

Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020

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**Annual Long-Range Plan for Construction of Naval Vessels
for Fiscal Year 2020**

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Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year (FY) 2020

I. Reporting Requirement

This report is submitted per Section 231 of Title 10, United States Code. Appendices 1-8 provide supporting details. Appendix 8 is controlled under limited distribution.

II. Submission of the Report

This report is the Department of the Navy's (DoN) 30-year shipbuilding plan for FY2020-FY2049. The FY2020 President's Budget (PB2020) provides planned funding to procure the ships included in the FY2020-FY2024 Future Years Defense Program (FYDP). Per the FY2019 National Defense Authorization Act (NDAA), the estimated operations and sustainment costs required to support the vessels delivered under the shipbuilding plan are included in Appendix 5. Unless otherwise noted, funding levels are shown in constant year (CY) FY2019 dollars.

III. Key Themes in this Report

The *National Defense Strategy* and the *Navy Strategy* provide the overarching high-level requirements for the *Navy the Nation Needs*, the Navy's enduring plan for building and sustaining a lethal, resilient force through balanced investments across readiness, capability, and capacity. This 30-year shipbuilding plan is the foundation of the Navy's future, with the following highlights:

- Continues the driving themes of adaptability, agility, and efficiency in both the ships and the industrial base that builds them, while pursuing the Secretary of the Navy's reform initiatives across a number of measurable process improvements in acquisition and program execution.
- Acts on the FY2018 NDAA supporting the Navy's validated minimum requirement of the correct mix of 355 battle force ships, and the FY2019 NDAA direction to include estimated sustainment costs for a larger fleet within the context of a balanced investment plan.
- Demonstrates the powerful combined impact of predictable shipbuilding profiles and stable, on-time funding (absent a continuing resolution), and portends the potential damaging impact of Budget Control Act sequestration on the future success of this plan.
- Includes procurement of 55 battle force ships within the FYDP and rebalances service life extensions (SLE) to produce a steady ramp to the aggregate goal of 355 approximately 20 years sooner than last year's plan. This steady profile provides a predictable forecast for supporting acquisition programs and reform efforts in shipbuilding, maintenance, and personnel management.
- Includes \$4B in savings (18%) through a negotiated two-ship aircraft carrier procurement plan and removes one aircraft carrier refueling overhaul – the combined savings supports pursuing balanced investments in next generation capabilities.
- Captures the fiscal challenge of sustaining the shipbuilding plan while introducing serial production of the new *Columbia*-class SSBN.
- Discusses commercial shipbuilding challenges regarding recapitalizing the auxiliary fleet in support of the employment concept of Distributed Maritime Operations (DMO).

IV. Force Structure Assessment and Fleet Architecture

Force Structure Assessments (FSA) are conducted in response to shifts in the threat analysis, changes in strategic guidance and/or operational concepts, and are typically conducted every few years. Because of the timeframes for designing and building ships, the long-term focus and periodicity of the FSA aligns well with industry's ability to respond. For this year's shipbuilding plan, the 2016 FSA remains the base requirement for the correct mix of 355 battle force ships.

In response to the latest *National Defense Strategy*, *Navy Strategy* and *CNO's Design for Maintaining Maritime Superiority 2.0*, the Navy is on track to complete the next FSA by the end of 2019. Some of the key elements that will be reviewed include ongoing threat-based fleet architecture review, logistics in support of DMO, surface ship mix with the inclusion of the new frigate, deterrence per the *National Defense Strategy*, and legacy capital investments versus the efficacy of next generation capabilities.

The battle force detailed in the 2016 FSA is based upon war plan analysis and acceptable levels of strategic and operational risk in the context of complex Navy responsibilities. In addition to the 2016 FSA, and as directed by the FY2016 NDAA, Navy sponsored three independent studies of alternative future fleet architectures. The results of all sponsored studies and assessments, along with insights gained from ongoing war games and advanced capability development efforts, converged on the need for a substantially larger Navy. These results ultimately informed the FY2018 NDAA legislation that established the correct mix of 355 battle force ships as the minimum requirement.

