

# U.S. Military Forces in FY 2021

## *Navy*

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Part of *U.S. Military Forces in FY 2021*. Unlike the other services, the Navy has sought to significantly expand its force structure. However, its previous plan to reach 355 ships collapsed because of high costs and the need to incorporate new technologies such as unmanned systems. A new plan incorporates smaller ships and large numbers of unmanned systems.

### KEY TAKEAWAYS

- In FY 2021, Navy active-duty personnel would increase by 5,300 to 347,800. Fleet size increases to 306 ships as previously ordered ships arrive, particularly the numerous littoral combat ships (LCS). The Navy continues to plan on significant expansion.
- The 355-ship goal was deemed infeasible because of its high cost. The structure was also criticized for focusing on large and expensive ships, particularly aircraft carriers, and not incorporating unmanned surface and undersea vessels/vehicles.
- When the Navy could not come up with a feasible new plan, Secretary of Defense Esper took over.
- On October 7, Secretary Esper outlined a “500+ ship” future fleet described as “an ever-present, resilient, and dominant fighting force.”
- Carriers and large surface combatants (LSCs) may be cut to pay for the unmanned vessels, additional submarines and small surface combatants, and a new class of small amphibious ships. However, many details remain unavailable, and to be real, the plan needs to be incorporated into the president’s FY 2022 budget proposal.
- The Navy and the secretary of defense seem to have different interpretations about the future fleet, as has been the case for many years.
- Affordability will be a challenge. The new fleet structure costs about the same as the 355-ship fleet. Esper wants the Navy to find the resources internally and may provide some resources from savings across the Department of Defense (DOD).

- Naval aviation, in contrast to the surface and subsurface fleets, remains focused on manned platforms.
- Ship numbers matter to the Navy because of the high demands for its forces in day-to-day operations for crisis response, allied and partner engagement, and ongoing regional conflicts.

## End Strength in FY 2021

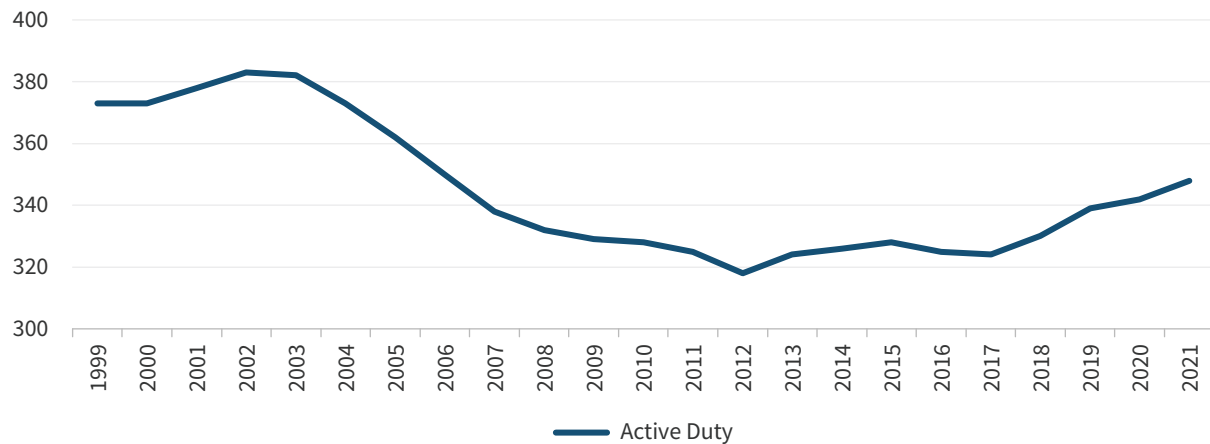
Table 1: Navy End Strength – Active, Reserve, and Civilians

	Active Navy	Navy Reserve	Civilian
	End Strength	End Strength	Full-time Equivalents
<b>FY 2019 Enacted</b>	337,000	59,700	195,000
<b>FY 2020 Enacted</b>	342,500 (340,500 authorized)	60,200 (59,000 authorized)	196,300
<b>FY 2021 Request</b>	347,800	58,800	198,000
<b>Change from FY 2020</b>	+5,300	-1,400	+1,700

Source: Department of the Navy, *Highlights of The Department of the Navy FY 2021 Budget* (Washington, DC: Department of Defense, 2020), Active End Strength data in Figure 2.1, Reserve End Strength data in Figure 2.3, Civilian data in Figure 2.10, includes direct and indirect hires but excludes Marine Corps, [https://www.secnav.navy.mil/fmc/fmb/Documents/21pres/Highlights\\_book.pdf](https://www.secnav.navy.mil/fmc/fmb/Documents/21pres/Highlights_book.pdf).

The Navy had a good year for recruiting and retention, so its actual active-duty end strength was higher than what had been authorized. (Congress allows the services some leeway.)

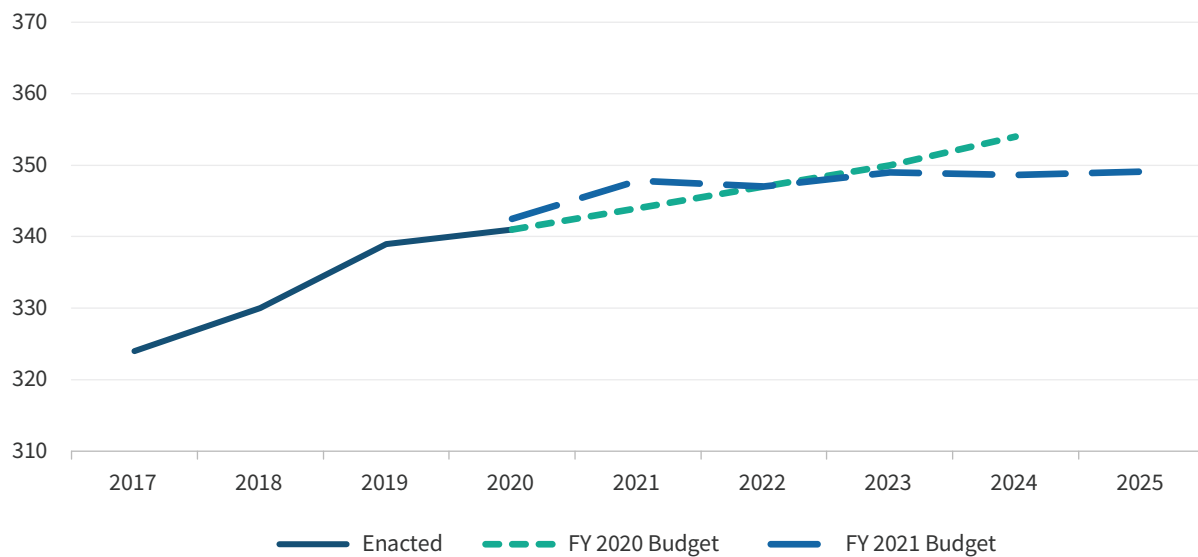
Chart 1: Navy Active-duty Personnel, 1999–2021



Source: Office of the Under Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2021* (Washington, DC: Department of Defense, April 2020), Table 7-5: Department of Defense Manpower, p. 260–262, [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21\\_Green\\_Book.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21_Green_Book.pdf); and Office of the Under Secretary of Defense (Comptroller), *PB 21 Budget Roll Out Brief* (Washington, DC: Department of Defense, February 2020), 13, [https://www.secnav.navy.mil/fmc/fmb/Documents/21pres/DON\\_Press\\_Brief.pdf](https://www.secnav.navy.mil/fmc/fmb/Documents/21pres/DON_Press_Brief.pdf).

Navy personnel levels have been on a roller coaster, reaching a high of 383,000 in FY 2002 and a low of 318,000 in FY 2012. The number has crept back up, but the Navy is still far below its pre-9/11 size. However, the number of sailors tracks roughly to the number of ships in the fleet (see Chart 2).

Chart 2: Navy Active-duty Personnel Projections



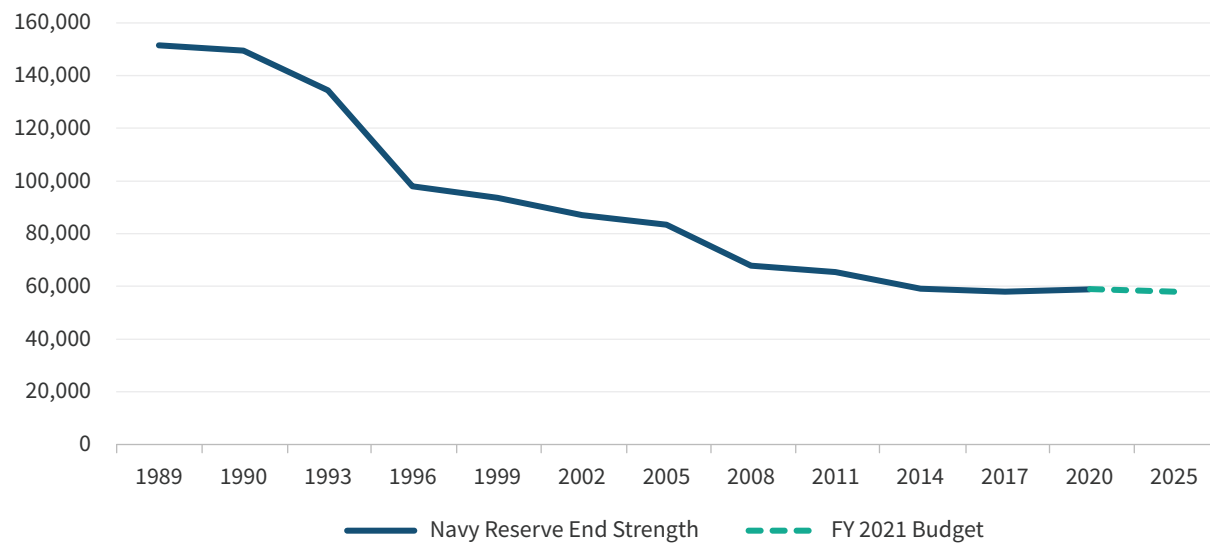
Source: Office of the Under Secretary of Defense (Comptroller), National Defense Budget Estimates for FY 2021 (Washington, DC: Department of Defense, April 2020), Table 7-5: Department of Defense Manpower, p. 260-262, [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21\\_Green\\_Book.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21_Green_Book.pdf).

The Navy projects that active-duty end strength will continue to grow, reaching 349,100 by FY 2025. However, unlike its projection last year and for several past years, this projection levels off.

This does not look like a personnel plan for 355 ships or 500+ ships. Indeed, just last year, the Navy said it was 6,200 sailors short in the fleet.<sup>1</sup> Instead, this projection looks like a placeholder designed to save money until a long-term fleet plan is put in place.

1. Sam LaGrone, "Fleet Forces: Navy Short 6200 at Sea Sailors Now to Meet New Manning Requirements," USNI News, February 26, 2019, <https://news.usni.org/2019/02/26/fleet-forces-navy-short-6200-at-sea-sailors-now-to-meet-new-manning-requirements>.

Chart 3: Personnel in Navy Reserve, 1999–2020



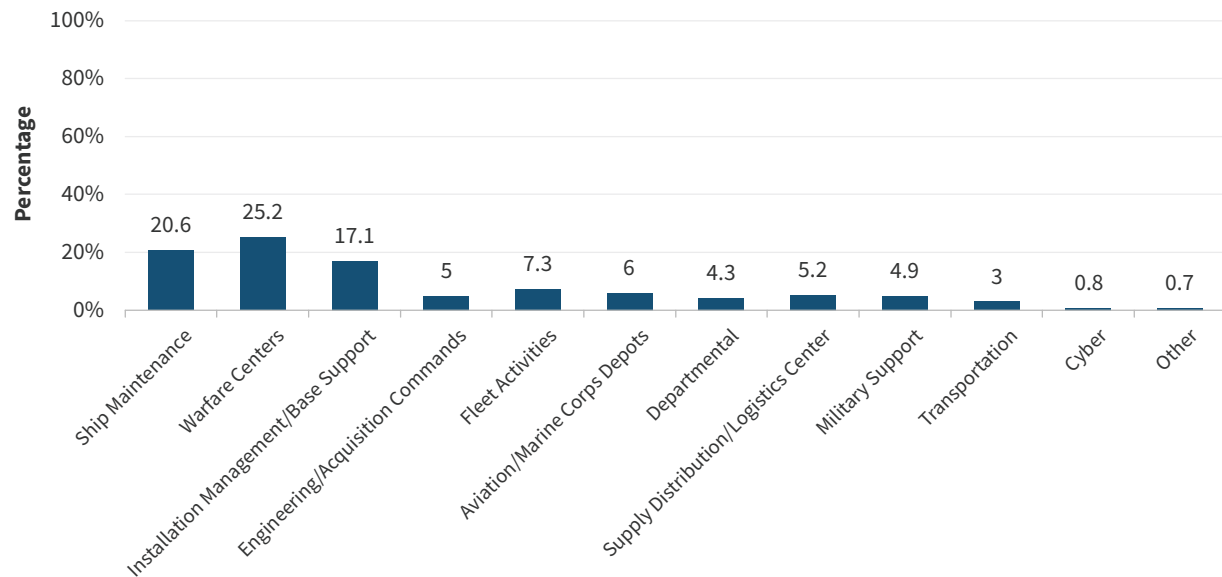
Source: Office of the Under Secretary of Defense (Comptroller), National Defense Budget Estimates for FY 2021 (Washington, DC: Department of Defense, April 2020), Table 7-5: Department of Defense Manpower, p. 260-262, [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21\\_Green\\_Book.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/FY21_Green_Book.pdf).

