of larger missiles, special-operations forces, or other types of payloads.

With respect to attack submarines, the Navy's 2025 plan is substantially similar to Alternative 2 in the 2024 plan. Specifically, the Navy would continue to buy Virginia class submarines with the Virginia payload module until 2029. After that, it would purchase 36 Virginia class ships without the VPM through 2054. It would also start the new and much more capable SSN(X) in 2040—five years later than it would have under any alternative in the 2024 plan. Overall, the Navy would purchase 2 attack submarines per year through 2054 (except for 2025, when it would purchase only 1), but once the SSN(X) entered serial production in 2042, the service would buy 1 Virginia and 1 SSN(X) each year (see Figure 5 on page 10).

A major source of uncertainty in the Navy's plans for attack submarines is the tripartite security arrangement between Australia, the United Kingdom, and the United States, known as AUKUS. (See Box 1 for a discussion of how AUKUS could affect the size of the U.S. attack submarine force.)

Ballistic Missile Submarines. SSBNs, which carry Trident ballistic missiles, constitute the sea-based component of the United States' strategic nuclear triad. (The other two components are land-based intercontinental ballistic missiles and strategic bombers.) The cost of the 10 Columbia class submarines included in the 2025 shipbuilding plan is one of the most significant uncertainties in the Navy's and CBO's analyses of future shipbuilding costs. Under the 2025 plan, the Navy would begin purchasing 1 Columbia class ship each year starting in 2026. The last ship would be ordered in 2035.[31]

The Navy currently estimates that construction of the first Columbia class ship, the *District of Columbia*, will be complete in 2029 at a cost of $16.1 billion (in 2024 dollars). As of November 2024, the ship was 51 percent complete (measured in terms of the number of labor hours the Navy estimates it will need to build the ship). The second ship, authorized in 2024, would cost about $9.0 billion. Subsequent ships in the class would cost $7.9 billion, on average, according to the Navy. The total procurement cost for the 12 submarines would be $106 billion (which includes appropriations totaling $27.4 billion from 2017 to 2024), or $8.8 billion per ship, on average.

According to the Navy's estimate, the cost per thousand tons of displacement for the first Columbia class ship would be 13 percent less than that of the first Virginia class attack submarine. But the costs of lead ships of new classes of submarines built in the 1970s and 1980s provide little evidence that ballistic missile submarines are cheaper to build, per ton, than attack submarines. In a February 2024 report to the Congress on the Columbia program, the Navy stated that there was a 68 percent chance that the cost of the first Columbia class submarine would exceed its estimates and a 32 percent chance that it would cost less than estimated. The likelihood that subsequent ships in the class would cost more or less

31. For additional information, see Ronald O'Rourke, *Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress*, Report R41129, version 277 (Congressional Research Service, September 30, 2024), https://go.usa.gov/xSvDe.

than estimated was similar—67 percent and 33 percent, respectively. Those estimates of the probability of cost growth were substantially higher than the estimates that the service provided the year before. When CBO analyzed the 2024 shipbuilding plan, the Navy had stated that the likelihood that cost growth would affect the lead ship was 54 percent; the probability of subsequent ships' being affected was 49 percent.[32]

CBO's estimate for a program of 12 ships is 16 percent higher than the Navy's. CBO estimates that the first Columbia class submarine will cost $18.1 billion—$2.0 billion more than the Navy estimates it will cost. The second submarine would cost $11.4 billion. Including appropriations from 2017 to 2024, CBO estimates that, all told, 12 Columbia class submarines would cost $123 billion ($95 billion of which would be appropriated from 2025 to 2036). The 10 submarines set to follow the first two ships would cost an average of $9.4 billion each—$1.5 billion more per submarine than the Navy estimates they would cost.

Costs for the Columbia class submarines could, however, exceed both the Navy's and CBO's estimates. The new SSBN will be the largest, most technologically complex submarine that the United States has ever built. It is expected to reuse some technology and components from the Virginia class submarine, but it would also include many new elements, such as an all-electric drive system, an X-stern ship control system (in which the rear rudders and dive planes are shaped like an "x" rather than a "+" as they are on the Ohio class submarines), a new missile compartment, and a nuclear reactor designed to last the entire 42-year service life of the submarine. Furthermore, the Navy has repeatedly stated that the Columbia is its first acquisition priority and that the program must stay on schedule to meet its strategic deterrence mission. Thus, if the program encounters problems in construction, the Navy and the shipbuilders are likely to invest more resources and assign more people to the program to meet the schedule, all of which would increase costs.

Conversely, costs for the Columbia class ships could be less than CBO estimates if the Navy and the shipbuilders are successful in their ongoing efforts to increase the speed and efficiency of construction and to improve the performance of the supplier base.

Large Payload Submarines. As with previous shipbuilding plans, the 2025 plan includes a program to buy large payload submarines. The ships would probably perform, among others, missions similar to those that are currently conducted by SSGNs (guided missile submarines) and that will, in the future, be conducted by Virginia class ships with VPMs. The first ship would be ordered in 2038, three years after the last Columbia was ordered. The Navy would then purchase 1 ship every three years through 2054 for a total of 6 ships. That program is similar to the one proposed under Alternative 2 in the Navy's 2024 shipbuilding plan.

The Navy's plan provides little information about the size and capabilities of the large payload submarine. CBO's and the Navy's estimates reflect the expectation that the ship would be based on the Columbia class hull with its missile tube section reconfigured to perform various missions and that other sections of the ship would receive the necessary equipment and modifications to support the payloads the submarine might carry. The Navy estimates that each ship would cost an average of $8.5 billion, or about 9 percent more than it estimated under Alternative 2 in the 2024 plan (see Table 5 on page 27). CBO estimates that they would each cost an average of $10.4 billion.