V. Unmanned Systems

Unmanned systems continue to advance in capability and are anticipated to become key enablers through all phases of warfare and in all warfare domains. Significant resources were added during PB2020 to accelerate fielding the full spectrum of unmanned and optionally-manned capabilities, including man-machine teaming ahead of full autonomy. These systems are now included in wargames, exercises and limited real-world operations. They are funded in the Navy's research and development investments and accounted for in detail in each warfare domain's Capability Evolution Plan (CEP).

Unmanned and optionally-manned system are not accounted for in the overall battle force as defined by the Secretary of the Navy on behalf of Congress. The physical challenges of extended operations at sea across the spectrum of competition and conflict, the concepts of operations for these platforms, and the policy challenges associated with employing deadly force from autonomous vehicles must be well understood prior to replacing accountable battle force ships. Accordingly, the Navy will continue to move quickly to assess the resultant naval power delivered by these systems, moving forward based on demonstrated, evidence-based capability.

Navy will continue to push aggressively to deliver these capabilities and evaluate progress, and will work closely with Congress as this develops.

VI. Plan Objectives – Balanced, Stable, Scalable

The *National Defense Strategy* articulates how the United States military will compete, deter and win with a more lethal, resilient, and rapidly innovating Joint Force. Operating in an increasingly complex security environment defined by rapid technological change in every

operating domain, the Navy continues to value adaptability and agility as a hedge against uncertainty. The *Navy Strategy* articulates the maritime implementation of the *National Defense Strategy* and includes the three driving elements of readiness, capability, and capacity, all of which must remain balanced and scalable in order to field credible naval power. A disciplined approach ensures force structure growth (capacity) accounts for commensurate, properly phased investments in readiness and capability.

The FY2020 shipbuilding plan is complemented by the reform initiatives included in the *2018 Shipyard Infrastructure Optimization Plan*, the *Long-Range Plan for the Maintenance and Modernization of Naval Vessels*, the *Sealift that the Nation Needs*, and Navy processes to improve the efficiency of operations and sustainment. The following framework defines the three enduring shipbuilding imperatives:

1st Imperative: Steady, Sustainable Growth. Sustains the minimum baseline acquisition profiles that grow the force at a steady, affordable rate while maintaining a balanced warfighting investment strategy. Of particular importance is sustaining the industrial base at a healthy level that supports affordable acquisition, predictable and efficient maintenance and modernization, and an appropriately sized workforce for more aggressive growth if additional resources become available. Steady profiles ensure there is enduring focus on the long-view.

2nd Imperative: Aggressive Growth. Accelerates production by taking advantage of available industrial capacity and additional resources, building upon the foundation of long-term steady growth if able to do so without threatening the overall balance of the warfighting investment plan – the upper boundary of what can be attained (aggressive growth) and what must be sustained (steady growth).

3rd Imperative: Service Life Extensions (SLE). SLEs provide valuable options for managing ship inventories, but must complement (not replace) the long-term growth profiles discussed above in order to have the desired positive effect on inventory objectives. There are two varieties of SLEs; class-wide SLEs based upon engineering analysis of performance metrics over time, and individual SLEs of specific ships nearing retirement. Class-wide extensions are more valuable for long-term planning, sustainment, and inventory management (filling in profile dips). Two notable examples of successful class-wide SLEs are the *Ohio*-class SSBN extension to 42-years and the recent *Arleigh Burke*-class DDG extension to 45-years.

SLE candidates are evaluated for basic hull, mechanical, and electrical restoration, their ability to be upgraded with current systems, anticipated additional life that could be gained, and return on investment vs. replacement or other capability investments. Reactivation of retired battle force ships is also considered under this imperative; however, due to their poor condition after a full service life, they typically do not provide meaningful return on investment.

VII. FY2020 Shipbuilding Plan Overview

Through the balanced application of the above shipbuilding imperatives, the timeframe for achieving the overall inventory was accelerated by approximately 20 years over last year's plan. Continual application of these imperatives, combined with Congressional support, on time funding, and strong industry response could yield additional opportunities for acceleration.

