The Navy in FY 2020 reflects the priorities of the department as a whole. It sustains the level of readiness built in the FY 2017-FY 2019 budgets and modernizes by increasing the production of existing ships, aircraft, and munition programs. Unlike the other services, the Navy is significantly expanding its force structure.

**KEY TAKEAWAYS**

- The Navy feels the capacity/capability tension acutely due to the high demands of day-to-day operations, long lead times, and high capital costs for weapons systems.

- In the face of this tension, the Navy is actively implementing force structure expansion plans, aiming to reach its 355-ship goal by FY 2034 through a mix of service life extensions and new construction.

- The Navy is also procuring unmanned surface and undersea vessels, with potentially revolutionary long-term force structure implications.

- Naval aviation inventories are stable and most modernization programs are operating smoothly; however, it is dogged by high costs to maintain its inventory and has been slow to field unmanned aerial vehicles.
The Navy in FY 2020 generally reflects the priorities of the department as a whole. It sustains the level of readiness built in the FY 2017–FY 2019 budgets and mostly modernizes by increasing production of existing ship, aircraft, and munition programs.

However, a major change is the acquisition of unmanned surface and subsurface vessels. Although these early acquisitions are essentially experimental, they could revolutionize naval combat in the long term by shifting the fleet balance to smaller, more numerous, and more dispersed systems. Thus, the Navy surface and subsurface fleet may be on the cusp of revolutionary change. Naval aviation, in contrast, remains focused on manned platforms.

The Navy feels the capacity/capability tension most acutely because of the high demands for its forces in day-to-day operations and the long lead times and high capital costs for its weapon systems. Therefore, it actually implements its force structure expansion plans, unlike the Army and Air Force, which have expansion plans but have had to defer implementation.

**End Strength in FY 2020**

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

<table>
<thead>
<tr>
<th></th>
<th>ACTIVE NAVY</th>
<th>NAVY RESERVE</th>
<th>CIVILIAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>End Strength</strong></td>
<td><strong>End Strength</strong></td>
<td><strong>Full-Time Equivalents</strong></td>
</tr>
<tr>
<td><strong>FY 2019 ENACTED</strong></td>
<td>335,400</td>
<td>59,100</td>
<td>192,702</td>
</tr>
<tr>
<td><strong>FY 2020 REQUEST</strong></td>
<td>340,500</td>
<td>59,000</td>
<td>195,502</td>
</tr>
<tr>
<td><strong>CHANGE</strong></td>
<td>+5,100</td>
<td>-100</td>
<td>+2,800</td>
</tr>
</tbody>
</table>

Source: Highlights of The Department of the Navy FY 2020 Budget (Washington, DC: Department of the Navy, 2019), https://www.secnav.navy.mil/fmc/fmb/Documents/20pres/Budget%20Highlights%20Book.pdf. PAA data in Figure 3.6, 3-6; Active End Strength data in Figure 2.1, 2-4; Reserve End Strength data in Figure 2.3, 2-5; Civilian data in Figure 2.10, 2-13.

The Navy continues to increase the number of personnel after hitting a low point of 318,000 active duty sailors in FY 2012. The Navy projects that active duty end strength will continue to grow, reaching 354,000 by FY 2024.
Many of the additional active duty personnel will go to increasing the manning of existing ships. The Navy had reduced manning over the years, counting on technology and shore-based capabilities to offset smaller ship crews. Ship collisions showed that more sailors were needed to cover all the many tasks aboard ship and to allow proper training. Additional sailors are also needed to man the new ships entering the fleet.

**Fleet Size in FY 2020 and Beyond**

Chart 2: Total Navy Active Ships – 1999-2020
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.) The Navy projects that it will hit 296 ships by the end of FY 2019 and 301 ships at the end of FY 2020, up from its low point of 271 in 2015.


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 about half the number of ships of 1988 (299 versus 565) but 78 percent of the tonnage. Today’s DDG-51 destroyer (Flight IIA) displaces 9,800 tons, twice the tonnage of a 1980s Charles F. Adams-class destroyer, and four times the size 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.