Attack Submarines. The 2025 plan also adopts a building profile for attack submarines that is similar to that of Alternative 2 in the 2024 plan. The Navy would buy 9 Virginia class ships with VPMs, 36 Virginia class submarines without VPMs, and 14 SSN(X)s—4 fewer than it would have bought under Alternative 2 in the previous plan because the Navy is delaying the first purchase of the next-generation submarines from 2035 to 2040. The Navy would buy 2 attack submarines per year (except for 2025, when it would purchase only 1) through 2054. From 2026 to 2039, the Navy would purchase 2 Virginias each year. Once the SSN(X) program began in 2040, the Navy would purchase 1 Virginia and 1 SSN(X) per year for all years through 2054, except for 2041, when it would buy 2 Virginias and no SSN(X)s.

Largely because of conditions in the submarine shipyards, CBO's and the Navy's cost estimates for Virginia class ships with VPMs increased substantially since last year (and those estimates were substantially higher

32. Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2024 Shipbuilding Plan* (October 2023), p. 25, www.cbo.gov/publication/59508.

Box 1.

The Potential Effect of the AUKUS Security Pact on the U.S. Navy's Inventory of Attack Submarines

In September 2021, the governments of Australia, the United Kingdom, and the United States announced that they were forming a pact to promote security and deterrence in the Western Pacific region. The pact, known as AUKUS, comprises two groups of cooperative endeavors, referred to as pillars. The aim of Pillar 1 is for the United States and the United Kingdom to help Australia establish an industrial base for building nuclear-powered attack submarines. The ships would eventually be built using a British design modified, in part, with technology from U.S. Virginia class submarines. Pillar 2 focuses on cooperation in several high-technology areas, including cyber capabilities, artificial intelligence, undersea capabilities, offensive and defensive hypersonic weapons, and electronic warfare.

Because it could take decades for Australia to build its own attack submarines, the pact calls for the United States to sell between 3 and 5 Virginia class nuclear-powered attack submarines (SSNs) to Australia as an interim step. The Navy has indicated that the first of those sales would be a used Virginia class submarine in 2032; the second, another used Virginia class ship in 2035; and the third, a new-construction ship in 2038. If the U.S. sold 5 SSNs to Australia, the remaining 2 would be new construction submarines in 2041 and 2044.

The Navy's 2025 shipbuilding plan discusses the prospective submarine sales under the AUKUS security pact, but it does not address whether or when replacements for those submarines would be ordered. The report states that the Navy would purchase 2 SSNs per year "in support of the National Defense Strategy and AUKUS."[1] However, given the Virginia class submarines' 33-year service life, purchasing 2 SSNs per year would allow the Navy only to achieve and maintain its own force goal of 66 attack submarines; to accommodate the prospective sales under AUKUS, the submarine industrial base would need to increase the production rate of the SSNs.

The U.S. submarine industrial base is struggling to meet the Navy's current demand for submarines. Since 2011, the Congress has authorized and appropriated funds for the Navy to buy 2 Virginia class submarines per year and to begin building a class of 12 Columbia class ballistic missile submarines (SSBNs). The Navy ordered the first Columbia class ship in 2021 and the second in 2024; the remaining ships are scheduled to be ordered between 2026 and 2035 at a rate of 1 ship per year. Although the Congress has been funding 2 SSNs per year, the shipyards, which are also working on the Columbia class ships, are currently building only 1.2 SSNs per year and therefore face a backlog of work. Over the past several years, the time between the appropriation of funds for SSNs and their delivery has increased from six years (when the Navy was building 1 SSN per year) to nine years.

It would be very difficult and expensive for the U.S submarine industry to increase production of attack submarines while also building 1 Columbia class ship per year. Columbia class SSBNs are two and one-half times the size of Virginia class SSNs, and the amount of work required to produce ships scales roughly with ship size. Moreover, SSBNs are the Navy's highest acquisition priority. As a result, the sale of SSNs to Australia could reduce the number of attack submarines available to the Navy.

Using the 2025 shipbuilding plan as a baseline, CBO developed three illustrative scenarios to show how AUKUS could affect the size of the Navy's attack submarine force through 2060 (see the figure). In the first two scenarios, the Navy would not buy submarines to replace those it sold to Australia, whereas in the third scenario, it would.

In **Scenario 1**, the United States would sell 3 Virginia class SSNs to Australia—2 used (in 2032 and 2035) and 1 new (in 2038). The used ships would have roughly 20 years of remaining service life, so they would probably come from the recently completed or soon-to-be-completed group of submarines known as Block IV. The new SSN would be the first ship completed from the group of submarines the Navy plans to order between 2030 and 2036, known as Block VII.

In **Scenario 2**, the United States would sell 5 attack submarines to Australia—2 used ships from Block IV (in 2032 and 2035) and 3 new ones from future blocks (in 2038, 2041, and 2044).

Under the 2025 plan, the SSN force would consistently number 50 or more ships beginning in 2032 and would grow to 66 by 2054. In Scenarios 1 and 2, the Navy would have between 3 and 5 fewer SSNs during most of the 2033–2053 period. The loss of those submarines translates to a loss of 65 operational years for the SSN force from 2032 to 2060 in Scenario 1 and a loss of 102 operational years over that period in Scenario 2. Those losses result in 28 fewer SSN deployments in Scenario 1 and 43 fewer deployments in Scenario 2.[2]

1. Department of the Navy, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2025* (March 2024), p. 8, https://tinyurl.com/mrwdcz35.