The PB2020 30-year shipbuilding plan includes procurement of 55 battle force ships within the FYDP. Overall inventory will reach 314 ships by FY2024 and 355 ships in FY2034. The DDG 51 class-wide extension was the principal driver of the 20-year acceleration and also

provided opportunity to address higher priority readiness challenges while adjusting profiles to achieve a steady, increasing ramp to 355 (removes FY2026-2031 inventory dip). Absent this dip, the aggregate profile now provides a more predictable forecast for fleet planners, shipbuilders and the numerous supporting acquisition programs and enabling contributors – maintainers, trainers, recruiters, etc. The mix of ships will be biased towards DDGs until reaching individual inventory objectives across all ship types, a timeline principally driven by SSNs and CVNs. Numerically, SSNs remain the furthest from the inventory objective and options are being explored regarding expanding production. While additional DDGs do not completely compensate for these other shortfalls, they do provide considerable lethality and utility while filling in the balance of the force mix. Inventory is capped at 355 beyond FY2034 to manage operating and sustainment costs while preserving the option to extend additional DDGs if needed, depending upon the security environment, overall shipbuilding plan dynamics, funding, or updated inventory requirements. In addition to the DDG extensions, the most notable adjustments from last year’s plan include:

- Two-ship aircraft carrier procurement (CVN 80 and CVN 81), resulting in \$4B in savings and the associated accounting shift of CVN 81 from FY2023 to FY2020. The *Ford* class represents Navy’s enduring commitment to the aircraft carrier new-construction industrial base. Note: The 2-ship procurement strategy does not alter the delivery schedule.

- Retirement of CVN 75 in lieu of its previously funded Refueling Complex Overhaul (RCOH). This adjustment is in concert with the Defense Department’s pursuit of a more lethal balance of high-end, survivable platforms (e.g. CVNs) and complementary capabilities from emerging technologies. Persistent threat analysis and ongoing warfighting studies will continue to inform the requirements for specific battle force ships in the context of an evolving capability force mix, and the Navy is postured to respond to these studies.

- Addition of a third SSN in FY2020, shifting one DDG from FY2021 to FY2020, and adding a second FFG(X) in FY2021. Note: Because it was added to the shipbuilding plan this year, advanced procurement was not programmed for the third FY2020 SSN. This will result in delivering it over a timeframe similar to a ship procured in FY2023. Per Congressional direction, the next SSN multi-year procurement contract will include options for a third submarine in FY2022 and FY2023, the years when not procuring an SSBN.

- LPD profile shift to balance shipbuilding accounts in support of near-term priorities articulated in the National Defense Strategy. Navy slid the LPD profile right and deferred the FY2024 procurement to beyond the FYDP. Note: In pursuing the NDS priorities, Navy was unable to take advantage of last year’s addition of advanced procurement funding for either a FY2020 LPD or for an adjustment to the LHA profile, and will work with Congress on options for the next budget cycle.

- SLE adjustments that extend the entire DDG-51 class and refuels two *Los Angeles*-class attack submarines. Five additional SSN candidates were identified for SLE beyond the FYDP. The funding for SLEs of the six oldest cruisers, added in PB2019, was removed in PB2020 in favor of readiness and other lethality investments. The first two of these retirements were scheduled for FY2020, but deferred one year to support reevaluation during PB2021. Modernization of the newer cruisers under the Congressionally mandated 2-4-6 plan is still in progress.

- Accelerate retirement of mine countermeasure ships (MCMs). The Navy is focused on both future MCM capability and near-term improvement of operational availability (Ao) of the aging *Avenger*-class MCMs, with priority on the forward deployed naval force (FDNF). Accordingly, the homeland threat environment supports retiring the three remaining continental United States based MCM ships in FY2020 and harvesting parts that are no longer manufactured in order to improve FDNF Ao. In parallel, and in response to the growing complexity of sea-mines, Navy is moving to a broad-spectrum, cross-domain, expeditionary approach that includes dedicated LCS-based MCM ships, MCM modules for use aboard Vessels of Opportunity (VOO), small expeditionary MCM teams, and undersea vehicles. This approach is the central theme of the classified Mine Warfare Strategy that will be provided to Congress in 2019, certifying Navy's intent per the FY2018 NDAA for evolving the MCM force.