Despite its slowly increasing size, the Navy is feeling a lot of stress. The average number of ships deployed has remained at the current level of 100 for three decades, even though the number of ships has declined over time. To meet deployment demands, the length of deployments has increased and the time between deployments has decreased. The need to deploy to Europe, a theater largely ignored since the end of the Cold War, adds to demands. To meet these new demands in Europe and 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. Because these theater requests are not resource constrained, it is unsurprising that the requests greatly exceed what is available.

Nevertheless, this shortfall engenders a concern that the Navy is too small for the tasks that it is being asked to perform. Highly-publicized gaps, such as the intermittent lack of a carrier in the Middle East, reinforce this perception. Many naval strategists, such as Bryan McGrath of the Hudson Institute, argue that “size matters”: “‘Freedom of the seas’, a concept that is essential to both the security and prosperity of the United States and all other trading nations . . . is overwhelmingly associated with being there, which is a function of numbers (capacity).”

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.

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One adjustment the Navy has made to the new strategy is to make ship deployments less predictable. Although maintenance and training cycles lock the window for deployments, the Navy has changed the location and timing of deployments to create some operational unpredictability that the NDS directs. Thus, the *Truman* carrier strike group sailed to the Arctic Circle and Europe, rather than the Middle East, and broke up the deployment by returning to Norfolk briefly.7

**The 355-Ship Fleet**

Both the president and Congress have 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”).8

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 (+16). It focuses on existing and proven ship types and includes none of the nontraditional ships that some outside force structure proposals had proposed. The intention is to get ships built quickly, without the delay and risk of development programs.

**Table 2: Comparison of Navy 355-ship and 308-ship Force Structure Goals**

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>355-ship Goal</th>
<th>308-ship Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballistic Missile Submarines (SSBN)</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Attack Submarines (SSNs)</td>
<td>66</td>
<td>48</td>
</tr>
<tr>
<td>Aircraft Carriers (CVNs)</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Large Surface Combatants (CGs/DDGs)</td>
<td>104</td>
<td>88</td>
</tr>
<tr>
<td>Small Surface Combatants (FFs/LCSs)</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>Amphibious Ships</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>Combat Logistics Force</td>
<td>32</td>
<td>29</td>
</tr>
<tr>
<td>Expeditionary Fast transports and Support Base Ships</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Command and Support Ships</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>355</strong></td>
<td><strong>308</strong></td>
</tr>
</tbody>
</table>

**Achieving the 355-ship Goal**

Achieving this 355-ship goal will require resources substantially above historical levels and even above the recent high shipbuilding budgets. The Navy’s 30-year shipbuilding plan calculates spending $20.3 billion per year through FY 2024 and $26 billion to $28 billion beyond FY 2024.9 The Congressional Budget Office (CBO) found that “[the cost] for new-ship construction under the Navy’s 2019 shipbuilding plan is almost double the historical average of $13.6 billion (in 2018 dollars). CBO’s estimate of $28.9 billion per year for the full cost of the plan is 80 percent higher than the $15.8 billion the Navy has received in annual appropriations, on average, over the past 30 years for all activities funded by its shipbuilding account.” Moreover, CBO also found that “the cost of operating and maintaining a 355-ship fleet over 30 years would be much greater than either the cost of purchasing the new ships or the recent budgets for operating

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today’s fleet.” The Congressional Research Service came to similar conclusions. On an encouraging note, Congress has added about $2 billion per year to the shipbuilding budget to help close this gap.

One way the Navy has proposed to close the gap between its fleet goal and its resources is to extend the life of existing ships by 5 to 19 years. Therefore, it will increase the life of the DDG-51 class to 45 years and possibly push amphibious ships to 50 years. The service lives of other classes could likewise be lengthened. Keeping the hull, mechanical, and engineering systems going this long is likely 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.