2. CBO made this calculation on the basis of the assumption that Virginia class submarines go on 14 deployments over the course of a 33-year service life.

Continued

Box 1. Continued

The Potential Effect of the AUKUS Security Pact on the U.S. Navy's Inventory of Attack Submarines

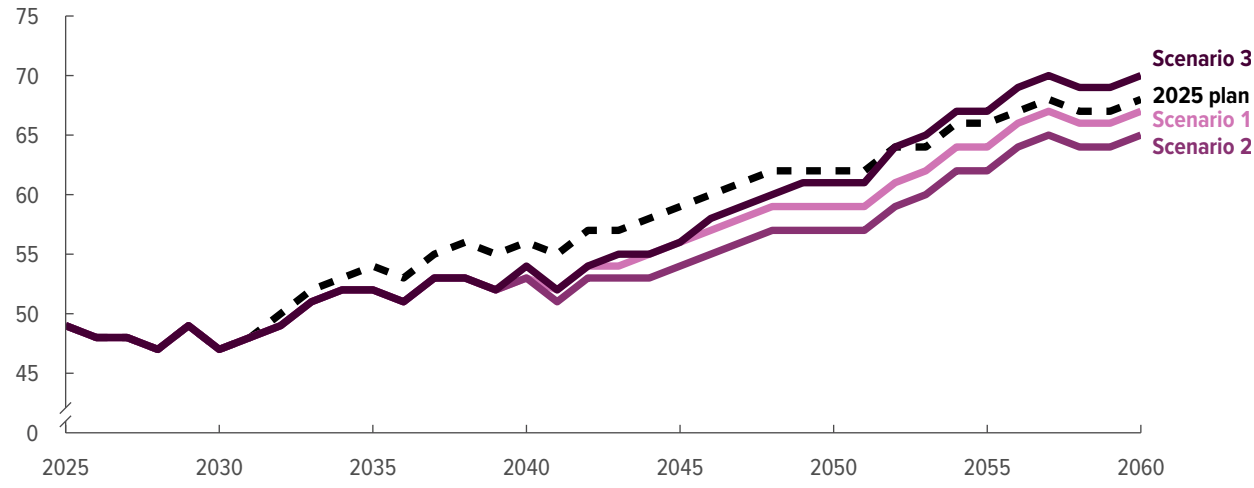
In **Scenario 3**, the United States would sell 5 SSNs to Australia—2 used and 3 new, just as it would in Scenario 2—but the Navy would buy 5 more submarines in the 2030s and 2040s (1 ship every three years starting in 2033) to replace them, effectively increasing production of SSNs to 2.33 ships per year during the period in which they are scheduled to be built.[3] In that case, the Navy would still have fewer attack submarines for 20 years, from 2032 to 2052, than it would have under its 2025 plan but more than it would have in the other two AUKUS scenarios. By 2053, however, the Navy would have a slightly larger force of SSNs in Scenario 3 than it would under the Navy's 2025 plan. Although the service would lose 40 operational years through 2052 in that scenario, it would begin regaining them in 2053, and by 2060, it would have recovered 13 of the lost operational years. The Navy would lose 17 deployments before 2052 but then regain 6 of them from 2053 to 2060. (More operational years would be regained after 2060, but estimating the amount was outside the scope of this analysis.)

CBO developed those scenarios under the assumption that Australia would purchase the smaller Virginia class SSNs instead of the larger ships with Virginia payload modules (VPMs), which add four large-diameter payload tubes to ships of that class. Under that assumption, the first two scenarios represent the minimum and maximum potential capability, respectively, that Australia could acquire from the United States under AUKUS given the time required to build new submarines. For example, the United States could not sell and deliver 5 new Virginia class SSNs to Australia in the 2030s unless Australia wanted the larger submarines with VPMs.

Would China be less deterred if the United States reduced the number of its attack submarines to help Australia develop its own submarine force? Because the United States and Australia have a strong alliance, improving the Australian navy's capability could help offset the U.S. Navy's potential loss of capability. That loss might even be more than offset because the Australian submarines would be based in the Western Pacific region and therefore could respond more quickly to any conflict with China over Taiwan or other issues in the South China Sea. However, Australia would control its own submarines, and their participation in any particular conflict would not be guaranteed. In March 2023, the Australian defense minister articulated that point when he specifically stated that his country had *not* promised to support the United States in any future conflict with the People's Republic of China over Taiwan as part of the AUKUS agreement.

3. If submarines could be built faster than that—3 per year in consecutive years, for example—then replacement submarines could be added to the force more quickly.

The Potential Effect of the AUKUS Security Pact on the U.S. Navy's Inventory of Attack Submarines



Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

than both sets of estimates under the 2023 plan). The Navy estimates that Virginia class submarines with VPMs would cost $4.3 billion each, on average, and that Virginia class ships built without VPMs (the first of which would be purchased in 2030) would cost $4.7 billion each, on average. Those estimates indicate that the Navy believes that Virginia class ships with VPMs would cost a little less than those without VPMs, even though those without VPMs are about 23 percent smaller than those with them. The basis for those estimates is not clear: The Navy may be including more cost growth in the later submarines, or it may not have fully captured the potential full costs of future Virginia class submarines with VPMs. In fact, recent press reports suggest that the Navy is facing substantial additional cost growth on the submarines it currently has under construction and on those it would order through 2030.[33]

By comparison, CBO estimates that all Virginia class ships would cost an average of $5.1 billion. CBO's cost model accounts for the smaller size of Virginia class submarines without VPMs. However, because real cost growth in the shipbuilding industry exceeds economy-wide inflation, those smaller submarines—which are purchased later in the plan—cost as much as the Virginia class ships with VPMs, which are purchased early in the plan. Furthermore, because the challenges in the submarine industrial base continue, costs could grow higher than the Navy's or CBO's estimates.