Appendix 1 summarizes the FSA requirement of the specific ship types that total 355 battle force ships, and also summarizes FYDP funding for ship construction (SCN – Shipbuilding and Conversion, Navy). Appendix 2 illustrates the 30-year acquisition, delivery and inventory profiles, and Appendix 3 discusses industrial base dynamics. Appendix 4 includes projected costs across the 30-year plan that shows an average of \$20.3B per year for SCN across the FYDP and \$26B to \$28B per year beyond the FYDP to sustain this plan while introducing continuous production of the new *Columbia*-class SSBN, last recapitalized from FY1974 to FY1989. The fiscal impact of the new SSBN begins in FY2023 with advanced procurement, and then increases in FY2026 with full annual procurements. This represents Navy's largest fiscal challenge for near-term budgets and could impact the pace of procuring other ship types – potentially causing a drop below the steady profiles detailed in Appendix 2.

Following four decades of a progressively smaller Navy, Appendix 5 illuminates the cost of owning and operating a significantly larger Navy, and the associated challenge of modeling the complex forecasting variables. Consistent annual funding in the shipbuilding account is foundational to sustaining steady growth (capacity), but equally important is the properly phased, additional funding in operating and sustainment accounts as new ships are delivered – the much larger fiscal burden over time.

Appendix 6 addresses the ongoing plan for inactivation and disposal of naval ships. Appendix 7 discusses the growing logistics requirement in the context of DMO and illustrates opportunities being pursued to recapitalize the auxiliary fleet, a key enabler for sustaining protracted medical, logistics, repair, command and control, and support missions. Because of industry dynamics over time resulting in an atrophied U.S. commercial industrial base, close partnering with industry and Congress is needed to recover the U.S. commercial market in order to competitively and affordably address the Navy's auxiliary shipbuilding requirement. Appendix 8 contains proprietary costing data and is controlled under limited distribution.

As a hedge against uncertainty later in the shipbuilding plan, the baseline acquisition profiles (1st shipbuilding imperative) provide long-term foundational workforce stability for thoughtful, agile modernization and a clearer forecast of when to evolve to the next ship design. Surface combatants, including aircraft carriers, and attack submarines in particular must be built to support the adoption of evolving technologies. Accordingly, the Surface Capability Evolution Plan (SCEP) and the Tactical Submarine Evolution Plan (TSEP), plus supporting aviation and ordnance plans, are structured to drive alignment, reduce cost, and prevent missed opportunity. Because the speed of technology evolution in all domains continues to increase at an increasing rate, capability evolution as an enduring, responsive process places high value on adaptability

and commonality – building in features to quickly move to new technologies and capabilities. The new *Ford*-class aircraft carrier is a sterling example, providing nearly three times the electrical power, adaptable support systems for the future air wing, and significant margin for long-term modernization.

The next generation Large Surface Combatant (LSC) and attack submarine (SSN(X)) design concepts are both focusing on adaptability. The legacy platforms they will replace continue to serve us well, but have nearly exhausted their margins for modernization and require a broader spectrum of solutions. The LSC and SSN(X) will follow the FFG(X) model of partnering with industry early to define the art-of-possible, balance cost, and reduce risk ahead of requirements definition, and will include alternative platform concepts. The LSC is nearer-term and industry engagement over the next year will determine the feasibility of accelerating the effort in accordance with the imperatives of the *CNO's Design for Maintaining Maritime Superiority 2.0*.