The Navy considered options to reactivate retired ships, especially the recently retired FFG-7 Perry-class but judged that the combat systems needed too much upgrading to make the reactivation worthwhile.

Gaps between available forces and requirements have also generated interest in “federated” approaches, that is, having allies and partners contribute niche capabilities so that the whole has a coherent set of capabilities.

The chart below shows the different projections for ship inventories from Navy 30-year shipbuilding plans. The FY 2017 projection, the last of the Obama administration, hit its 308-ship goal through the 2020s, then dipped below 300 for the remainder of the projection.

The Trump administration produced several shipbuilding options in its FY 2019 30-year shipbuilding plan. (There was no plan in FY 2018 since the Trump administration had just taken office.) The basic, sustainable FY 2019 option reached about 315 ships through the 2020s, then rose to about 340 but did not achieve 355 ships until the 2050s, outside the 30-year window. Since not meeting the Navy’s (and the president’s) goal was bureaucratically embarrassing, the Navy offered an “accelerated” option that used all available shipbuilding capacity (at a much higher cost) and reached 355 ships in 2040.

The higher budget cost was a major stumbling block, so the Navy proposed extending ship service lives. That greatly increased ship count starting in the late 2020s, reaching 355 ships by FY 2032. The 2020 plan adopts the FY 2019 extended service life plan, reaching a total of 355 ships in FY 2034 (though not of the exact distribution in the 355-ship FSA) and capping fleet size at that level. The FY 2020 plan is lower in the near term because of decisions this year to retire MCMs and cruisers (discussed later).

16. Ibid.
A New Force Structure Assessment

All of this carefully planned and deeply analyzed 355-ship fleet may soon be tossed out the window (or porthole). As noted earlier, all the services, the Navy included, have been criticized for not moving fast enough to align budgets and procurement plans with the national defense strategy. The Navy’s concept of operations for great power conflicts is called “distributed operations,” that is, having a large number of shooters with long-range munitions that would be dispersed around the battle area. However, the relatively small number of highly-capable but expensive ships in the Navy’s current fleet does not fit well with this concept, a disconnect that has been evident for several years.

In its FY 2020 budget, the Navy takes the radical step of procuring unmanned surface and undersea vessels (USVs and UUVs). The FY 2020 budget proposes to procure two large USVs per year through FY 2024. These would be smaller than the smallest U.S. manned vessel (2,000 tons versus 3,200 tons for LCS) but about the size of European corvettes. The purpose is almost experimental (the unmanned vessels are purchased in the RDT&E account, not the shipbuilding account), the intention being to get the capability into the fleet quickly to better understand how it operates.\(^{17}\)

There are concepts and prototypes for medium USVs, building on experience from the DARPA funded Sea Hunter experiment and on the “Ghost Fleet” concept of outfitting commercial ships with weapons. There are also concepts for small USVs but no procurement plans for either medium or small USVs yet.\(^{18}\)

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The planned medium and large UUVs are more like munitions than manned vehicles, being small and, as a result, funded in the Other Procurement, Navy appropriation. These systems could act like reconnaissance elements for manned submarines and, eventually, underwater strike assets. The FY 2020 budget and associated FYDP proposes to procure several varieties. One system, the MK-18 “Swordfish,” has been operating for several years.

The Navy is procuring “Extra Large UUVs” (called “Orcas”) that are the size of mini-submarines, two in FY 2020 and nine in the FYDP, all in the RDT&E account, reflecting their experimental nature.

The Navy plans to release a new force structure assessment in late-2019. Navy leaders have dropped hints that it will include new capabilities such as smaller ships and unmanned systems that are more adaptable to distributed operations. To pay for these new capabilities, the FSA might propose retiring legacy systems.19

**Navy Shipbuilding in FY 2020 and Beyond**

The president’s budget proposed to construct 12 ships in FY 2020: one *Ford*-class CVN-78 carrier, three **SSN-774** submarines, three **DDG-51** destroyers, one **FFG(X)** frigate, and four auxiliaries (two T-AO 205 **Lewis**-class replenishment oilers and two T-ATS salvage and rescue ships), one fewer than what Congress finally enacted in FY 2019. This is the shipbuilding rate that would be needed to reach 355 ships over the long term. Shipbuilding projections in the FYDP average 11 new ships per year.