*[The Navy's personnel] this projection looks like a placeholder designed to save money until a long-term fleet plan is put in place.*

The Navy reserve has been in a long-term decline, unlike other reserve components. Although its end strength has been roughly stable since 2014, by FY 2025 the Navy Reserve will shrink a bit further to 58,000. This long-term decline results from the retirement of all Navy Reserve ships and many Navy Reserve aircraft, so the remaining forces are mainly logistics, support, and staff augmentation. While these have an important role, that role is much narrower than in the reserve components of other services.

The number of civilians increases by 1,700. The Navy, like DOD in general, emphasizes that most civilians work outside Washington and are a critical element of readiness because of the work they do on facilities and maintenance.

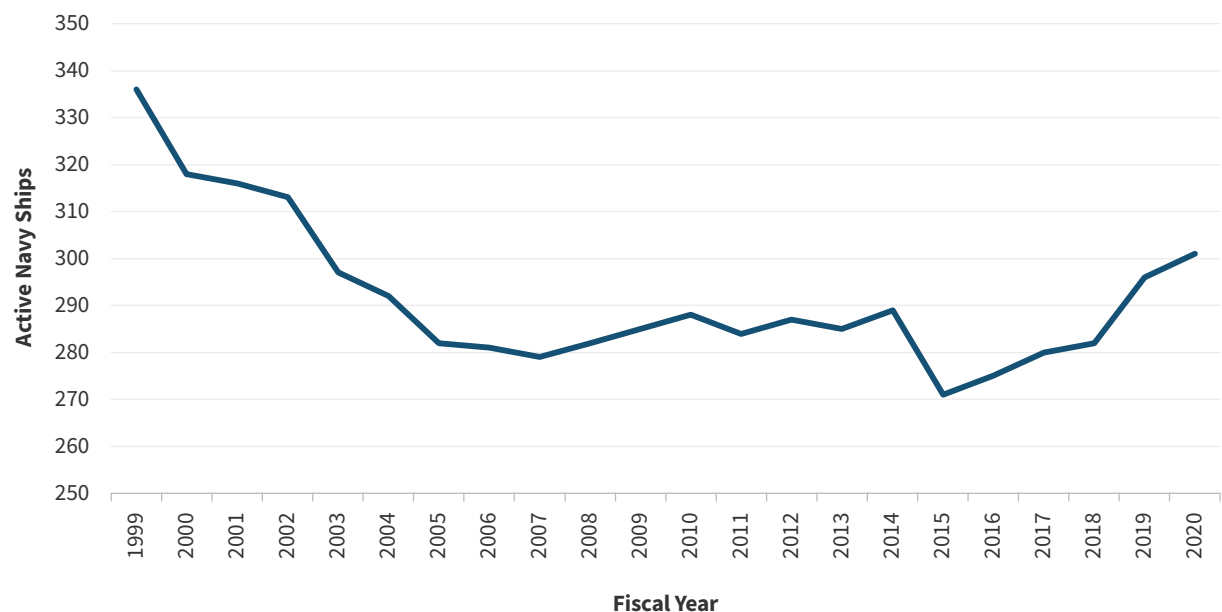
Chart 4: Civilian Manpower Work Areas, FY 2021



Source: Department of the Navy, *Navy Budget Highlights for FY 2021*.

## Fleet Size in FY 2021 and Beyond

Chart 5: Total Navy Active Ships, 1999–2020

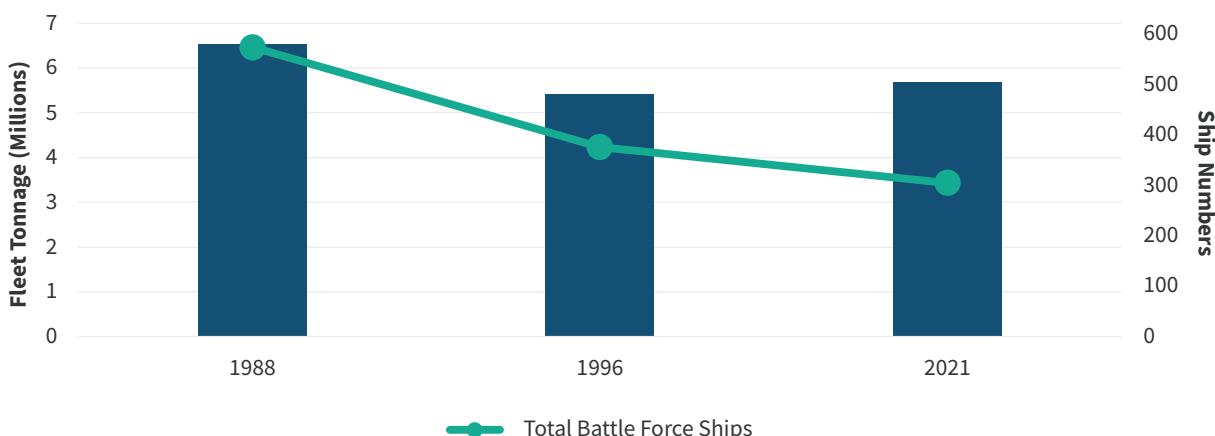


Note: The sharp dip in ship count from 2014 to 2015 was due to the retirement of the last FFG-7 Oliver Hazard Perry-class frigates and to the Navy changing its counting rules briefly in 2014 to include, and then exclude in 2015, patrol coastal craft and hospital ships. Sydney J. Freedberg, Jr., “Outrage On Capitol Hill As Navy Changes Ship-Counting Rules,” *Breaking Defense*, March 11, 2014, <https://breakingdefense.com/2014/03/outrage-on-capitol-hill-as-navy-changes-ship-counting-rules/>.

Source: Ship count 1999–2016 data from “U.S. Ship Force Levels: 1886 to Present,” Naval History and Heritage Command, <https://www.history.navy.mil/research/histories/ship-histories/us-ship-force-levels.html#2000>. Current and projected ship count from Department of the Navy, *FY 2021 President’s Budget*, 5, 15.

After years of shrinkage, the fleet is growing as new ships are delivered, particularly the numerous littoral combat ships (LCSs) and DDG-51 destroyers. (Rightly or wrongly, the ship count is often used as a measure of Navy capacity.<sup>2</sup>) The Navy hit 297 ships by the end of FY 2020 and will reach 306 ships at the end of FY 2021, up from its low point of 271 in 2015.

Chart 6: Ship Count and Tonnage of Navy Battle Force, 1988, 1996, 2019



Source: Ship numbers, see previous chart; tonnage from Richard Sharpe, *Jane's Fighting Ships 1988* (New York: Jane's Pub., 1988); Sharpe, *Jane's Fighting Ships 1996* (New York: Jane's Pub., 1996); Stephen Saunders, *Jane's Fighting Ships 2019-2020* (New York: Jane's Pub, 2019); and "U.S. Navy Ships," U.S. Navy, [https://www.navy.mil/navydata/our\\_ships.asp](https://www.navy.mil/navydata/our_ships.asp).

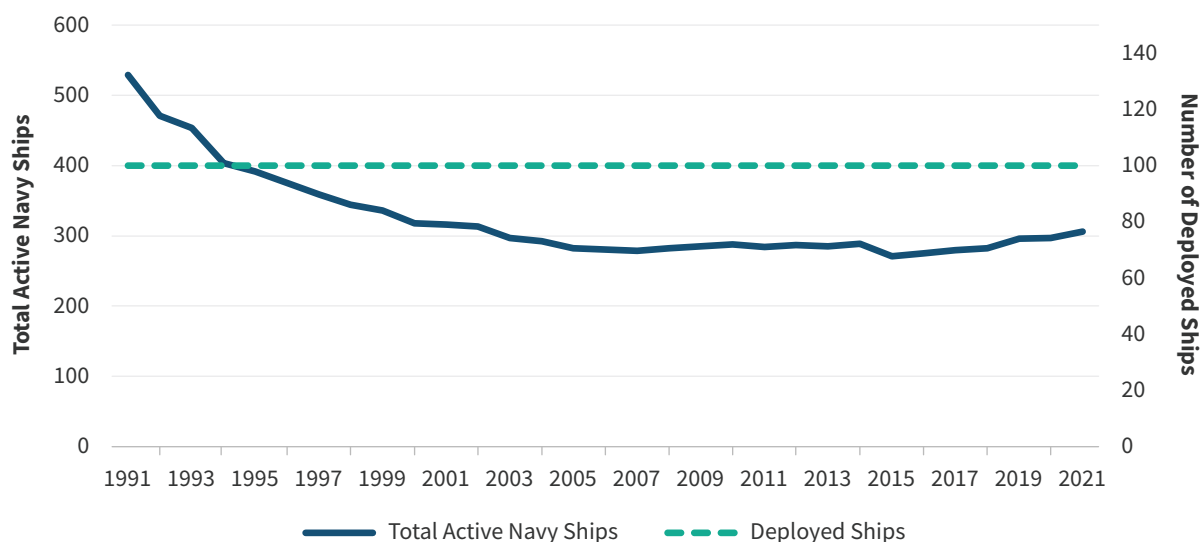
*After years of shrinkage, the fleet is growing as new ships are delivered, particularly the numerous littoral combat ships (LCSs) and DDG-51 destroyers.*

In part, the decline in ship numbers resulted from Navy decisions to buy bigger, and more expensive, ships. As the chart on tonnage shows, today's fleet has 54 percent of the number of ships of 1988 (303 versus 565) but 87 percent of the tonnage. Today's DDG-51 destroyer (Flight IIA) displaces 9,700 tons, twice the tonnage of a 1980s Charles F. Adams-class destroyer and four times the tonnage of a World War II Fletcher-class destroyer (2,500 tons). Indeed, the DDG-51 has the tonnage of a World War II cruiser. The increased size produces greater capability, but ships can only be in one place at a time.

2. Admiral James Winnefeld, for one, argues that focus on ship count distorts decisionmaking: James Winnefeld, "Charting a New Course for the U.S. Navy," *Boston Globe*, November 8, 2015, <https://www.bostonglobe.com/opinion/2015/11/08/charting-new-course-for-navy/rJeaDKEDlZiXkpKEXIAFlN/story.html>.

## The Unrelenting Demands of Current Operations

Chart 7: Navy Fleet Size and Deployment Levels



Source: Ship count from Chart 5; deployment levels from Department of the Navy, *FY 2021 President's Budget*, 5.

The average number of ships deployed has remained at the current level of about 100 for three decades, even though the number of ships has declined over time. The need to deploy to Europe, a theater largely ignored since the end of the Cold War, adds to demands. The CENTCOM commander still wants carriers and naval presence.<sup>3</sup> To better cover the Atlantic, the Navy reactivated the Second Fleet headquarters in Norfolk.

The Navy reports that it can fulfill only about half of the theater commanders' requests for Navy ships.<sup>4</sup> Because these theater requests are not resource constrained, it is unsurprising that the requests greatly exceed what is available.

This shortfall engenders a concern that the Navy is too small for the tasks that it is being asked to perform, hence the drive to expand.

On the other hand, the *National Defense Strategy* (NDS) calls for a focus on great power conflict, specifies the need for high-end capabilities, downplays the need for force expansion, and states an intention to reduce day-to-day demands.

## The Collapse of the 355-Ship Fleet Goal

After candidate Trump, who had called for a 350-ship Navy, won the 2016 election, the Navy did a quick force structure assessment and came up with a new goal of 355 ships.

3. John Grady, "CENTCOM Commander: Middle East Aircraft Carrier Presents Key to Deterring Iran," USNI News, March 11, 2020, <https://news.usni.org/2020/03/11/centcom-commander-middle-east-aircraft-carrier-presence-key-to-deterring-iran>.

4. John M. Richardson, "Statement of Admiral John M. Richardson," Testimony before the House Committee on Appropriations, Subcommittee on Defense, Hearing on the United States Navy and Marine Corps, 115th Cong., 2nd sess., January 18, 2018, <https://docs.house.gov/meetings/AS/AS03/20180118/106784/HHRG-115-AS03-Wstate-RichardsonJ-20180118.pdf>.