VIII. Industrial Base

A healthy and efficient industrial base continues to be the fundamental driver for achieving and sustaining the Navy's baseline acquisition profiles. Our shipbuilding and supporting vendor base constitute a national security imperative that is unique and must be protected. To keep a clear eye on historical context, the “boom and bust” behavior discussed in detail in last year's shipbuilding plan is summarized in Appendix 3 and continues to provide insight into the power of a skilled workforce with career stability, especially in the face of today's competitive job market. We are at a level of fragility that without consistent and continuous commitment to steady acquisition profiles as proposed in this plan, the industrial base will continue to struggle and some elements may not survive another “boom/bust” cycle.

Discussed in the March 2018 report *Sealift That the Nation Needs* and in Appendix 7, recapitalizing the auxiliary fleet in support of DMO has become a top priority. Regrettably, the same factors that drove the investment imbalance across readiness–capability–capacity of the battle force also resulted in deferring timely reinvestment in the auxiliary and sealift fleets. In parallel, the commercial industry supporting our auxiliaries and sea-lift has atrophied due to the combined effect of increased foreign competition and U.S. legislation/policy.

For 2019, the Navy is also developing a *Long-Range Plan for the Maintenance and Modernization of Naval Vessels*. This plan captures the combined complexity of high-tempo operations, increasing fleet size, and a dynamic support base resulting in maintenance and readiness challenges. The plan will address end-to-end depot-level maintenance and modernization processes for various ship classes, examine the industrial base, and look ahead 30 years as the fleet grows.

The Navy's role is to partner with industry to define and establish workable requirements and to partner with Congress to sustain predictable profiles. These supportive relationships will continue to promote efficiency through capital improvement and expansion, research and development, and sustainment of a world-class workforce – the key contributors to winning in any timeframe.

IX. Summary

The 30-yr shipbuilding plan reflects the *National Defense Strategy* priority to build a more lethal force. Through the judicious application of predictable shipbuilding profiles and stable, on-time funding, the timeframe for achieving the overall inventory was accelerated by 20 years over last year's plan, providing a path to 314 ships by FY2024 and a steady ramp to 355 ships by the mid-2030s, with the inventory biased towards DDGs while filling in the rest of the force.

The dynamic threat environment continues to drive creative, adaptable capability development, new operational concepts, and alternative force structure composition. The shipbuilding plan realistically supports this dynamic environment and reflects the unwavering imperative to remain fiscally balanced. Accordingly, the plan's most valuable feature is scalability, and by setting the conditions for an enduring industrial base as a top priority the Navy is postured to more aggressively grow the force with additional resources, or to responsibly shrink the force with fewer resources, assuming the steady profiles are sustained.

The shipbuilding plan is structured using a FYDP view of PB2020 funding levels carried forward, and also provides enough fidelity beyond the FYDP to illuminate looming fiscal challenges both in procurement and operations and sustainment. In conjunction with pursuing required long-term, predictable funding, and in concert with the Secretary of Navy's business reform initiatives, the Navy continues to pursue a spectrum of acquisition strategies to build and operate ships more efficiently – steady resourcing is ultimately the most important factor.

Appendix 1

PB20 Shipbuilding Plan (FY2020-FY2024)

Table A1-1 shows the *Navy the Nation Needs* requirement, by ship type, based upon the 2016 Force Structure Assessment (FSA) and the FY2018 National Defense Authorization Act (NDAA). Table A1-2 includes the President’s Budget (PB2020) funding for the Future Years Defense Program (FYDP) portion of the 30-yr shipbuilding plan.