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 elevators and catapults to work). The addition of unmanned surface ships, discussed earlier, is a major change and may be a signal for large changes to shipbuilding plans in the future.

**Carriers**

Chart 6: Projected Carrier Fleet Size – FY 2020-FY 2049

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*; Chief of Naval Operations, *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*. The Updated 2020 Budget removes the early retirement of the USS *Harry Truman* in 2024.20


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

The long-running debate about carrier utility and survivability continues without resolution: are carriers versatile systems, providing a strong backbone for naval operations in peace and war or are carriers dinosaurs, too large and vulnerable to survive in great power conflicts? Unfortunately, this question cannot be answered short of a major war. Caught between these two perspectives, the Navy’s current carrier plans are a complete muddle.

On the one hand, a RAND study indicated that other carrier options might be attractive. Several commentators, like Senator McCain in 2017, have proposed building smaller carriers on the America-class LDA hull. Undersecretary Thomas Modley stated that the $13 billion cost of a Ford-class carrier was “unsustainable.”

On the other hand, Huntington Ingalls Industries, the shipbuilder that builds nuclear carriers, proposed saving $4 billion by constructing two carriers. Congress authorized the Navy to do this, and the Navy executed the two-carrier option in January 2019. This double procurement had the effect of locking in the carrier force as currently configured for at least another decade.

Seeming to have second thoughts about the size of the carrier force, the Navy proposed retiring the USS Harry Truman (CVN-75) early, arguing that the funds freed up could be allocated to programs focused on the new strategy. However, the incongruity of buying new carriers while retiring existing carriers early was hard to justify. As a result, the Navy quickly reversed the decision.

**Large Surface Combatants**

Large surface combatants (LSCs) are destroyers and cruisers.

**DDG-51 Destroyers.** The program is on track, with another three DDG-51s proposed for FY 2020. The program is transitioning to the Flight III configuration with a more powerful radar, called the AN/SPY-6 Air and Missile Defense Radar. The Navy is confident the radar is ready, and the technologies are deemed to be mature, but operational testing will be concurrent with production, so there’s some risk.

**DDG-1000 Zumwalt Destroyers.** These three stealthy, high-technology destroyers (at 14,500 tons, larger than Ticonderoga-class cruisers) are an exception to the “smooth sailing” shipbuilding story. 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 2019 because of a series of serious engineering casualties. The other two ships...
were similarly delayed. Further, the ships’ 155mm guns, originally a primary justification for the ship, have lost much of their effectiveness with the cancellation of the long-range munition that they were to fire. The lead ship has still not joined the fleet.25

CG-47 Cruiser modernization. The Navy once again proposes to end the cruiser modernization program, decommissioning two ships in FY 2021 and four in FY 2022, arguing that the future fleet would have too many LSCs and that the life-extension was not worthwhile. Concerned about a shrinking ship inventory, Congress has repeatedly balked in the past, mandating that the Navy modernize all the ships under a “2/4/6” program (two ships entering modernization per year, the work lasting no more than four years, and a maximum of six ships in maintenance at any one time). Six ships have been inducted into the program so far with a seventh coming later this year.

Next generation LSC. Shipbuilding plans continue to show some version of a next-generation LSC but in the future beyond the FYDP-period, indicating that such plans are in flux pending the outcome of the next FSA.

Small Surface Combatants

Small surface combatants (SSCs) are frigates, littoral combat ships, and mine countermeasures ships.26

Such ships are extremely valuable for providing global presence and for executing missions that don’t require a large surface combatant like a DDG-51. During the Cold War, they had a wartime mission of escorting convoys. This mission disappeared after the Cold War but may reemerge in a great power conflict where adversaries can reach out extended distances and threaten U.S. sea lines of communication. In the Navy’s next FSA, the numbers of small surface combatants are expected to hold steady or increase to meet the needs of a more distributed naval force structure.