Compared with the 2014 goal of 308 ships, the Navy's 355-ship goal added numbers in several categories but especially submarines (+18) and large surface combatants (LSCs) (+16). It focused on existing and proven ship types and included none of the nontraditional ships contained in many more recent alternative force structure proposals. The intention was to get ships built quickly, without the delay and risk of development programs.

Both the president and Congress endorsed the Navy's 355-ship goal ("It shall be the policy of the United States to have available, as soon as practicable, not fewer than 355 battle force ships").<sup>5</sup>

However, the 355-ship goal collapsed because of strategy and money. The strategic problem was that it did not explicitly include unmanned systems, which were attracting a lot of attention, and by focusing on large and expensive ships, it did not seem consistent with a developing strategy of dispersed operations for combat in the Western Pacific.

The other problem was that the goal was just too expensive. The Navy's FY 2020 30-year shipbuilding plan calculated spending at \$20.3 billion per year through FY 2024 and \$26 billion to \$28 billion beyond FY 2024, but the Congressional Budget Office (CBO) calculated a cost of \$31 billion per year.<sup>6</sup> That was "50 percent larger than the Navy's average funding for shipbuilding over the past five years."<sup>7</sup> The Congressional Research Service came to similar conclusions.<sup>8</sup>

The Navy considered closing this gap between its fleet goal and its resources by extending the life of existing ships by 5 to 19 years.<sup>9</sup> Keeping the hull, mechanical, and engineering systems going this long was possible, given appropriate maintenance. In the past, however, the Navy has retired ships early to free funds for new construction and because of concerns that the combat systems were becoming obsolete. Further, even with service-life extensions, the Navy still needed more money.

Through the fall of 2019 and into the early winter of 2020, the Navy tried but failed to come up with a viable FY 2021 30-year shipbuilding plan. There were too many constraints:<sup>10</sup>

- The Navy suggested getting more money, but the other services pushed back immediately;
- The Navy raised the possibility of changing the way ships are counted, by including in the count unmanned and different kinds of ships, but Congress has always been suspicious, seeing this as a way of cutting the Navy while keeping the appearance of size;
- The Navy proposed changing the 355-ship goal, but that was inflexible having been endorsed by the president and fixed in statute; and

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5. U.S. Congress, House, *National Defense Authorization Act for Fiscal Year 2018*, HR 2810, 115th Cong., 1st sess., December 12, 2017, Section 1025, <https://www.congress.gov/bill/115th-congress/house-bill/2810/text>.

6. For Navy costs, see Chief of Naval Operations, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020* (Washington, DC: DOD, March 2019), [https://www.navy.mil/strategic/PB20\\_Shipbuilding\\_Plan.pdf](https://www.navy.mil/strategic/PB20_Shipbuilding_Plan.pdf).

7. For CBO costs, see: Eric Labs, *An Analysis of the Navy's Fiscal Year 2020 Shipbuilding Plan* (Washington DC: Congressional Budget Office, October 2019), 3, <https://www.cbo.gov/system/files/2019-10/55685-CBO-Navys-FY20-shipbuilding-plan.pdf>. Because the Navy did not publish a 30-year shipbuilding plan for the FY 2021 budget, CBO's analysis of the FY 2020 shipbuilding plan is the most recent.

8. Ronald O'Rourke, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, CRS Report No. RL32665 (Washington, DC: Congressional Research Service, July 2019), <https://fas.org/sgp/crs/weapons/RL32665.pdf>.

9. Sydney Freedberg, "Keep Ships Longer To Boost Fleet Size: 355 Ships By 2035," *Breaking Defense*, June 20, 2018, <https://breakingdefense.com/2018/06/keep-ships-longer-to-boost-fleet-size-355-ships-by-2035/>.

10. For a complete discussion, see Mark Cancian and Adam Saxton, "The Spectacular and Public Collapse of Navy Force Planning," *Breaking Defense*, January 28, 2020, <https://breakingdefense.com/2020/01/the-spectacular-public-collapse-of-navy-force-planning/>.

- The Navy proposed finding savings elsewhere in its budget and then shifting these funds to shipbuilding but found this difficult.

With the Navy unable to find a feasible solution, Secretary Esper, in a bureaucratic slap at the Navy, took over development of the Navy's force structure plan.

### *The Esper Force Structure Assessment*

Although DOD had announced its intention to release the plan "in the summer," DOD repeatedly delayed publication, greatly annoying Congress.<sup>11</sup> Finally, on October 7, Secretary Esper presented the outlines of a future fleet. This future fleet, which he called "Battle Force 2045," described the major elements but lacked detail. There was no written product to back up his oral presentation.<sup>12</sup>

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In developing this future fleet, Esper took inputs from the Navy, the Office of Cost Assessment and Program Evaluation, and a study by the Hudson Institute.<sup>13</sup>

Esper described this as a 500+ ship fleet, including both manned and unmanned vessels/vehicles.<sup>14</sup> He indicated that it would "reach 355 traditional battle force ships prior to 2035."

Although Esper did not give a cost, he acknowledged the need for additional resources, calling for shipbuilding funds to rise to the level of the Reagan buildup. He stated that these funds would not come from other services but from the Navy internally and savings from DOD overhead.<sup>15</sup>

CSIS calculated an annual shipbuilding cost of \$28.5 billion for this future plan (a total shipbuilding appropriation of about \$30.6 billion when other costs, such as small craft and outfitting, are included). Near-term costs would likely be higher to build up to the numbers specified. This was about the level of CBO's analysis of the 355-ship Navy.<sup>16</sup> Savings from procurement of smaller and less expensive ships were offset by larger numbers.

11. Paul McLeary, "EXCLUSIVE SecDef Esper Seeks Detente with HASC; New Navy Plan This Summer," Breaking Defense, February 28, 2020, <https://breakingdefense.com/2020/02/exclusive-secdef-esper-seeks-detente-with-hasc-new-navy-plan-this-summer/>.

12. "Defense Secretary Discusses National Defense Strategy," (event, CSBA, Washington, DC, October 6, 2020), <https://www.defense.gov/Watch/Video/video/768646/>.

13. Brian Clark, Timothy Walton, and Seth Cropsey, *American Seapower at a Crossroads: A Plan to Restore the US Navy's Maritime Advantage* (Washington, DC: Hudson Institute, September 29, 2020), <https://www.hudson.org/research/16406-american-sea-power-at-a-crossroads-a-plan-to-restore-the-us-navy-s-maritime-advantage>.

14. The Navy and DOD are inconsistent in labeling these as unmanned systems as "vessels" or "vehicles." Generally, unmanned surface ships are described as vessels and unmanned undersea systems are described as vehicles. This report follows this practice, using unmanned surface vessels and unmanned undersea vehicles.

15. Paul McLeary, "Navy scours budget to build more ships; SECNAV looks to WWII carriers as model for future," Breaking Defense, October 8, 2020, <https://breakingdefense.com/2020/10/navy-scours-budget-to-build-more-ships-secnav-looks-to-wwii-carriers-as-model-for-future/>.

16. Congressional Budget Office, *Analysis of the Navy's Fiscal Year 2020 Shipbuilding Plan* (Washington, DC: October 2019), <https://www.cbo.gov/system/files/2019-10/55685-CBO-Navys-FY20-shipbuilding-plan.pdf>.

It is important to keep in mind that changes of this magnitude will take decades to implement. The fleet will have mixed ship varieties for many years. Further, this is only a concept. It needs to get into the FY 2022 budget and associated five-year plan with specific numbers for ships and costs. Although the White House is likely to support the plan, that support needs to be manifest in the president's next budget proposal.

The table below was pieced together from his comments and previous news reports. The following section, "The Fleet in FY 2021 and Beyond," contains a detailed description of each ship type and what the Esper proposal would do.<sup>17</sup>

Table 2: Future Fleet Structures

Ship Type	Current Fleet	355-ship Goal	Esper Statement
Aircraft Carriers (CVNs)	11	12	8–11
"Light Carriers"	-	-	6
Attack Submarines (SSNs)	50	66	70–80
Cruise Missile Submarines (SSGNs)	4	-	-
Large Unmanned Undersea Vehicles	-	-	140–240
Large and Medium Unmanned Surface Vessels	-	-	140–240
Large Surface Combatants (CGs/DDGs)	92	104	Unstated, but likely 80–90
Small Surface Combatants (FFs/LCSs/mine warfare)	30	52	60–70
Amphibious Ships	33	38	50–60
Combat Logistics Force	29	32	70–90
Expeditionary Fast Transports and Support Base Ships	34	16	
Command and Support Ships		23	
Ballistic Missile Submarines (SSBN)	14	12	12
<b>Total</b>	<b>297</b>	<b>355</b>	<b>500+</b>

Source: For current fleet size, see Department of the Navy, *Highlights of the Department of the Navy FY 2021 Budget* (Washington, DC: Department of Defense, February 10, 2020) Figure 3.2; for the 355 ship goal, see, EXECUTIVE SUMMARY 2016 Navy Force Structure Assessment (FSA) (Washington, DC: Department of Defense, December 14, 2016), [https://news.usni.org/wp-content/uploads/2016/12/FSA\\_Executive-Summary.pdf](https://news.usni.org/wp-content/uploads/2016/12/FSA_Executive-Summary.pdf).

## The Fleet in FY 2021 and Beyond

To understand the future fleet, the place to start is the FY 2021 budget proposal. The president's budget proposed to construct only seven ships in FY 2021: one Columbia-class submarine, one SSN-774 submarine, two DDG-51 destroyers, one FFG(X) frigate, one large amphibious assault ship, and one auxiliary. Congress might add ships in its final bills as it customarily does, another submarine being the most likely addition, but the number of ships funded in FY 2021 will be unusually low compared with recent shipbuilding budgets.

17. For a detailed description of Esper's future fleet, see Mark Cancian and Adam Saxton, "Sec. Esper Previews the Future Fleet," CSIS, *Critical Questions*, October 8, 2020, <https://www.csis.org/analysis/secretary-esper-previews-future-navy>.

The reason for the low number is that the Navy shipbuilding account declines from \$24 billion in FY 2020 to \$19.9 billion in FY 2021. One reason for this decline is that the Navy lost money at the last minute of budget preparation as resources shifted from DOD to the Department of Energy's National Nuclear Security Administration for nuclear weapons infrastructure.

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Shipbuilding projections in the five-year plan, the Future Year Defense Program (FYDP), average 8.4 new ships per year, down from 11 per year in the FY 2020 projection.

Table 3: Implied Fleet Size for Shipbuilding Rate and Service Life

Ship construction/year	Average life of 30 years	Average life of 35 years	Average life of 40 years
7 (FY 2021 rate)	210	245	280
8.4 (average in FY 2021 five-year plan)	252	294	336

Source: Department of the Navy, *Navy Budget Highlights for FY 2021*.

Table 3 calculates fleet size with different assumptions about building rate and service life. Although building rates will change over the course of decades, the calculation gives insight into the achievability of the goal.

The calculation shows that the fleet never reaches 355 ships. Under most assumptions, the fleet does not even get to 300 ships. Fleet size does reach 336 ships with heroic assumptions about service life. However, the Navy tends to retire ships at 30 or 35 years, as combat systems become obsolete, and service-life extensions do not produce enough additional useful life to make them worthwhile. Assuming a 35-year service life, the Navy would need to build 10.1 ships per year to eventually reach 355 ships.

The good news in the shipbuilding budget is that with the exception of the Columbia-class SSBN and the new FFG(X), Navy shipbuilding programs are in serial production and moving ahead without major issues (assuming the Ford-class carrier can get its ammunition elevators to work). Thus, the Navy avoids the controversies that plagued it in the 2000s when severe problems with the Ford-class carriers, LCSs, and the DDG-1000s brought into question the Navy's ability to effectively manage shipbuilding programs.

This stability will shortly be upset when the new ship types specified by the future force structure begin the acquisition process.

A near-term risk is that the Navy will retire large numbers of ships early to save money to buy a small number of additional new ships. In that case, it will have the worst of both worlds: high costs and smaller numbers.

## UNMANNED SHIPS

Discussion begins with unmanned ships, not because they are important in the fleet—none have yet gone beyond the experimental stage—but because they figure so prominently in the new force structure and because so much of the discussion regarding the future fleet centers on this new technology.

Unmanned systems, both surface and undersea, currently exist in various forms from essentially conceptual to working prototypes. None yet constitute a program of record whereby the Navy commits to a certain number and builds all the needed support and infrastructure capabilities. How unmanned systems will operate in the fleet, whether the network can handle the bandwidth, and where unmanned surface vessel (USVs) will be based are all unanswered questions.