Estimating the costs of the SSN(X) is difficult because the Navy has not yet determined its capabilities or size. In the past, the Navy has indicated that, like the Seawolf class submarine, the next-generation attack submarine would be faster, stealthier, and able to carry more torpedoes than Virginia class ships; the latest information provided to CBO is consistent with that vision for the ship. The service has also indicated that it wants the SSN(X) to have a vertical launch capability, an attribute of the improved Los Angeles class submarine and the original Virginia class submarine. CBO's cost estimates therefore reflect the assumption that the SSN(X) would be similar to a Seawolf submarine in terms of several capabilities (including underwater speed and weapons payload) but have an entirely new design. The submarine's advanced features would make it quieter and stealthier than any existing submarine; it could launch missiles from missile cells and would contain a torpedo room as large as those on Seawolf submarines.

Given that information, CBO estimated the displacement of the SSN(X) when fully submerged to be 10,100 tons, making it about 11 percent larger than a Seawolf class ship. The agency estimated the increase in size from the Seawolf to the SSN(X) by comparing the displacement of the original Los Angeles class submarine with that of the newer Virginia class submarine. In that case, the combined effect of a new generation of submarine technology and a vertical missile capability resulted in the Virginia class's being 11 percent larger, in terms of displacement, than the Los Angeles class. CBO could have estimated the size of the SSN(X) in relation to the Seawolf by measuring the change in displacement from the older Ohio class SSBN to the newer Columbia class SSBN. The new generation of submarine technology included on the Columbia class ship increased its displacement by about 21 percent.[34] CBO used the smaller estimate (11 percent) because it is based on displacements of attack submarines rather than ballistic missile submarines.

On the basis of that analysis, CBO estimates that the average cost of each SSN(X) would be $8.7 billion. The Navy estimates that each SSN(X) would cost $7.1 billion, on average. (Those averages include the lead ship, which costs considerably more than subsequent submarines in the class.) Although CBO's estimate for the SSN(X) has increased by $500 million per boat (or 6 percent) since last year, the Navy's estimates have remained unchanged, which appears inconsistent with the Navy's increasing its estimates for the Virginia class submarines.

Large Surface Combatants

The Navy's 2025 plan calls for the purchase of the same types of destroyers in nearly the same quantities as Alternative 2 in the 2024 plan called for. Currently, the Navy's fleet includes 74 destroyers of the DDG-51 class, which consists of four variants, designated as Flight I, Flight II, Flight IIA, and Flight III. In addition to the

33. Chris Panella, "US Navy's New Submarines are 'In Crisis' as Costs Balloon by $17 Billion, Lawmaker Says," *Business Insider* (September 20, 2024), https://tinyurl.com/369vsd25.

34. In a personal communication, Ronald O'Rourke, naval affairs analyst with the Congressional Research Service, suggested comparing the displacements of Ohio class and Columbia class ships as an additional way to estimate the size of the SSN(X). To compare the displacements of those two classes, CBO adjusted its calculations to account for the fact that an Ohio class ship carries 24 sea-launched ballistic missiles, whereas a Columbia class ship carries 16 of them.

ships already in the fleet, 2 Flight IIAs and 18 Flight IIIs (an upgraded design) are being built or have been authorized for construction by the Congress. The Navy also has 2 DDG-1000 Zumwalt class destroyers, and construction of 1 more is nearing completion. The construction of a next-generation destroyer, designated as the DDG(X), would commence in 2032.

Aside from any differences in the quantities of ships being purchased, there are two major differences between the 2025 and 2024 budgets and shipbuilding plans. First, both the Navy's 2025 budget request and 2025 shipbuilding plan reveal substantial cost growth in the DDG-51 program since last year. Second, the DDG-51 destroyers currently under construction have experienced substantial delays.

DDG-51 Flight III Destroyers. In the President's 2025 budget, the average cost of the 13 destroyers that the Navy has already ordered or wants to order from 2023 to 2028 increased by more than 16 percent—from an average of $2.1 billion per ship (in 2024 dollars) in last year's budget to an average of $2.5 billon per ship in this year's. The Navy stated in a briefing to CBO and CRS that the increase in its estimates of the cost of the DDG-51 Flight IIIs was attributable to shipbuilding inflation's outpacing economywide inflation as well as to declining shipyard performance.[35]

Factoring in the higher costs of ships and the difficulty in completing them, CBO estimates that the 23 DDG-51 Flight III destroyers in the Navy's shipbuilding plan would cost an average of $2.7 billion per ship. The Navy's estimate for average costs through 2054 is the same as CBO's. Under the 2025 plan, the Navy expects the purchase of DDG-51 and DDG(X) ships to overlap for six years. That is consistent with Alternative 2 in the 2024 plan, which would have had a seven-year overlap in the purchases of those two classes; Alternatives 1 and 3 would have had only two years of overlap.