Navy plans are on track to go beyond the much-criticized LCS program and quickly institute 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. Prospective bidders were told to bring mature designs already in production to meet an FY 2020 procurement target. The FY 2020 budget, indeed, requests procurement of the Navy’s first FFG(X) frigate and does not request the procurement of any further LCSs (a total of 35 have been procured thus far).

The Navy’s 30-year shipbuilding plan shows procurement of two FFG(X)s every year from FY 2021-FY 2029, with one additional FFG(X) procured in FY 2030, a total of 20 frigates over 10 years to meet the 52 small surface combatant goal of the 355-ship navy outlined in the Navy’s 2016 Force Structure Assessment (FSA). The Navy intends to select a design by the end of FY 2020.

However, the Congress, impelled by both a desire to increase ship numbers and to avoid a production gap at the LCS shipbuilders, might add one last LCS in FY 2020 as it did in FY 2019 to avoid a production gap. 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 2023.

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26. 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.
The amphibious fleet is in flux. On the one hand, the fleet size looks stable, with numbers gradually increasing toward the stated goal of 38 by the mid-2020s.

On the other hand, 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 seems doubtful. The goal of 38 large ships, which is built around the notion of a large amphibious landing, will almost certainly change in the next FSA. There are strong hints that the Navy will consider smaller amphibious ships, and General Berger, the new Marine commandant, has stated his support for such a change, as described in the Marine Corps section. That would be a major change in direction since, over many decades, the amphibious fleet has been trending toward larger and more capable ships, which are more efficient for moving Marine forces but expensive and limited in number.

After funding the lead ship of the LPD-17 Flight II-class replacement for the LSDs in FY 2018, the Navy originally intended to skip a year, funding no amphibs in FY 2019 but planning to procure LPD-31 in FY 2020. However, the FY 2020 budget has now pushed off procurement of LPD-31 until FY 2021. Further, the Navy plans to procure only two LPDs through FY 2024, as opposed to four planned in the FY 2019 budget. This pause may indicate that the Navy is rethinking the structure of its amphibious fleet.

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Huntington Ingalls, currently the only builder of amphibious ships, has sought to lock in current amphibious shipbuilding plans by offering to cut costs for acceleration of the next LHA and for multiyear procurement of the LPD-17 Flight II. So far, Congressional reaction has been mixed.

**Attack Submarines**

chart: Projected Attack Submarine Fleet (SSNs and SSGNs) – FY 2020-FY 2049

In the near term, the attack submarine fleet is stable. Numbers stay in the 50s, and the Navy builds new boats at the rate of two per year. The 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. This prospective submarine shortfall will happen at a time when Russian and Chinese submarines are becoming more capable and active. Retirement of the Ohio-class SSGNs in the late-2020s, which greatly reduces the undersea strike capability, exacerbates the 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. Nevertheless, the Navy now plans to continue building two attack boats every year, even in the years that it procures a Columbia-class boat. Incorporation of the Virginia payload module into new Virginia-class submarines, to address the undersea strike shortfall when the SSGNs retire, begins in FY 2019 but also increases the submarine’s cost by about $550 million.

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30. For example, Kathleen H. Hicks, et. al., Undersea Warfare in Northern Europe.
**Ballistic Missile Submarines**

**Chart 9: Projected Ballistic Missile Submarine Fleet (SSBNs) – FY 2020-FY 2049**

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 2020.

The Columbia-class SSBN program—which will replace the existing Ohio class—continues in development, with first ship authorization planned for FY 2021. The budget cost is substantial—$2.3 billion in FY 2020 (RDT&E plus procurement)—so affordability of the program, long identified as a challenge for Navy shipbuilding, is becoming a near-term, rather than a long-term, issue.