The Navy is beginning to incorporate unmanned vessels/vehicles into the fleet to distribute capabilities over more platforms and thereby reduce vulnerability in a great power conflict. Unmanned vessels/vehicles can do work that is too dull and dangerous for manned systems. Unmanned systems may also reduce the number of personnel required or at least move personnel to less vulnerable and less stressful locations.

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The Navy has three programs for seagoing unmanned vessels/vehicles: a large USV, a medium USV, and an extra-large undersea vehicle. Table 4 shows acquisition plans. Funding is nonstandard since these are rapid acquisitions. None are currently funded through the regular shipbuilding account. Funding through the RDT&E appropriation implies that the system is experimental; funding through the Other Procurement account implies that it is a sensor, not a weapon.

The lack of an official program of record for unmanned systems and the nonstandard funding is inconsistent with Esper’s plan for major investments. Navy officials have said that concrete plans will be in the FY 2022 budget.<sup>18</sup>

Table 4: Navy Acquisition Plans for Unmanned Surface and Undersea Vessels/Vehicles

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Five-year Total	Funding
Large USV	2	1	2	2	3	10	RDTE, Navy through FY 2022; in SCN (shipbuilding) FY 2023 and out
Medium USV			1			1	RDTE,N
Extra-large UUV			2	2	2	6	Other Procurement, Navy

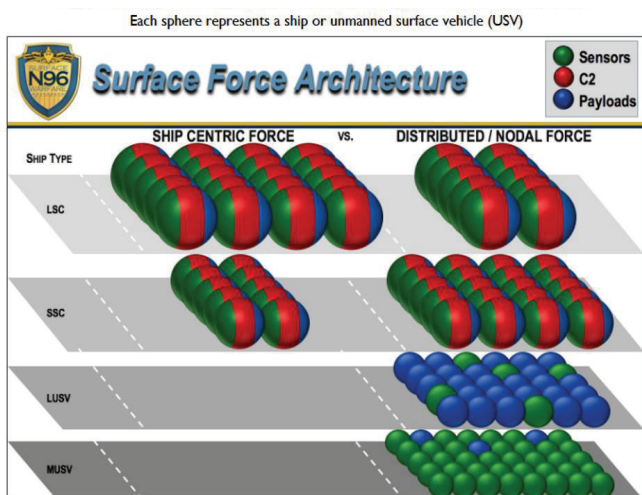
Source: Ronald O’Rourke, Navy Large Unmanned Surface and Undersea Vehicles, CRS Report No. R45757 (Washington, DC: Congressional Research Service, October 2020), 19, <https://fas.org/sgp/crs/weapons/R45757.pdf>.

The Navy has used Chart 8 to explain its plan for surface ships. Large ships (1,000–2,000 tons, the size of a corvette) will be shooters as well as sensors. A medium-sized unmanned vessel (500 tons, about the

18. Thomas Modly, “SECNAV Vector 9,” U.S. Navy, January 31, 2020, <https://www.navy.mil/Resources/ALNAVs/Message/Article/2235534/secnav-vector-9/>.

size of a current patrol craft) is still in the prototype phase (one was procured in FY 2019 for experimental purposes) and would only carry sensors, in effect being a disposable scout for the shooters. Note that the fielding of unmanned vessels will reduce the need for LSCs.<sup>19</sup>

Chart 8: Navy Architecture for Unmanned Surface Vessels



Source: Rear Admiral Casey Moton “Designing & Building the Surface Fleet: Unmanned and Small Combatants,” presentation at the conference of the American Society of Naval Engineers (ASNE), June 20, 2019, slide 2. Cited in Ronald O’Rourke, “Future Force Structure Requirements for the United States Navy,” House Armed Services Committee, Subcommittee on Seapower and Projection Forces, 116th Cong, 2nd session, June 4, 2020, <https://www.congress.gov/116/meeting/house/110772/witnesses/HHRG-116-AS28-Wstate-ORourkeR-20200604.pdf>.

reason, they are more easily accepted. Many of the systems are small, torpedo-like systems for scouting.

The major undersea system is the Extra Large Unmanned Undersea Vehicle (XLUUV), a 50-ton minisub with a modular payload bay so it can execute a variety of missions. Five are under construction as experimental systems. Additional procurements begin in FY 2023, but in the Other Procurement Navy account, not the shipbuilding account.

Congress has supported the concept of unmanned systems but has been skeptical about the Navy’s desire to move quickly before key technologies are proven.

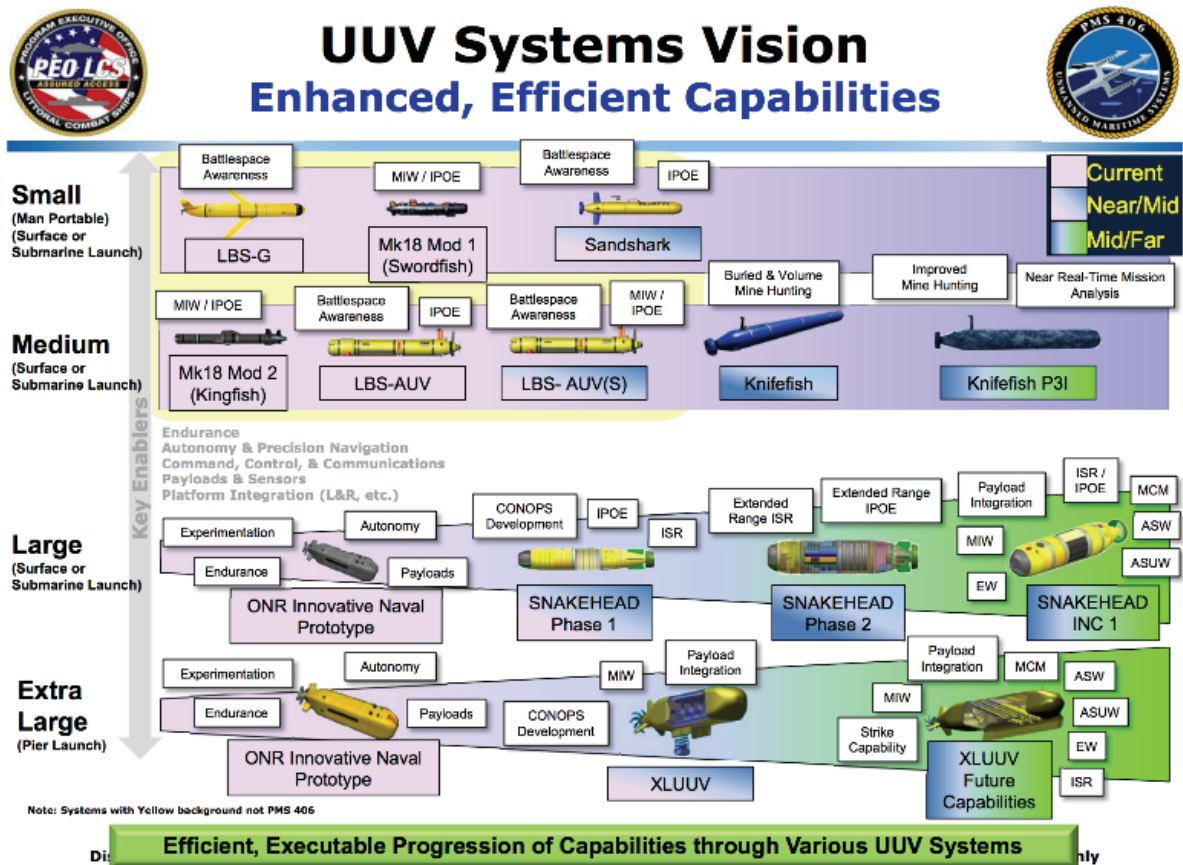
Size is a limitation on USVs. As vessels become larger, they run the risk of becoming too complex for remote operation; small vessels would be appropriate for coastal or harbor operations but become inadequate for ocean seakeeping.

A major limitation of unmanned ships is that they cannot perform many noncombat roles, such as engagement with partners and allies, humanitarian assistance, and gray zone competition.

Chart 9 shows Navy plans for undersea unmanned vehicles (UUVs). The chart is too busy for detailed discussion. The key point is that, unlike surface and air units, subsurface units are seen as complements to manned submarines, not as replacements. For that

19. Ronald O’Rourke, *Navy Large Unmanned Surface and Undersea Vehicles*, CRS Report No. R45757 (Washington, DC: Congressional Research Service, October 2020), 19, <https://fas.org/sgp/crs/weapons/R45757.pdf>.

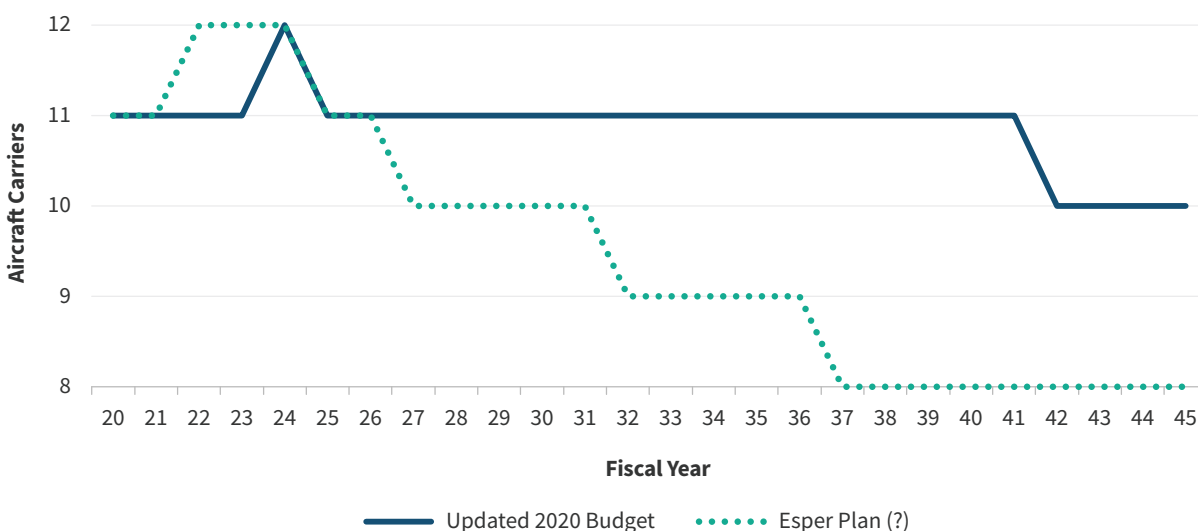
Chart 9: Navy Plans for Unmanned Undersea Vehicles



Source: Pete Small, Unmanned Maritime Systems Update (Washington DC: Department of Defense, January 15, 2019), 2, <https://www.navsea.navy.mil/Portals/103/Documents/Exhibits/SNA2019/UnmannedMaritimeSys-Small.pdf?ver=2019-01-15-165105-297>.

## CARRIERS

Chart 10: Projected Carrier Fleet Size, FY 2020–FY 2045



Note: This and subsequent ship inventory charts use data from last year's 30-year shipbuilding program since no program has been published for FY 2021.

Source: Data from Long-Range Naval Inventory tables in the Chief of Naval Operations, Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2019 (Washington, DC: DOD, February 2018), [https://www.secnv.navy.mil/fmc/fmb/Documents/19pres/LONGRANGE\\_SHIP\\_PLAN.pdf](https://www.secnv.navy.mil/fmc/fmb/Documents/19pres/LONGRANGE_SHIP_PLAN.pdf); and Chief of Naval Operations, Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020 (Washington, DC: DOD, March 2019), [https://www.navy.mil/strategic/PB20\\_Shipbuilding\\_Plan.pdf](https://www.navy.mil/strategic/PB20_Shipbuilding_Plan.pdf). The updated 2020 budget removes the early retirement of the USS Harry Truman in 2024.<sup>20</sup>

The size of the carrier force drives Navy force structure and budgets for two reasons: carriers and their escorts take up most of the shipbuilding budget, and providing aircraft for the carriers takes most of the aviation budget.

Congress established a requirement for a minimum operational carrier force of 11. The Navy's 2016 Force Structure Assessment established a goal of 12, but this is nearly impossible to achieve because of the long lead time needed to build carriers.<sup>21</sup>

## *The size of the carrier force drives Navy force structure and budgets . . .*

Although Secretary Esper gave a range of 8 to 11, he implied that the number would go down. Press reports indicated that the secretary's staff had recommended 9 carriers.<sup>22</sup> However, Admiral Gilday later stated, "[w]hen the report comes out, you'll see the same numbers for the supercarrier force."<sup>23</sup> The Navy and the Office of the Secretary of Defense seem to be in different places here.

20. Occasional one-year dips or spikes in carrier numbers in 2027, 2040, and 2045 have been removed to better portray the long-term differences in the respective shipbuilding plans.

21. Ronald O'Rourke, *Navy Ford Class (CVN-78) Aircraft Carrier Program: Background and Issues for Congress*, CRS Report No. RS20643 (Washington, DC: Congressional Research Service, August 2020), <https://fas.org/sgp/crs/weapons/RS20643.pdf>.