DDG(X) Next-Generation Destroyers. According to the 2025 plan, production of the next-generation class of destroyers would start in 2032. However, after the shipbuilding plan was submitted to the Congress, the Navy informed CBO and CRS that the first ship would most likely not be requested until 2034 or later. To keep this analysis consistent with the Navy's shipbuilding plan, CBO made its estimates on the basis of the assumption that production of the lead ship would begin in 2032. Under the 2025 plan, the Navy would purchase 28 DDG(X)s. It would order 1 ship every other year from 2032 to 2038, buy 2 ships in 2039, and then alternate between purchasing 1 or 2 ships per year through 2054.

The Navy increased its estimates for the DDG(X) by about one-third since last year; it now estimates that the 28 DDG(X)s it plans to buy would cost an average of $3.3 billion per ship. That increase was driven mostly by an increase in the size and capabilities of the ship that the Navy is planning. According to Navy officials, the new DDG(X)'s combat capabilities would be equivalent or superior to those of the DDG-51 Flight III; it would have a larger hull, substantially more power, more stealth characteristics, and a greater capacity to accommodate the installation of new weapon systems and other capabilities in the future.[36] The Navy has indicated that the initial design now prescribes a displacement of 14,500 tons—1,000 tons more than the design under the 2024 plan and 4,800 tons more than a DDG-51—as well as a higher top speed.

The Navy's estimates for its destroyers imply that the DDG(X) would cost about 22 percent more than the DDG-51 Flight III but would have a full-load displacement that was 50 percent greater than that ship. Such an outcome, however, seems unlikely given the history of surface combatants. For example, in the 2000s, the Navy estimated that the Zumwalt class DDG-1000 guided missile destroyer would cost only slightly more than the DDG-51s that were then in production, even though the DDG-1000 was about 50 percent larger. Ultimately, costs for the DDG-1000 were about 45 percent higher than anticipated (see Figure 11).[37]

But the Navy contends that the case of the DDG(X) will differ from that of the DDG-1000 because the next-generation ship would have a combat system and radar substantially similar to those of the DDG-51 Flight III

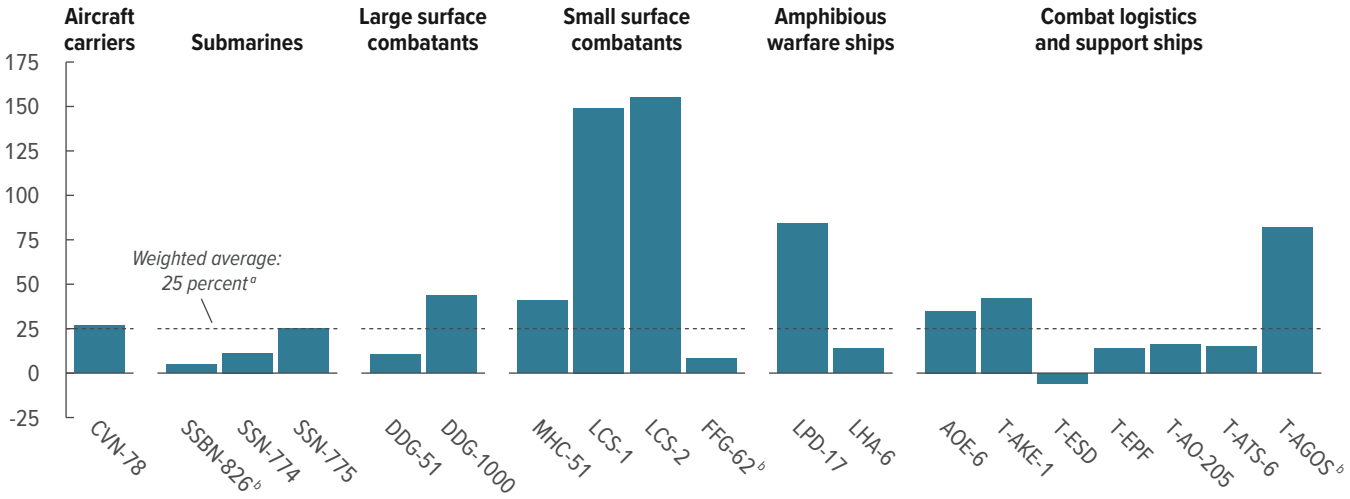
35. For more information about the Navy's DDG-51 program, see Ronald O'Rourke, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, Report RL32109, version 280 (Congressional Research Service, December 16, 2024), https://go.usa.gov/xSKzU.

36. Ronald O'Rourke, *Navy DDG(X) Next-Generation Destroyer Program: Background and Issues for Congress*, Report IF11679, version 44 (Congressional Research Service, December 12, 2024), https://go.usa.gov/xSKSR.

37. Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2020 Shipbuilding Plan* (October 2019), www.cbo.gov/publication/55685.

Figure 11.

Cost Growth in the Navy's Lead Ships, 1985 to 2024



Data source: Congressional Budget Office, using data from the Department of the Navy. See www.cbo.gov/publication/60732#data.

The lead ship is the first ship of its class. For most ships, CBO calculated cost growth using the first and last mentions of a ship in the books that accompany each year's budget: *Justification of Estimates, Shipbuilding and Conversion, Navy.* For AOE-6, DDG-51, MHC-51, and T-EPF, CBO relied on information provided by the Navy for the final estimates and on the *Budget Appendixes* for the years those ships were authorized.