GAO has questioned DOD’s cost estimate, citing overly optimistic labor assumptions and noting that lead ships have historically had an average of 27 percent cost growth. A welding defect caused delays and additional cost. Thus, the sheer size of the program ($127 billion in total, then-year dollars), the inherent risks in lead ships, and the program’s tight schedule impelled the CNO to direct “increased oversight” and create a senior acquisition position, a program executive officer, just for this program. Nevertheless, this program may represent a “ticking time bomb” in the Navy’s shipbuilding budget.

**Naval Aviation Modernization—The Future Air Arm**

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 arm). 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 2020, naval aviation (Navy and Marine Corps) proposes to procure 148 aircraft of all kinds. Naval aviation procurement is in generally good shape with mature programs producing aircraft with few major issues. Inventories are stable. That is the good news.

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The bad news is that the Navy faces ever higher costs to maintain its aircraft inventory and has been slow to field unmanned aerial vehicles (UAVs).

**FY 2020 Procurement**

Table 3: Department of the Navy Aircraft Procurement in FY 2020

<table>
<thead>
<tr>
<th>Fixed Wing</th>
<th>FY 2019 (Proposed)</th>
<th>FY 2019 (Enacted)</th>
<th>FY 2020</th>
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</thead>
<tbody>
<tr>
<td>F-35C (CV)</td>
<td>9</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>F-35B (STOVL)</td>
<td>20</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>FA-18E/F</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>E-2D AHE</td>
<td>4</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>P-8A (MMA)</td>
<td>10</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>C-40A (USMC)</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>KC-130J</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>F-5</td>
<td>-</td>
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<td>22</td>
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<table>
<thead>
<tr>
<th>Rotary Wing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CH-53K (HLR)</td>
<td>8</td>
</tr>
<tr>
<td>MV-22B / CMV-22B</td>
<td>7</td>
</tr>
<tr>
<td>AH-1Z</td>
<td>25</td>
</tr>
<tr>
<td>TH-57 Replacement (Navy)</td>
<td>-</td>
</tr>
<tr>
<td>VH-92A</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UAV</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MQ-4C Triton</td>
<td>3</td>
</tr>
<tr>
<td>MQ-25 Stingray (NAVY)</td>
<td>-</td>
</tr>
<tr>
<td>RQ-21 (USMC)</td>
<td>-</td>
</tr>
<tr>
<td>MQ-9A Reaper (USMC)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120</td>
</tr>
</tbody>
</table>


The Navy aviation procurement plan shows continuing production of mature systems: E-2D, P-8, KC-130, V-22B, and AH1-Z. All of these systems have been in production for many years. Congress increased Navy aircraft procurement by 10 percent in FY 2019, indicating its strong support.

Procurement of the CH-53K heavy-lift helicopter, a replacement for the Marine Corps, falls from nine in FY 2019 to six in FY 2020, reflecting Congressional concerns about the program’s technical problems, cost growth, and schedule delay. Nevertheless, because the program is an upgrade to the existing CH-53E program rather than a completely new development, it has benefited from needing less development.

One piece of good news: there are no headlines about the new presidential helicopter. The previous attempt to develop a replacement for the aging presidential helicopter fleet ended in acquisition disaster, with large overruns, schedule slippage, and presidential criticism. Having learned from the previous experience, the current program (VH-92A) has moved through development with apparently few issues and is now entering production, with the first six funded in FY 2019 and six more requested in the FY 2020 budget. Thus, it often is with acquisition program management: bad management makes headlines, good management is invisible.
What stands out in the aviation plan, and is very different from the Air Force, is the continuing procurement of fourth (plus)-generation aircraft (FA-18 E/F) at the same time as procurement of fifth-generation aircraft (F-35B/C).