22. David Larter, "Defense Department Study Calls for Cutting Two of the U.S. Navy's Aircraft Carriers," *Defense News*, April 20, 2020, <https://www.defensenews.com/naval/2020/04/20/defense-department-study-calls-for-cutting-2-of-the-us-navys-aircraft-carriers/>.

23. "CNO ADM. Michael Gilday," *Defense One Podcast*, October 14, 2020, <https://www.defenseone.com/ideas/2020/10/ep-79-cno-adm-michael-gilday/169236/>.

Aircraft carriers have long been criticized by strategists because of their high cost and perceived vulnerability. Many strategists see large aircraft carriers as “legacy” systems. A recent House Armed Services Committee study tentatively suggested to “shift funding from a single aircraft carrier and instead use multiple unmanned aerial vehicles.”<sup>24</sup>

However, the highly visible usefulness of aircraft carriers for day-to-day crisis response and regional conflicts gives them a lot of support.<sup>25</sup> Pushed by Congress and a highly attractive offer from Huntington Ingalls Industries, the carrier builder, the Navy executed a two-carrier procurement in January 2019.<sup>26</sup> This double procurement had the effect of locking in carrier construction for a decade.

Faced with an institutional, political, and industrial need to continue building large nuclear-powered aircraft carriers, the Navy has periodically proposed retiring old carriers early, instead of doing a midlife extension, and will likely propose the same in the future. However, Congress rejected both previous proposals to do this, for the USS *George Washington* (CVN-74) and USS *Harry Truman* (CVN-75), and the Navy quickly backed down. The incongruity of buying new carriers while retiring old ones early was hard to justify. Further, such an approach constituted the highest-cost strategy for carrier procurement, since a year of operational life gained from a midlife extension is much less costly than a year gained from new construction.<sup>27</sup>

Chart 10 assumes that the Navy continues to build nuclear aircraft carriers every five years (five-year “centers,” to use the Navy term, because funding is spread over eight years) but retires the next three Nimitz-class carriers early, consistent with what it has tried to do recently. If Congress refuses to go along, then the carrier levels will stay at the level of the FY 2020 plan. The Navy could propose building carriers on a slower timeline, for example, on eight year “centers,” but carrier advocates have prevailed against such a slowdown in the past.

**“Light” carriers:** The idea of a “light” carrier—something smaller than the large CVN—has been around for decades. Recently, a RAND study indicated that such carrier options might be attractive.<sup>28</sup> Several commentators, such as Senator John McCain in 2017, proposed building smaller carriers on the America-class landing helicopter assault (LHA) design. In 2019, then-Undersecretary Thomas Modly stated that the \$13 billion cost of a Ford-class carrier was “unsustainable,” thus reinforcing the case for a lighter alternative.<sup>29</sup>

Esper’s future Navy has “up to six” light carriers to supplement the CVN “supercarriers,” as he called them. He raised the possibility of using the USS *America* “as a model.” The assumption in this CSIS analysis is that

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24. House Armed Services Committee, *Future of Defense Task Force Report 2020* (Washington, DC: U.S. House, September 23, 2020), 67, [https://armedservices.house.gov/\\_cache/files/2/6/26129500-d208-47ba-a9f7-25a8f82828b0/6D5C75605DE8DDF0013712923B4388D7.future-of-defense-task-force-report.pdf](https://armedservices.house.gov/_cache/files/2/6/26129500-d208-47ba-a9f7-25a8f82828b0/6D5C75605DE8DDF0013712923B4388D7.future-of-defense-task-force-report.pdf).

25. Examples of the carrier debate this year: Talbot Manvel, “Aircraft Carriers: Bigger Is Better,” U.S. Naval Institute, *Proceedings*, September 2020, <https://www.usni.org/magazines/proceedings/2020/september/aircraft-carriers-bigger-better>. And the response, Philip Pournelle, “Overemphasis on efficiency can endanger the fleet,” U.S. Naval Institute, *Proceedings*, Letter to the editor, October 2020. Also, Loren Thompson, “Claims of Aircraft Carrier Vulnerability Are False, but the Versatility Is Real,” *Forbes*, June 9, 2020, <https://www.forbes.com/sites/lorenthompson/2020/06/09/claims-of-aircraft-carrier-vulnerability-are-false-but-the-versatility-is-real/#73c7a6ab591a>.

26. For an extended discussion of the carrier debate, see Mark Cancian, *U.S. Military Forces in FY 2018: The Uncertain Buildup* (Washington, DC: CSIS, October 2017), p. 62, <https://www.csis.org/analysis/us-military-forces-fy-2018>.

27. Mark Cancian, “Penny Wise and Pound Foolish: The Navy’s Carrier Construction Strategy,” U.S. Naval Institute, *Proceedings*, March 2019, <https://www.usni.org/magazines/proceedings/2019/march/penny-wise-and-pound-foolish-navys-carrier-construction-strategy>.

28. Bradley Martin and Michael McMahon, *Future Aircraft Carrier Options* (Santa Monica, CA: RAND Corporation, 2017), [https://www.rand.org/pubs/research\\_reports/RR2006.html](https://www.rand.org/pubs/research_reports/RR2006.html).

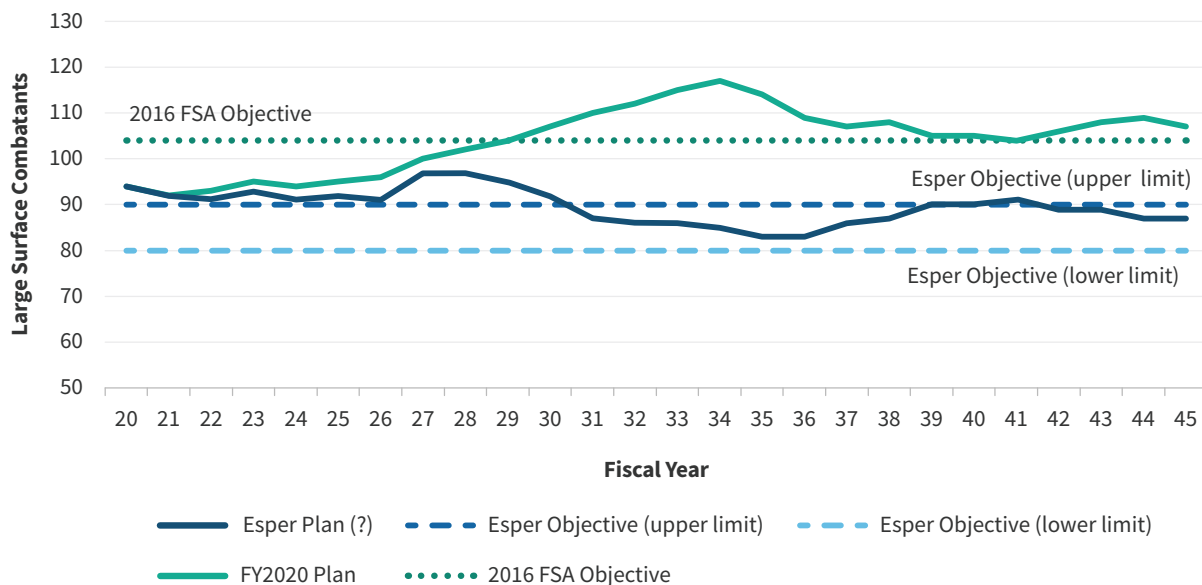
29. Justin Katz, “Modly: \$13B carriers are not affordable, but what’s next is not clear,” *Inside Defense*, February 14, 2019, <https://insidedefense.com/daily-news/modly-13b-carriers-are-not-affordable-whats-next-not-yet-clear>.

these light carriers are repurposed helicopter carriers, not new builds. Currently there are 11 helicopter carriers intended for amphibious missions and classed as amphibious ships (an “L” designator). However, they have large flight decks from which the short takeoff and landing version of the F-35 (B model) can fly. Strategists have long proposed using these ships as aircraft carriers for non-amphibious missions such as power projection and sea control.

Admiral Gilday muddled the waters by talking about the light carrier as the “aviation combatant of the future,” noting that the time horizon was 2045. This implies a specifically designed ship far in the future, a concept that seems entirely different from the near-term capability that Esper implied.<sup>30</sup>

## LARGE SURFACE COMBATANTS

Chart 11: Projected Large Surface Combatants, FY 2020–FY 2045



Note: Lines for the “Esper plan” are estimates, hence the question mark. This is the same for the following charts.

Source: Chief of Naval Operations, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020* (Washington, DC: DOD, March 2019), [https://www.navy.mil/strategic/PB20\\_Shipbuilding\\_Plan.pdf](https://www.navy.mil/strategic/PB20_Shipbuilding_Plan.pdf).

Large surface combatants (LSCs) are destroyers and cruisers. Historically, these constituted the backbone of the service fleet. However, as indicated in Chart 8, the fielding of unmanned vessels may reduce the number of LSCs even as they increase the number of small-scale combatants. Indeed, the Navy’s director of surface warfare said, “the future force mix is one that favors a ratio of small surface ships and unmanned surface vessels.”<sup>31</sup> Although Esper did not discuss large combatants, other sources put the number for the future fleet at 80 to 90.<sup>32</sup> This is substantially below the goal in the 355-ship fleet (104 LSCs) but about where the fleet is today (92).

30. Patrick Tucker, “Chief of Naval Operations Outlines Plans for Drones, Many Carriers,” *Defense One*, October 13, 2020, <https://www.defenseone.com/policy/2020/10/chief-naval-operations-outlines-future-drones-minicarriers/169204/>.

31. Jason Sherman, “New Future Surface Combatant Fleet Analysis Validates Contribution of Medium, Large USVs,” *Inside Defense*, January 22, 2020, <https://insidedefense.com/daily-news/new-future-surface-combatant-fleet-analysis-validates-contribution-medium-large-usvs>.

32. David Larter, “Defense Department Study Calls for Cutting Two of the Navy’s Aircraft Carriers,” *Defense News*, April 20, 2020, <https://www.defensenews.com/naval/2020/04/20/defense-department-study-calls-for-cutting-2-of-the-us-navys-aircraft-carriers/>.

**DDG-51 Destroyers:** The program is on track, with 85 currently funded or delivered. Ships built since 2010 incorporate a ballistic missile defense capability. The most current version is the Flight III configuration with a more powerful radar, called the AN/SPY-6 Air and Missile Defense Radar.

In April 2018, the Navy announced that it wanted to extend the service lives of all DDG-51s to 45 years—an increase of 5 or 10 years over previous plans—in order to reach the numbers required for the 355-ship goal. However, the Navy recently announced plans to retire the first four DDG-51s rather than upgrade them, thus putting in question its extended life plan.<sup>33</sup>

The FY 2020 plan showed the Navy procuring 13 DDG-51s from FY 2021 to FY 2025, a level sufficient to maintain a fleet of 85. The FY 2021 plan shows procurement of only 9 over the same period. The Navy's plan may be to reduce production of these ships until the inventory gets down to the target levels.

**DDG-1000 Zumwalt Destroyers:** These three stealthy, high-technology destroyers (at 14,500 tons, larger than Ticonderoga-class cruisers and, indeed, the size of pre-World War I battleships) are still having problems. The total buy was cut in the 2000s from 32 to 3, with 47 percent cost growth. The lead ship was commissioned in 2016, but delivery was delayed to late 2020 because of a series of serious engineering casualties. The other two ships have now been delivered, but neither has made a deployment. Further, the ships' 155mm guns, originally a primary justification for the ship, have become ineffective with cancellation of the long-range munition that they were to fire.<sup>34</sup>

**CG-47 Cruiser Modernization:** The Navy proposes to modernize only 7 of the 11 newest cruisers, not all 11 as had been the plan last year. Concerned about a shrinking ship inventory, Congress has repeatedly balked at retiring these ships in the past. Esper's plan likely assumes retirement of these cruisers since there is no need to expand the LSC force.

**Next generation LSC:** Shipbuilding plans continue to show some version of a next-generation LSC ("DDG Next") but in the future beyond the FYDP-period, indicating that such plans are in flux.