AOE = fast combat support ship; CVN = nuclear-powered aircraft carrier; DDG = guided missile destroyer; FFG = guided missile frigate; LCS = littoral combat ship; LHA = amphibious assault ship; LPD = amphibious transport dock; MHC = coastal mine hunter; SSBN = ballistic missile submarine; SSN = attack submarine; T-AGOS = ocean surveillance ship; T-AKE = dry cargo ship; T-AO = oiler; T-ATS = towing, salvage, and rescue ship; T-EPF = expeditionary fast transport; T-ESD = expeditionary transfer dock.

a. CBO calculated the weighted average cost growth by adding the initial costs for all ships in the dataset and comparing the result with the sum of all final costs for the ships in the dataset. For ships still in an early phase of construction, their weight in the average was adjusted by the percentage of the ship that was complete. The unweighted average cost growth is 40 percent.

b. These ships are still in an early phase of construction, and further cost growth is likely.

and would require designing only a new hull, power system, and cooling system. By contrast, the DDG-1000 incorporated new technology that affected every major aspect of the ship's design—its hull, power system, radar, and weapons, among other things.[38]

Given the Navy's new estimate of the size of the DDG(X) and the ship's use of new technology, CBO increased its estimates of the ship's cost by one-third since last year. CBO now estimates the average cost of each of the 28 ships to be $4.4 billion, which is also about one-third more than the Navy's estimates. To fund the DDG(X) program under the 2025 plan, the Navy would need $123 billion. The uncertainty about the ultimate size and capabilities of the next-generation destroyer suggests that its final cost could differ substantially from both the Navy's and CBO's estimates.

Small Surface Combatants

Under the 2025 plan, the Navy would purchase a larger number of small surface combatants than it would have under any of the 2024 plan's alternatives. Indeed, the Navy would buy more small surface combatants than any other category of ship. Specifically, it would purchase a total of 81 frigates: 24 FFG-62 Constellation class guided missile frigates (the type of frigate that is currently being built for the service) and then 57 of an upgraded version of the FFG-62, called the Flight II, starting in 2036. (The Navy stopped purchasing littoral combat ships in 2019.)

38. In the 1980s, the Navy sought to build a lower-cost surface combatant, the DDG-51, by reusing the combat systems and propulsion train of the CG-47 cruiser and building a smaller ship. Using that technique, the Navy succeeded in building a less expensive ship, but the cost-to-weight ratio of the two classes' lead ships was roughly the same. Similarly, the cost-to-weight ratio of the last 11 cruisers was about the same as that of the 12 destroyers built after the lead ship.

The Navy's FFG-62 program has experienced numerous problems since its inception. Originally, the ship was going to be based on the FREMM, a multipurpose frigate that was built for the French and Italian navies. (FREMM is its acronym in the French and Italian languages.) The design of the U.S. version was expected to have about 85 percent in common with that of the FREMM. But after the many changes requested by the Navy, the FFG-62's design is now expected to have only 15 percent in common with the FREMM's design. In addition, the FFG-62's design weight has grown by over 500 tons, from 7,300 tons in 2021 to 7,800 tons in 2024, and the design is still incomplete. The lead ship, which was ordered in 2020, is three years behind schedule and is not expected to enter the fleet until 2029 at the earliest.

Nevertheless, under its 2025 plan, the Navy would increase its purchases of frigates to 3 per year in 2031. The shipyard that currently builds the frigate, Fincantieri Marinette Marine in Wisconsin, has a workforce capable of building 1 frigate per year and the infrastructure to build 2 frigates per year. Both the Navy and Fincantieri are trying to increase the shipyard's workforce to build 2 ships per year. Moving to 3 ships per year would require another shipyard. As a result, both the Navy and CBO made the assumption that at some point, a second shipyard would begin building FFGs. CBO assumed that would occur in 2030 so that the service could achieve its goal of building 3 per year starting in 2031. The Navy estimates that the average cost of an FFG-62 would be $1.0 billion, whereas CBO estimates that the average cost would be $1.4 billion.

The Flight II designation for that follow-on ship in the 2025 plan suggests that it would be roughly the same size as the FFG-62, which is now expected to displace about 7,800 tons and to be equipped with upgraded combat and weapon systems. The Navy's estimated average cost for the Flight II ships is $1.1 billion. CBO estimates a cost of $1.4 billion, on average.[39]

Amphibious Warfare Ships

The Navy's new force goal calls for 31 large and midsize amphibious warfare ships, and separately, the service has an initial goal of 18 medium landing ships. The 31-ship goal brings the Navy, the Marine Corps, and the Congress into alignment on the desired number of the larger ships.[40] In the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, the Congress directed the Navy to maintain a force of 31 large and midsize amphibious ships, consisting of LHA and LHD amphibious assault ships, LPD amphibious transport docks, and LSD dock landing ships. In contrast to the 2023 and 2024 shipbuilding plans, which would have reduced the number of those ships to fewer than 20 by the early 2050s, the 2025 plan would maintain a force of at least 31 of those ships through 2054. It would do so by having the Navy buy more ships and extend the service life of some existing ships beyond what it would have been under the alternatives in the 2024 plan.[41] The Navy's plan would also result in a force of 35 medium landing ships, which, at nearly double the service's initial planning goal of 18 LSMs as stated in the BFSAR, aligns with the Marine Corps' goal for that program.

Specifically, under the 2025 plan, the Navy would purchase 8 LHA America class amphibious assault ships, 5 LPD-17 Flight II amphibious transport docks, and 12 next-generation amphibious transport docks, designated as the LPD(X). In addition, to build and then maintain a force of 35 medium landing ships, the service would purchase 55 LSMs in all—35 for the initial force and then, because those ships have a service life of 20 years, 20 replacements as the first-generation ships were retired.