The Air Force stopped buying its fourth-generation F-15s and F-16s back in the 1990s and moved solely to fifth-generation aircraft, the F-22 and the F-35 (although, as discussed later, the Air Force has recently changed course, requesting eight F-15EXs in FY 2020). In contrast, the Navy invested in an enhanced fourth-generation aircraft—the F-18 in its E, F, and G models—to keep inventory numbers up. Indeed, the Navy plans to continue investing in the F-18 family with a “Block III” improvement, which will have an advanced cockpit, reduced observability, and longer life. As a result, the Navy’s tactical aviation fleet is much younger than the Air Force’s (16 years on average versus 29.2 years), and its inventory shortfalls are less acute.34

The policy issue is not whether a particular factory remains open (although that’s important to the Missouri Congressional delegation, where F-18s are manufactured). Rather, the policy issue is what kinds of conflicts the United States expects its aircraft to fight. Procuring a mix of fourth-generation and fifth-generation aircraft implies that some conflicts or phases of conflicts will not require the stealth and high-survivability of fifth-generation aircraft. Procuring a mix also increases total numbers since fourth-generation aircraft, being far into production, are less expensive. The Navy has taken this path. Current plans call for carriers to have two squadrons of F-18E/Fs and two squadrons of F-35Cs.

The Navy’s F-35C program has always been low-visibility because it is the last F-35 variant to enter production and is the smallest total buy. Continued procurement of the F-18, as noted above, allowed the Navy to hedge its bets and let the urgent requirements of the Air Force and Marine Corps take the brunt of the cost, schedule, and performance problems. The number of F-35Cs (the carrier version of the F-35) procured rises to 20 in FY 2020. The Navy declared initial operating capability in February 2019.

The High Cost of Stable Inventories

Chart 10: Department of the Navy Aircraft Inventory


Threatening the long-term health of Navy aviation (and Marine Corps and Air Force aviation, as described later) is the high cost of just maintaining a stable inventory. As the chart above indicates, 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 cost $112 million per aircraft (in FY 2019 dollars) when last procured in the early-2000s. Its replacement, the E-2D, has more powerful radar and enhanced command linkages but costs $230 million (FY 2019 dollars).


The (Slow) Fielding of UAVs: Triton and MQ-25

Overall, Navy UAV procurement (3) in FY 2020 is far behind the Air Force’s (12), and its UAV inventory (41) is even further behind the Air Force’s (291, MQ-9 and RQ-4). Both reflect the Navy’s relative emphasis on manned systems and, to some, a lack of interest in unmanned systems.

The MQ-4C Triton long-range surveillance UAV (a relative of the Air Force’s RQ-4 Global Hawk) continues low-rate procurement in FY 2020 with three systems and significant ($214 million) funding for development of upgrades. 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 a strike platform.

The good news is that in FY 2020, the Navy increases its funding commitment to $684 million. It awarded the development contract to Boeing in August 2018, so the program is moving forward. Flight tests are planned to begin at the end of 2019, with initial procurement still planned for FY 2023 and fielding in FY 2026.

The bad news is that this is no longer a rapid acquisition program but will take a decade to get a significant capability into the field. Further, the refueling capability, while very useful, is not a strike capability. Many naval strategists have harshly criticized the Navy—“strategic malpractice of the highest order” in one commentary—for missing an opportunity to gain the advantages in dull, dirty, and dangerous missions that unmanned aircraft have and the range advantage of the MQ-25, after successive generations of naval aircraft have become shorter-ranged.36

The controversy has died down as the program moves forward but will never go away. The Navy’s tepid action with unmanned aviation systems stands in contrast with its bolder action with unmanned surface and subsurface systems.

**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 conflict. 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” zone).

The Navy’s solution is to put long-range precision munitions on these 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. The president’s FY 2020 budget buys for ships the latest version of tactical Tomahawk (Block IV), an upgraded Harpoon, and an over-the-horizon missile for LCS, and for aircraft the Long Range Anti-Ship Missiles (LRASM), essentially an adaptation of the Air Force’s JASSM. The budget develops the more capable Offensive Anti-Surface Warfare (OASuW) Increment 2 missile and a Next-Generation Land Attack Weapon.37

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