The projection assumes that the CG-47 class retires without modernization and that the service lives of the DDG-51s are not extended. The projection stays above the Esper target because so many previously ordered ships deliver but falls into the target zone as decommissionings increase.<sup>35</sup>

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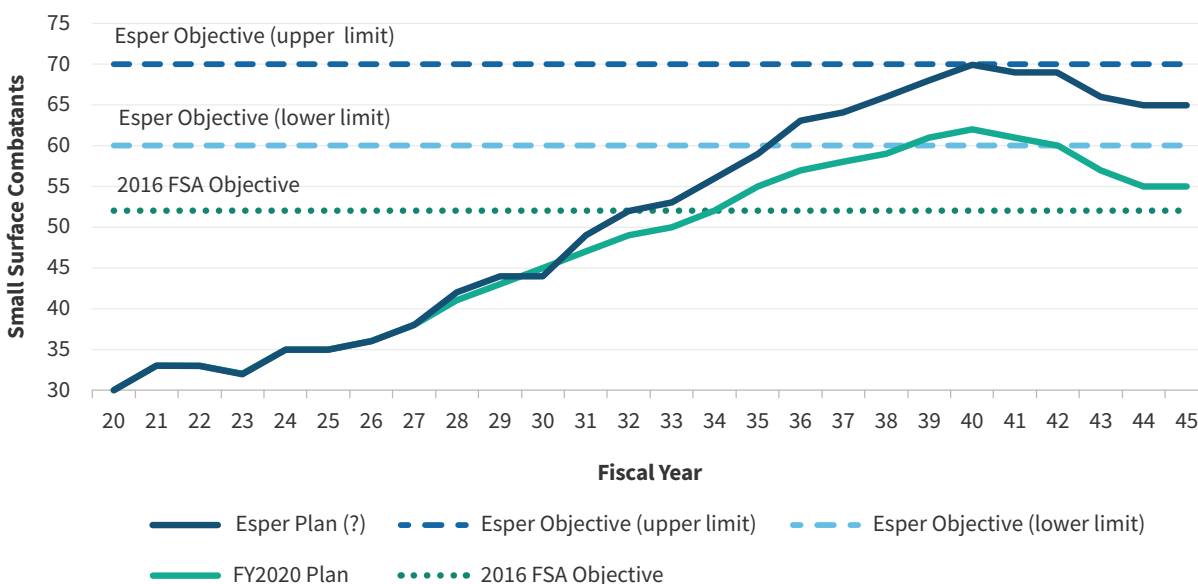
33. Mallory Shelborne, "Navy Cancels DDG 51 Service Life Extensions," Inside Defense, March 9, 2020, <https://insidedefense.com/daily-news/navy-cancels-ddg-51-service-life-extensions>.

34. Ronald O'Rourke, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, CRS Report No. R32109 (Washington, DC: Congressional Research Service, July 28, 2020), <https://fas.org/sgp/crs/weapons/RL32109.pdf>.

35. My thanks to Eric Labs of the Congressional Budget Office for this projection of LSCs.

## SMALL SURFACE COMBATANTS

Chart 12: Projected Small Surface Combatants, FY 2020–FY 2045



Source: Chief of Naval Operations, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*.

Small surface combatants (SSCs) are frigates, LCSs, and mine countermeasures ships.<sup>36</sup>

Although smaller and less capable than cruisers and destroyers, they cost half as much.

During the Cold War, SSCs had a wartime mission of escorting convoys. This mission disappeared after the Cold War, and SSCs went out of favor. However, interest has renewed in an environment of a great power competition where adversaries can reach out extended distances and threaten U.S. sea lines of communication. SSCs are also useful for providing a more distributed naval force structure to operate within an adversary's defensive zone. They can operate in shallower waters such as the South China Sea and provide a secondary benefit of increasing total fleet numbers, therefore allowing the Navy to be present in more places globally.

In Secretary Esper's future force, the goal for SSCs increases from 52 to between 60 and 70. This force will consist of LCSs and the follow-on frigates.

Because LCSs with mine countermeasure modules are now entering the fleet, the Navy proposes to phase out the mine countermeasures ships (MCM-1 Avenger-class), retiring all by 2024, a one-year delay from last year's plan. This class of ship disappears from the fleet, replaced by sensors on other ships such as LCSs.

The LCS classes are now entering the fleet in large numbers, typically two to three per year. However, performance of the LCS classes is widely regarded as disappointing, and production has now ended. The Navy proposes retiring the first four ships instead of upgrading them.

Replacing the LCS program is a follow-on frigate program, FFG(X), that will be multi-mission, like the earlier FFG-7 class, and not single-mission like the LCSs. The first ship was authorized in FY 2020 and

36. The Navy includes patrol craft in this category but not in the battle force inventory and so are excluded here. The general rule is that ships must be able to deploy overseas on their own to count, and patrol craft are too small.

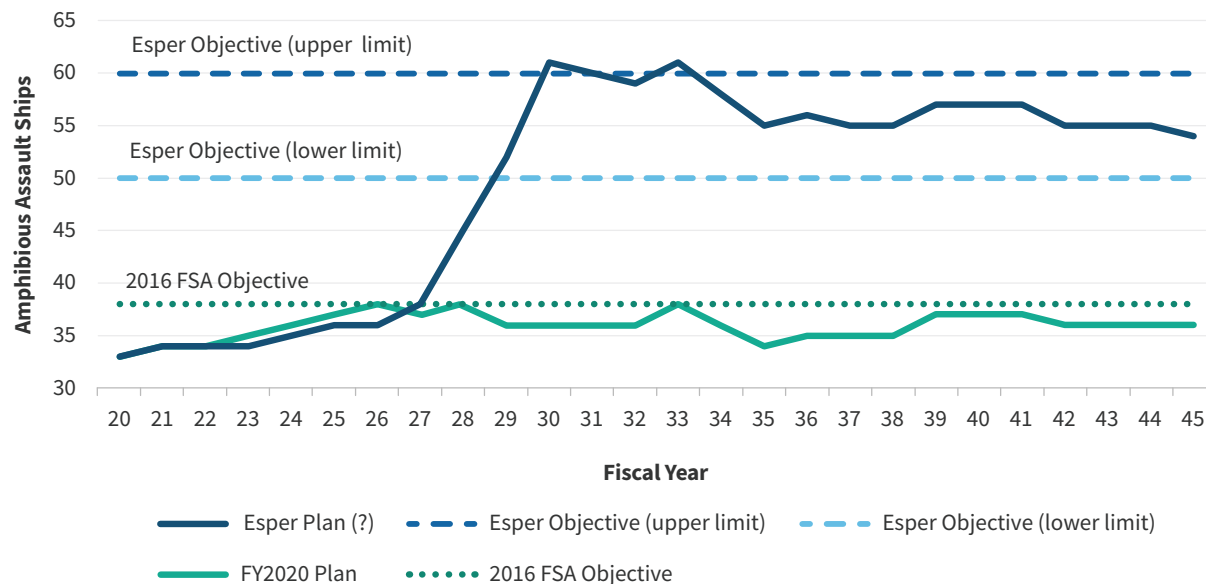
another ship is proposed for FY 2021. To speed introduction of the class and to reduce risk, both driven by the experience of the LCS program, bidders were required to use an existing design. A team led by Fincantieri/Marinette Marine won the competition with a European design. Using a foreign design is highly unusual and reflects the Navy's desire for speed and risk reduction.

The Navy's FY 2020 shipbuilding plan showed procurement of two FFG(X)s every year from FY 2021 to FY 2029. However, the FY 2021 five-year plan shows one in FY 2021 and FY 2022 and two per year after that. This phasing will delay entry of larger numbers into the fleet but is prudent given the difficulties typically encountered with new ship classes.<sup>37</sup> Eventually, however, production will need to increase if the fleet is to reach the goals set out by Esper. The projection assumes a "2-3-2-3" profile beginning FY 2024.

The phasing may mitigate technical risk, but there is also risk of cost growth. The CBO places the cost per ship at potentially 40 percent higher than the Navy is currently estimating. That would be a major challenge for the program.<sup>38</sup>

## AMPHIBIOUS SHIPS

Chart 13: Projected Amphibious Assault Ships, FY 2020–FY 2045



Source: Chief of Naval Operations, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*.

Plans for the amphibious fleet have been thoroughly disrupted in the last year. For many years, the Navy and Marine Corps goal was 38 large ships—landing helicopter assault/decks (LHAs/LHDs), dock landing platforms (LPDs), dock landing ships (LSDs). This goal was calculated by the need to launch an amphibious operation of two Marine expeditionary brigades (17 ships each) plus a 10 percent margin for maintenance.

37. Ronald O'Rourke, *Navy Constellation (FFG-62) Class Frigate (Previously FFG[X]) Program: Background and Issues for Congress*, CRS Report No. R44972 (Washington, DC: Congressional Research Service, July 2020), <https://fas.org/sgp/crs/weapons/R44972.pdf>.

38. Eric Labs, *The Cost of the Navy's New Frigate*, Congressional Budget Office, October 2020, <https://www.cbo.gov/system/files/2020-10/56669-New-Frigate-Program.pdf>.

General Berger, in his commandant's guidance (described in detail in the Marine Corps chapter) rejected this methodology. He argued that large amphibious ships appear vulnerable in a great power conflict, and the ability of the Navy and Marine Corps to execute a classic landing in the high-threat environment foreseen by the NDS seemed doubtful: "Visions of a massed naval armada nine nautical miles off-shore in the South China Sea preparing to launch the landing force in swarms of ACVs, LCUs, and LCACs are impractical and unreasonable."<sup>39</sup>

Instead, he proposed smaller amphibious ships that would be more distributed, with the loss of any individual ship less catastrophic. This would reverse a long-standing trend toward larger and more capable ships, which are more efficient for moving Marine forces and for peacetime presence but expensive and limited in number.

Navy and Marine Corps officials have floated 28 to 30 as a possible fleet size for these small amphibious ships, tentatively called a "light amphibious warship," with first funding in FY 2023. These would indeed be small, carrying 30 to 40 crew and 70 Marines. This would make them about the size of a World War II landing craft infantry (LCI), much smaller than the De Soto County-class tank landing ship (LSTs) of the 1960s to 1990s and even smaller than World War II LSTs.<sup>40</sup>

The future amphibious fleet projection in Chart 13 shows the implication of the Navy's tentative construction program: 3 in FY 2023, 6 in FY 2024, 10 in FY 2025, and 9 in FY 2026 (commissioning assumed to be two years after funding). The projection assumes that 6 of the LHAs/LHDs are subtracted from the amphibious fleet and attributed to the carrier fleet. That brings the total down into the target range.

The FY 2021 budget continues buying large amphibious ships. It proposes buying one LPD flight II (the second in the class) and buying one every two years in the longer term.

The large deck helicopter carriers, LHA-6-class, are still in the five-year program, with the next one planned for FY 2023. Congress added advance procurement funds for a ship in FY 2020, but these funds were diverted to construction of the border wall. The implication of Esper's comments is that these would be America-class ships, optimized for aviation.<sup>41</sup>

If up to six LHAs/LHAs are diverted to operations as light carriers, the amphibious force will look very different in the future.

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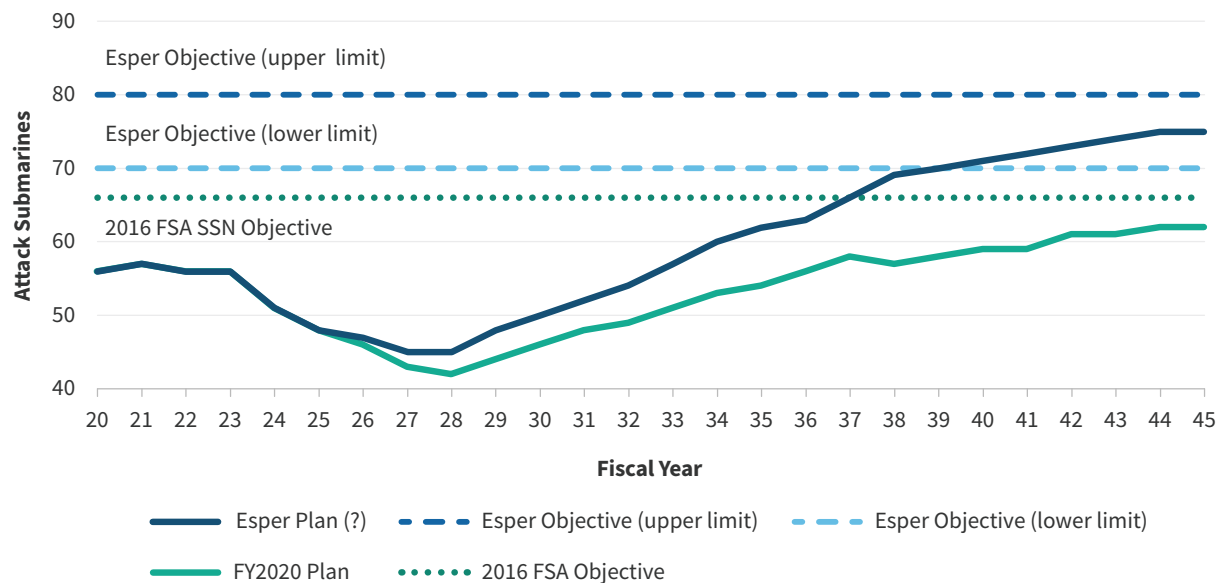
39. General David Berger, *Commandant's Planning Guidance* (Washington, DC: Department of the Navy, 2019), 5, [https://www.hqmc.marines.mil/Portals/142/Docs/%2038th%20Commandant%27s%20Planning%20Guidance\\_2019.pdf?ver=2019-07-16-200152-700](https://www.hqmc.marines.mil/Portals/142/Docs/%2038th%20Commandant%27s%20Planning%20Guidance_2019.pdf?ver=2019-07-16-200152-700).