As for LHA class ships, the Navy's plan would purchase them at an alternating rate of 1 every 3 or 4 years, starting in 2027. The Navy estimates that each ship would cost an average of $4.4 billion. By contrast, CBO estimates they each would cost an average of $4.8 billion. Both estimates are generally consistent with those under the 2024 plan.

39. For a discussion of the differences between the Navy's and CBO's estimates of the initial costs of the FFG-62 class program, see Congressional Budget Office, *The Cost of the Navy's New Frigate* (October 2020), www.cbo.gov/publication/56669.

40. See testimony of General David H. Berger, Commandant of the Marine Corps, before the Senate Appropriations Committee (March 28, 2023), p. 1, https://tinyurl.com/bdha4j5z; and Chief of Naval Operations, *Navigation Plan 2022* (July 2022), p. 10, https://tinyurl.com/waru7vwt.

41. The Navy's approach to maintaining a force of 31 large and midsize ships is similar to what CBO described in its analysis of the Navy's 2024 shipbuilding plan. See Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2024 Shipbuilding Plan* (October 2023), pp. 35–36, www.cbo.gov/publication/59508.

The Navy's and CBO's cost estimates for LPD-17 Flight II ships are similar—an average of $2.0 billion and $2.2 billion, respectively, for each ship. By contrast, their estimates for the next-generation LPD(X) differ: The Navy estimates that each would cost an average of $2.3 billion, and CBO estimates that each would cost an average of $2.8 billion. Most of the difference lies in the fact that CBO's constant-dollar estimates account for historically observed real growth in the costs of labor and materials in the shipbuilding industry, whereas the Navy's estimates do not. Because the Navy would begin to purchase those replacement ships in 2039, the effect of that real growth, which compounds over time, would be significant.

The Navy has not yet settled on a design for medium landing ships. It is considering options that range from 4,500 tons to 5,400 tons in full-load displacement. The Navy, which did not specify the size of the ship that it used in its calculations, estimates that the 55 LSMs would cost less than $200 million per ship, on average. In its analysis of the Navy's 2025 shipbuilding plan, CBO estimated the costs of the smaller ship, which the agency projects would be an average of $350 million per ship.[42]

42. Recent press reports indicate that the bids from shipyards for the LSM were much higher than the Navy expected. As a result, the Navy will delay the contract for the ship and reevaluate the ship's capabilities. For a discussion of the medium landing ship program and the difference between the Navy's and CBO's estimates for it, see Congressional Budget Office, *Acquisition Costs of the Navy's Medium Landing Ship* (April 2024), www.cbo.gov/publication/60071.

Combat Logistics and Support Ships

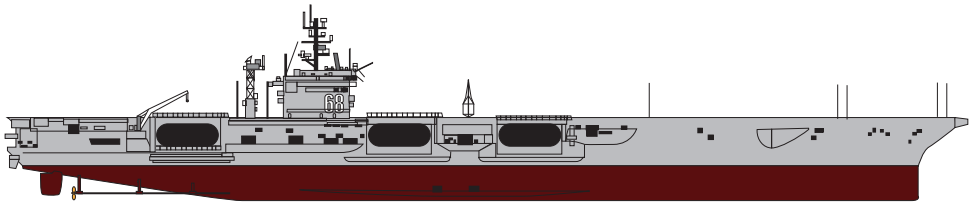
The Navy would buy 71 combat logistics and support ships, excluding medium landing ships, under its 2025 plan. Most of those ships are operated by the Military Sealift Command in support of naval operations, which means they are mostly crewed by civilian mariners. Of the 71 ships, 58 are for combat logistics: large fleet oilers, small light oilers, and dry cargo ships. As for support ships, the Navy plans to buy 2 submarine tenders, 1 command ship, and 10 new ocean surveillance ships. (One of those surveillance ships would be purchased in 2054 as a replacement for the lead ship of the class, which the Navy bought in 2022.)

The Navy's and CBO's estimates for both types of oilers are nearly the same (see Table 5 on page 27). But for the dry cargo ships and the ocean surveillance ships, the estimates are far apart. In the case of the dry cargo ships, which would be purchased in the 2040s and 2050s, CBO's estimate of $1.1 billion per ship is 57 percent more than the Navy's estimate of $700 million per ship, largely because CBO's constant-dollar estimates account for real cost growth in the shipbuilding industry.

The lead ship of the Navy's new ocean surveillance ship program, the T-AGOS(X), was authorized in 2022, and under the 2025 plan, the Navy would buy an additional 9 ships at a rate of 1 per year from 2026 to 2034. To estimate the costs of the new ship, CBO used the T-AGOS-23, which was authorized in 1991 and commissioned in 2000, as an analogue. CBO estimates that the 9 T-AGOS(X) ships would cost an average of $900 million each—twice the Navy's estimate of an average of $450 million per ship.

Appendix: Major Types of Ships in the Navy's Fleet

Aircraft Carriers



Nimitz Class CVN-68

The Navy's 11 aircraft carriers are the heart of the battle force. Each carries an air wing of about 60 aircraft, which can attack hundreds of targets per day (assuming 12 hours of flight operations each day) for up to a month before needing to rest. Carriers are the largest ships in the fleet, with a displacement of about 100,000 tons. (A ship's displacement is the weight of water that it displaces when floating or, for a submarine, when submerged.) Ten of the current carriers belong to the Nimitz class. The Navy commissioned the first of a new class, the *Gerald R. Ford*, in 2017.