40. Paul McLeary, "If It Floats, It Fights: Navy's New Small Ship Strategy," *Breaking Defense*, August 28, 2020, <https://breakingdefense.com/2020/08/if-it-floats-it-fights-navys-new-small-ship-strategy>; and Joseph Trevithick, "Navy Wants to Buy 30 New Light Amphibious Warships to Support Radical Shift in Marine Ops," *The Drive*, May 5, 2020, <https://www.thedrive.com/the-war-zone/33299/navy-wants-to-buy-30-new-light-amphibious-warships-to-support-radical-shift-in-marine-ops>.

41. Ronald O'Rourke, *Navy LPD-17 Flight II and LHA Amphibious Ship Programs: Background and Issues for Congress*, CRS Report No. R43543 (Washington, DC: Congressional Research Service, October 2020), Table I., p. 8, <https://fas.org/sgp/crs/weapons/R43543.pdf>.

## ATTACK SUBMARINES

Chart 14: Projected Attack Submarine Fleet (SSNs and SSGNs), FY 2020–FY 2049



Source: Chief of Naval Operations, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*.

Attack submarines (SSNs) receive strong support from strategists because their firepower and covertness are useful in great power conflicts. Thus, they are likely to receive strong support in the next administration, whether that is a Trump or Biden administration. However, submarines are expensive (about \$3.3 billion each in the current version), so increasing production is difficult.

Secretary Esper's goal is 70 to 80, higher than the old goal of 66. He implies that this is the highest shipbuilding priority.

In the near term, the attack submarine fleet is stable. Numbers stay in the fifties, and the Navy planned to build new boats at the rate of two per year. That plan was disrupted in the FY 2021 budget proposal, where the number of new attack submarines dropped to one. That occurred because of a last-minute shift of \$2 billion from DOD to the National Nuclear Security Administration to pay for upgrades in the nuclear weapons infrastructure. However, Congress seems disinclined to go along, with the House version of the National Defense Authorization Act (NDAA) putting a second submarine back in and the Senate version providing supportive sentiments and some money.

The greater problem is long term. Numbers dip in the late-2020s and early-2030s, bottoming at 42 boats as Los Angeles-class boats built during the 1980s retire.<sup>42</sup> Secretary Esper said that the new plan intends to extend the service life of additional older submarines, but the Navy tends to retire old ships early in order to buy new ships.

This prospective submarine shortfall will happen at a time when Russian and Chinese submarines are becoming more capable and active.<sup>43</sup> Retirement of the Ohio-class SSGNs in the late-2020s, which

42. Chief of Naval Operations, *Report to the Congress on Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020* (Washington, DC: March 2019), [https://media.defense.gov/2020/May/18/2002302045/-1/-1/1/PB20\\_SHIPBUILDING\\_PLAN.PDF](https://media.defense.gov/2020/May/18/2002302045/-1/-1/1/PB20_SHIPBUILDING_PLAN.PDF).

43. For example, Kathleen H. Hicks et al., *Undersea Warfare in Northern Europe* (Washington, DC: CSIS, July 2016), <https://www.csis.org/analysis/undersea-warfare-northern-europe>.

greatly reduces the undersea strike capability, exacerbates the numbers shortfall, although the missile compartments of the newest Virginia-class submarines, with the Virginia Payload Module, will mitigate the capability shortfall.

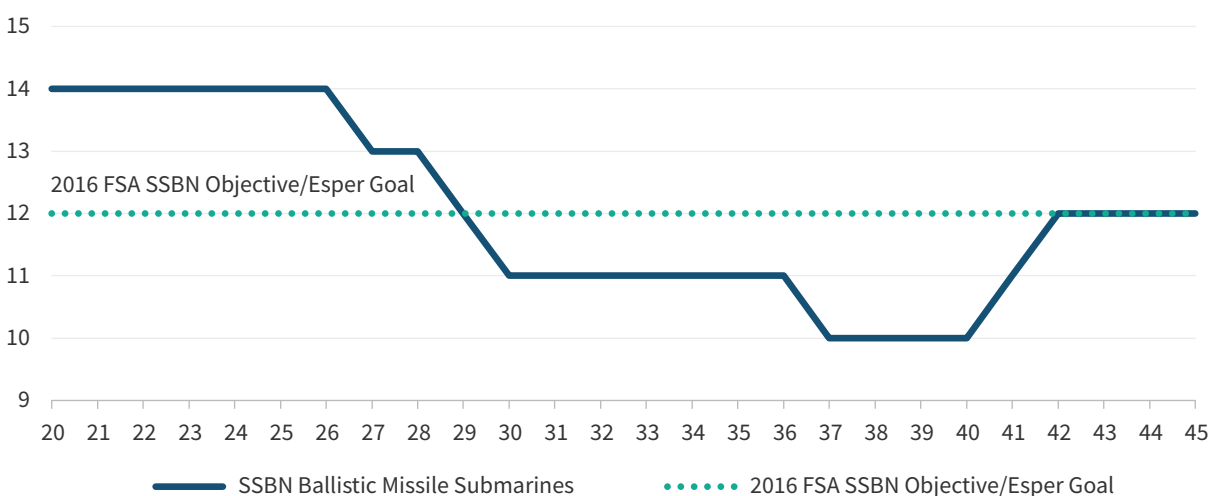
The obvious solution is to build more submarines, but having two submarine construction programs operating simultaneously puts pressure on both the shipbuilding account and the submarine industrial base.<sup>44</sup> The FY 2020 Navy 30-year shipbuilding plan showed a capacity for three total submarines per year, attack (SSN) or ballistic missile (SSBN) submarines, although the Navy did not always fund to the total capacity. Esper called for building three Virginia-class submarines per year in addition to SSBNs as soon as possible, but the industrial base will need a lot of funding and lead time to get to that level of production.

The Esper projection in Chart 14 assumes additional submarines in FY 2022 and FY 2023, with a level of three SSNs per year achieved in FY 2026, just outside the five-year period. Delivery is six years from funding. Production returns to two submarines per year in FY 2038 so the inventory does not overshoot. It also assumes that additional older submarines will be extended for an additional 10 years.

The dotted line on the chart shows the problem. The Navy cannot build enough new submarines quickly enough to significantly mitigate the trough. What it can do is accelerate the rate at which it gets to its target level.

## BALLISTIC MISSILE SUBMARINES

Chart 15: Projected Ballistic Missile Submarine Fleet (SSBNs), FY 2020–FY 2045



Source: Chief of Naval Operations, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*.

The Columbia-class SSBN program—which will replace the existing Ohio-class submarines—continues as planned. The FY 2021 budget proposes authorization for the first ship. Because the program is high priority, enjoys strong bipartisan support, and has no schedule slack, it will likely be unaffected by any changes in future shipbuilding plans. The Esper plan, for example, maintains the same goal of 12.

44. Ronald O'Rourke, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, CRS Report No. RL32418 (Washington, DC: Congressional Research Service, September 2020), <https://fas.org/sgp/crs/weapons/RL32418.pdf>.

The budget cost is substantial—\$4.4 billion in FY 2021 (\$4 billion procurement plus \$400 million RDT&E)—and has nearly doubled from FY 2020.<sup>45</sup> Affordability of the \$100 billion program, long identified as a challenge for Navy shipbuilding, has become a near-term, rather than long-term, issue.

There have been proposals to find other funding mechanisms for the Columbia-class, for example, through a National Sea-based Deterrence Fund. However, none have resulted in substantially increasing funds for Navy shipbuilding.<sup>46</sup>

CBO has questioned the cost estimates, noting that cost per ton for submarines has been higher than what the Navy is planning. CBO's cost estimate is 10 percent, or \$700 million, higher per Columbia-class submarine than the Navy's estimate. The Government Accountability Office has similarly questioned DOD's cost estimate.<sup>47</sup> So far, the Navy has not changed any cost estimates.

Any substantial cost growth here will severely disrupt other elements of the shipbuilding plan and hence the future fleet.

### *Naval Aviation Modernization: The Future Air Wing*

It has been said that the U.S. Navy comprises a complete military itself: a navy (with its ships), an army (with the Marine Corps), and an air force (with its air wing). Because naval aircraft provide the striking power of the aircraft carrier, the central weapon system in the U.S. Navy, aviation plays a larger role in the U.S. Navy than it does in other navies.

In FY 2021, naval aviation (Navy and Marine Corps) proposes to procure 121 aircraft of all kinds, down from 163 in FY 2020. Naval aviation is in generally good shape. Inventories have been stable, the average age for most elements is good, and the Navy has been buying enough aircraft to maintain its inventory. That is the good news.

The bad news is that the Navy needs to increase aircraft procurement in the future to maintain current inventories, faces ever higher costs to maintain its aircraft inventory, and has been slow to field unmanned aerial vehicles (UAVs).

*Inventories have been stable, the average age for most elements is good, and the Navy has been buying enough aircraft to maintain its inventory. That is the good news.*

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45. Office of the Under Secretary of Defense Comptroller, *Program Acquisition Cost by Weapon System for FY 2021* (Washington, DC: Department of Defense, February 2020), 6-3, [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021\\_Weapons.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021_Weapons.pdf).

46. Ronald O'Rourke, *Navy Columbia Class (SSBN-826) Ballistic Missile Submarine Program: Background and Issues for Congress*, CRS Report No. R41129 (Washington, DC: Congressional Research Service, October 1, 2020, <https://fas.org/sgp/crs/weapons/R41129.pdf>).

47. Labs, *Navy's Fiscal Year 2020 Shipbuilding Plan*, 19-21; Government Accountability Office, *Columbia-Class Submarine Overly Optimistic Cost Estimate Will Likely Lead to Budget Increases* (Washington, DC: April 2019), <https://www.gao.gov/products/GAO-19-497>.

## FY 2021 Procurement

Table 5: Department of the Navy Aircraft Procurement in FY 2021

Fixed Wing	FY 2021 (Proposed)	First procurement	Last procurement
F-35C (CV)	21	2011	-
F-35B (STOVL)	10	2008	-
FA-18E/F	24	1995	2021
E-2D Advanced Hawkeye	4	2014	2023 (planned)
P-8A	-	2010	2020
KC-130J	5	2005	-

Rotary Wing			
CH-53K (HLR)	7	2018	-
MV-22B / CMV-22B	9	1997	2022 (planned, small buys in 2023 and 2024)
AH-1Z /UH-1Y	-	2004	2019
TH-57 Replacement/TH-73	36	2022 (planned)	-
VH-92A	5	2021	2023

UAV			
MQ-4C Triton	0	(2023 production restart)	-
MQ-25 Stingray	0	(2023 planned)	-
MQ-8B/C	0	2005	2020
MQ-9A Reaper (USMC)	0	2020	2020
<b>Total</b>	<b>121</b>		

Source: Department of the Navy, *Highlights of the Department of the Navy FY 2021 Budget*, Office of Budget (Washington, DC: Department of Defense, March 12, 2020), Figure 4.3, [https://www.secnavy.mil/fmc/fmb/Documents/21pres/Highlights\\_book.pdf](https://www.secnavy.mil/fmc/fmb/Documents/21pres/Highlights_book.pdf); Navy Fact Files, <https://www.navy.mil/Resources/Fact-Files/>; Year of first/last procurement is the budget year.

For many years, naval aviation has been procuring mature systems with predictable costs and schedules (with the significant exception of the F-35). As Table 5 shows, that stability is coming to an end. Long-established production lines have recently finished or soon will (gray highlighted); new systems will replace them.

Particularly striking is the plan to end F-18 production after nearly 40 years. This is a change from last year's plan, which continued to buy F-18s at least through FY 2024. F-35 production does not increase to make up for the lost F-18 production. The planned end to F-18 procurement may reflect an expectation of having to fill fewer carrier decks. Although there is a next-generation fighter in development ("Next Generation Air Dominance"), procurement is not expected until the 2030s. (See Air Force chapter for further discussion.)

The other challenge is that the total number of aircraft procured goes down. In the FY 2020 budget, the average number of aircraft procured per year in the five-year plan was 130. In the FY 2021 plan, it is 107.

Table 6: Aircraft Inventory Replacement Rate

Number of Aircraft Procured	Total Inventory to be Replaced	Years Required to Replace Inventory
121 (FY 2021 procurement)	3,933	33 years
107 (FY 2021 five-year plan average)		37 years
157 (Rate required for 25-year average service life)		25 years

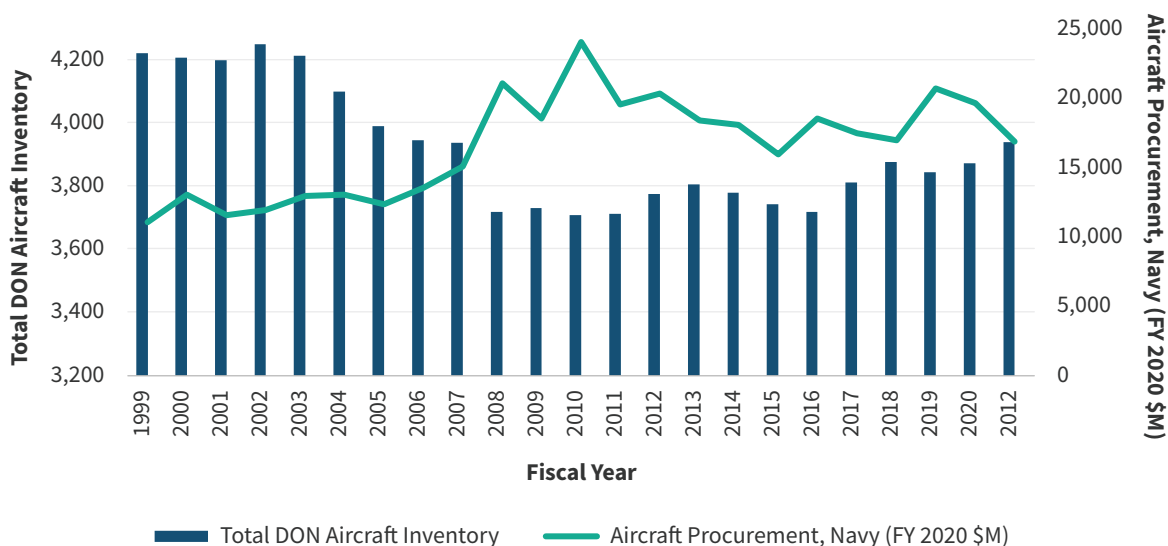
Source: FY 2021 procurement numbers from *Highlights of The Department of the Navy FY 2021 Budget*.

Table 6 shows the number of years required to replace the current aircraft inventory at various procurement rates. The FY 2021 and five-year average procurement rates result in very old fleets. The rate would need to increase to 157 aircraft procured per year to get to a target of 25 years.

The bottom line is that if the Navy does not start buying more aircraft, either the fleet gets smaller or the fleet gets older.

### THE HIGH COST OF STABLE INVENTORIES

Chart 16: Department of the Navy Aircraft Inventory



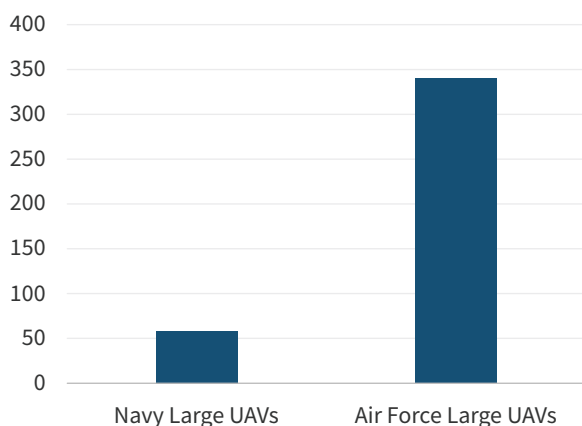
Source: Department of the Navy, *FY 2017 Budget Estimates Data Book* (Washington, DC: Department of Defense, April 2016), 64, [https://www.secnave.navy.mil/fmc/fmb/Documents/17pres/FY17\\_Data\\_Book.pdf](https://www.secnave.navy.mil/fmc/fmb/Documents/17pres/FY17_Data_Book.pdf); Updated with data from Department of the Navy, *Highlights of the Department of the Navy FY 2019* (Washington, DC: Department of Defense, 2018), [https://www.secnave.navy.mil/fmc/fmb/Documents/19pres/Highlights\\_book.pdf](https://www.secnave.navy.mil/fmc/fmb/Documents/19pres/Highlights_book.pdf); and Department of Defense, *Fiscal Year (FY) 2021 Budget Estimates: Justification Book Volume 1 of 3: Aircraft Procurement, Navy* (Washington, DC: March 2019), [https://www.secnave.navy.mil/fmc/fmb/Documents/20pres/APN\\_BA1-4\\_BOOK.pdf](https://www.secnave.navy.mil/fmc/fmb/Documents/20pres/APN_BA1-4_BOOK.pdf).

Threatening the long-term health of Navy aviation (and Marine Corps and Air Force aviation, as described later) is the high cost of sustaining fleet numbers. As the chart above shows, funding for procurement of naval aviation has increased by about 50 percent since the early-2000s to maintain a smaller inventory.

The reason is that each generation of aircraft costs more than the generation before it. For example, the E-2C costs \$116 million per aircraft (in FY 2021 dollars) when last procured in the early-2000s. Its replacement, the E-2D, has more powerful radar and enhanced command linkages but costs \$227 million (FY 2021 dollars).<sup>48</sup>

### THE (SLOW) FIELDING OF UAVS: TRITON AND MQ-25

Chart 17: Navy and Air Force Large UAV Inventories



Source: Department of the Air Force, *Air Force Budget Highlights for FY 2021* (Washington, DC: DOD, 2020), appendix, [https://www.saffm.hq.af.mil/Portals/84/documents/FY21/SUPPORT\\_/FY21%20Budget%20Overview\\_1.pdf](https://www.saffm.hq.af.mil/Portals/84/documents/FY21/SUPPORT_/FY21%20Budget%20Overview_1.pdf); and *Department of Defense Fiscal Year (FY) 2021 Budget Estimates Aircraft Procurement, Navy, Book 2*, line 59 (p. 841-860) and line 65 (p.981-1001), [https://www.secnave.navy.mil/fmc/fmb/Documents/21pres/APN\\_BA5\\_BOOK.pdf](https://www.secnave.navy.mil/fmc/fmb/Documents/21pres/APN_BA5_BOOK.pdf).

The Navy's FY 2021 procurement of large UAVs (0) is the same as the Air Force's (0)—a problem for both services—but the Navy's UAV inventory (58, MQ-8 and MQ-4) is far behind the Air Force's (340, MQ-9 and RQ-4). This reflects the Navy's relative emphasis on manned systems and, to some, a lack of interest in unmanned systems. The Navy's tepid action with unmanned aviation systems stands in contrast to its bold action with unmanned surface and subsurface systems.

In his shipbuilding speech, Secretary Esper made an interesting side point about naval aviation. He said that the plan for the future fleet included unmanned ship-based aircraft for "all types, fighters, refuelers, early warning, and electronic attack aircraft." This is a significant development because the Navy's near-term plans are for UAVs to have only support rules, not to be shooters.

*The Navy's tepid action with unmanned aviation systems stands in contrast to its bold action with unmanned surface and subsurface systems.*

Despite Secretary Esper's endorsement, the future for Navy unmanned aircraft does not look much better. The MQ-8C Fire Scout, though a significant improvement over the "B" model, continues to have performance problems, having been declared "not operationally effective" by testers.<sup>49</sup>

48. Procurement funding only; E-2D costs from "E-2D Advanced Hawkeye Aircraft Selected Acquisition Report," Department of Defense, Dec 2018, [https://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Selected\\_Acquisition\\_Reports/FY\\_2018\\_SARS/19-F-1098\\_DOC\\_29\\_E-2D\\_AHE\\_SAR\\_Dec\\_2018.pdf](https://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Selected_Acquisition_Reports/FY_2018_SARS/19-F-1098_DOC_29_E-2D_AHE_SAR_Dec_2018.pdf). E-2C costs from Obaid Younossi et al., *The Eyes of the Fleet: An Analysis of the E-2C Aircraft Acquisition Options* (Santa Monica, CA: RAND Corporation, 2002), [https://www.rand.org/content/dam/rand/pubs/monograph\\_reports/2009/MR1517.pdf](https://www.rand.org/content/dam/rand/pubs/monograph_reports/2009/MR1517.pdf). Escalation factors from Undersecretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2021* (Washington, DC: Department of Defense, April 2020), [https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/FY19\\_Green\\_Book.pdf](https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/FY19_Green_Book.pdf).

49. Justin Katz, "DOT&E Says Fire Scout Is 'Not Operationally Effective,'" Inside Defense, February 4, 2020, <https://insidedefense.com/daily-news/dote-says-fire-scout-not-operationally-effective-reveals-navy-created-tiger-team>.

The MQ-4C Triton long-range surveillance UAV (a relative of the Air Force's RQ-4 Global Hawk), which began production in FY 2020, pauses production until FY 2023. This is a change from the Navy's previous plan to procure two per year. The system received some notoriety when the Iranians shot down one of the prototypes in June 2019.

The MQ-25 is the Navy's first carrier-capable unmanned aircraft, growing out of a series of experimental programs such as the Unmanned Carrier Launched Aerial Surveillance and Strike (UCLASS) program. In 2017, the Navy announced its plan to develop the aircraft as a tanker with some intelligence, reconnaissance, and surveillance (ISR) capabilities, rather than as a strike platform. The program remains stable, with first procurement planned for FY 2023. Nevertheless, controversy lingers about the program because many observers see it as having been sidelined to a support mission when it should constitute a frontline attack capability. Secretary Esper's comments will add to that controversy.<sup>50</sup>

### *Munitions as an Element of Strategy: Range and Precision*

The Navy's warfighting problem is that it built platforms designed for regional conflicts and for operating close to the adversary. Its ships are highly capable but large and few. Its tactical aircraft are very short ranged. So, the Navy's challenge—and that of the other services, to a lesser degree—is how to use these existing systems against an adversary that can build a formidable defensive zone (often called an anti-access/area denial, or A2/AD, zone).

One Navy solution is to put long-range precision munitions on existing weapons systems, both ships and aircraft. That allows assets to stay out of the most dangerous area but still participate in the fight. Thus, the Navy has developed an "offensive missile strategy." Although the details are classified, the strategy purports to sustain current inventories, increase the capabilities of existing weapons, and develop new weapons.

*One Navy solution [to the problem of operating close to the adversary] is to put long-range precision munitions on existing weapon systems, both ships and aircraft.*

The president's FY 2021 budget maintains a high level of munitions procurement, comparable to the purchasing rate last year even though Navy procurement resources decreased. Key munitions actions include:

- For ships, buying the latest version of tactical Tomahawk (Block IV) and an over-the-horizon missile for LCSs;
- For aircraft, buying the Long Range Anti-Ship Missiles (LRASM), essentially an adaptation of the Air Force's JASSM, and the Joint Standoff Weapon – Extended Range (JSOW-ER);
- For longer-term capability, \$1 billion to develop the Conventional Prompt Strike (CPS), a hypervelocity missile, as well as continuing development of the Offensive Anti-Surface Warfare (OASuW) Increment 2 missile and a Next-Generation Land Attack Weapon;<sup>51</sup> and

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50. Called "strategic malpractice" in Robert Martinage and Shawn Brimley, "The Navy's New Museum Drone and Strategic Malpractice," War on the Rocks, April 28, 2015, <http://warontherocks.com/2015/04/the-navys-new-museum-drone-and-strategic-malpractice>. Similar criticisms have come from Bryan McGrath of the Hudson Institute and Jerry Hendrix of the Center for New American Security.

51. Megan Eckstein, "Navy Investing in Researching Next-Generation Missiles, Enhancing Current Ones," USNI News, April 15, 2019, <https://news.usni.org/2019/04/15/navy-investing-in-researching-next-generation-missiles-enhancing-current-ones>; and Statement

- The budget does cut procurement of Small Diameter Bomb II, an airdropped land-attack munition, likely reduced because of the less intense bombing campaigns in the Middle East. The budget also cuts procurement of the LCS surface-to-surface missile module, likely because of a reduced LCS buy and a changing missile mix.

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of Honorable James F. Geurts, Lieutenant General Steven Rudder, and Rear Admiral Scott Conn, Senate Armed Services Committee, Seapower Subcommittee, 116th Cong., 1st sess., April 10, 2019, [https://www.armed-services.senate.gov/imo/media/doc/Geurts\\_Rudder\\_Conn\\_04-10-19.pdf](https://www.armed-services.senate.gov/imo/media/doc/Geurts_Rudder_Conn_04-10-19.pdf). In addition, other systems, such as stealthy long-range unmanned strike platforms, have been advocated by others as means to argue the Navy's ability to penetrate A2/AD environments. Jerry Hendrix, *Filling the Seams in U.S. Long-Range Penetrating Strike* (Washington, DC: Center for a New American Security, August 2018), <https://www.cnas.org/publications/reports/filling-the-seams-in-u-s-long-range-penetrating-strike>.