Strategic Ballistic Missile Submarines

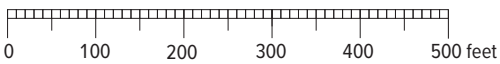
Ohio Class SSBN-726

Strategic ballistic missile submarines are one component of the U.S. nuclear triad. Each submarine carries up to 20 Trident missiles armed with 1 to 8 nuclear warheads apiece. (Originally, they were built with 24 missile tubes, but arms control treaties now limit them to 20 operational tubes.) The Navy has 14 Ohio class ballistic missile submarines, each of which displaces about 19,000 tons when submerged. The service has 4 other submarines of that class that it converted to a conventional guided missile (SSGN) configuration. Those SSGNs carry up to 154 Tomahawk missiles as well as special operations forces.

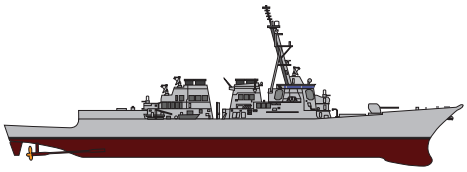
Attack Submarines

Virginia Class SSN-774

Attack submarines are the Navy's premier undersea warfare and antisubmarine weapons. Since the end of the Cold War, however, they have mainly been used for covert intelligence gathering. They can also launch Tomahawk missiles at land targets, a critical capability used in the early stages of a conflict in an effort to destroy enemy air defense systems. Of the Navy's 48 attack submarines, 23 belong to the Virginia class, 3 to the Seawolf class, and 22 to the Los Angeles class. Their displacement is less than half that of ballistic missile submarines.



Large Surface Combatants



Arleigh Burke Class DDG-51 Destroyer

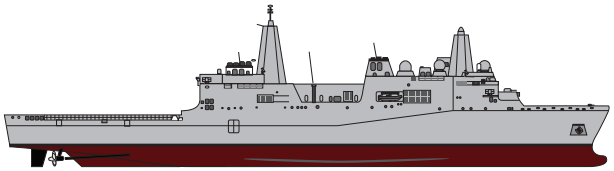
Large surface combatants, which include cruisers and destroyers, are the workhorses of the fleet. They provide ballistic missile defense for the fleet and for overseas regions. They defend aircraft carriers and amphibious warfare ships against other surface ships, aircraft, and submarines, and they perform such day-to-day missions as patrolling sea lanes, providing an overseas presence, and conducting exercises with allies. They can also launch Tomahawk missiles at land targets. Most of the Navy's surface combatants displace about 9,000 to 10,000 tons.

Small Surface Combatants

Freedom Class LCS-1 Littoral Combat Ship

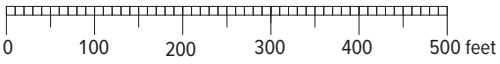
Small surface combatants include littoral combat ships (LCSs) and frigates. LCSs, which are built in two variants, are intended to counter mines, small boats, and diesel-electric submarines in the world's coastal regions. The Navy's new frigates, which it began building in 2020, are designed to be multimission ships: Not only are they capable of performing many of the missions of the LCS, but they also carry robust antiship capabilities and are able to defend against threats in the immediate area. More routinely, LCSs and frigates—like their counterparts, the large surface combatants—patrol sea lanes, provide an overseas presence, and conduct exercises with allies. They range in size from 3,000 to 7,000 tons. The Navy currently has no frigates because it retired the last of its Oliver Hazard Perry frigates in 2015.

Amphibious Warfare Ships

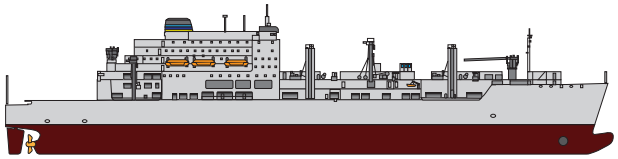


San Antonio Class LPD-17

The Navy has five classes of amphibious warfare ships. The two classes referred to as amphibious assault ships (also known as large-deck amphibious ships or helicopter carriers) are the second-largest types of combat ships in the fleet, displacing between 40,000 and 45,000 tons. With capacity for about half the troops and equipment of a Marine expeditionary unit, the amphibious assault ship is the centerpiece of the amphibious ready group. In addition to troops, each ship can carry as many as 30 helicopters and 6 fixed-wing Harrier jump jets or short takeoff and landing versions of the Joint Strike Fighters (F-35Bs), or up to 20 of those fixed-wing aircraft. The other three classes are divided into two types: amphibious transport docks and dock landing ships. Two of those ships together provide the remaining transport capacity for a Marine expeditionary unit in an amphibious ready group. They range in size from 16,000 to 25,000 tons.

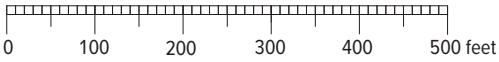


Combat Logistics and Support Ships



Lewis and Clark Class T-AKE-1

The many combat logistics and support ships in the Navy's fleet provide the means to resupply, repair, salvage, or tow combat ships. The most prominent of those vessels are fast combat support ships, which resupply carrier strike groups with fuel, dry cargo (such as food), and ammunition. Logistics and support ships can be as small as 2,300 tons for an oceangoing tug or as large as 90,000 tons for an expeditionary sea base.



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About This Document

This testimony reprises the Congressional Budget Office's January 2025 report *An Analysis of the Navy's 2025 Shipbuilding Plan*. That report was prepared as required by the National Defense Authorization Act for Fiscal Year 2012 (Public Law 112-81). In keeping with CBO's mandate to provide objective, impartial analysis, the testimony and report make no recommendations.

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