Table A1-1. Navy the Nation Needs

Type	2016 FSA ¹
Ballistic Missile Submarines ²	12
Aircraft Carriers ³	12
Attack Submarines	66
Guided Missile Submarines ⁴	0
Large Surface Combatants	104
Small Surface Combatants	52
Amphibious Warfare Ships	38
Combat Logistics Force	32
Command and Support	39
Total	355

Notes:

1. In response to the *National Defense Strategy, Navy Strategy* and *CNO’s Design for Maintaining Maritime Superiority 2.0*, the Navy is on track to complete the next FSA by the end of 2019.
2. Replace 14 *Ohio*-class SSBNs with 12 *Columbia*-class SSBNs.
3. Similar to last year, the current profile will achieve the requirement of 12 ships beyond 2060.
4. The 4 SSGNs now in service retire in the mid-2020s. To meet payload and Special Forces requirements, Navy is inserting *Virginia* Payload Modules (VPM) into Block V and VI *Virginia*-class attack submarines beginning in FY2019. A payload-based large diameter submarine will follow VPM in accordance with the Tactical Submarine Evolution Plan (TSEP), a plan that features a fast, lethal next generation attack submarine and a large-diameter, next-generation payload-based submarine.

Table A1-2 PB2020 FYDP funding for Ship Building and Conversion Navy (SCN)

Ship Type	(\$M)	FY20		FY21		FY22		FY23		FY24		FYDP	
		\$	Qty	\$	Qty	\$	Qty	\$	Qty	\$	Qty	\$	Qty
CVN 78 ¹		2,347	1	2,645		2,324		1,929		1,718		10,962	1
DDG 51		5,323	3	3,464	2	3,578	2	6,160	3	5,649	3	24,174	13
FFG(X) ^{2,3}		1,281	1	2,057	2	1,750	2	1,792	2	1,828	2	8,709	9
SSN 774		9,926	3	6,123	2	5,968	2	6,081	2	7,052	2	35,150	11
SSBN 826 ⁴		1,699		3,921	1	4,196		3,872		4,790	1	18,477	2
LPD Flt II		247		1,591	1			1,739	1			3,577	2
LHA(R) ⁵								171		1,618	1	1,788	1
ESB						127		549	1			676	1
T-AO 205		1,054	2	513	1	522	1	1,101	2	559	1	3,749	7
T-ATS(X)		150	2	78	1	79	1	81	1			388	5
T-AGOS (X)						343	1	369	1	302	1	1,014	3
Total New Construction⁶		22,028	12	20,392	10	18,887	9	23,843	13	23,516	11	108,665	55

Notes:

1. Funding reflects the two-CVN procurement for CVN 80 and CVN 81.
2. Estimated costs pending completion of the service cost position estimate and competitive award of the detail design and construction contract in FY2020.
3. New ships planned for future procurement or for replacement of legacy ships are annotated with (X) until their class has been named, such as FFG(X) and T-ATS(X).
4. FY2021 represents incremental funding for the lead ship: FY2021=41% (\$3.6B), FY2022=35% (\$3.1B), FY2023=24% (2.1B).
5. Advance procurement funding for LHA 9 in FY2023 and first year full funding in FY2024
6. Funding for sustainment (maintenance, personnel, operations, etc.) is in addition to funding for shipbuilding (SCN), and is phased with delivery of battle force ships within the FYDP.

Notable FYDP procurement activity in the PB2020 budget submission includes:

- Two-ship procurement of CVN 80 and CVN 81, and the resulting shift in accounting of CVN 81 to FY2020. Note: the 2-ship procurement strategy does not alter the delivery schedule.
- Adding one *Virginia*-class ship in FY2020 (three total in FY2020), and projecting two-per-year steady state thereafter. Note: Because it was added to the shipbuilding plan this year, advance procurement funding was not programmed for the third FY2020 SSN, and consequently it will deliver over a longer timeframe, similar to a ship procured in FY2023.
- Shifting one DDG 51 Flight III earlier from FY2021 to FY2020 (three total in FY2020), and averaging 2.5 per year steady state thereafter.
- Adding one FFG(X) in FY2021 (two total FY2021), and projecting 2 per year steady state thereafter.
- Procuring lead *Columbia*-class SSBN in FY2021, the second in FY2024, with serial production beginning in FY2026 (advanced procurement partial funding begins in FY2023).
- Shifting one T-AO 205 from FY2021 to FY2020.
- Procuring the final T-ESB in FY2023, continuing procurement of T-ATS(X), and procuring T-AGOS(X) starting in FY2022.

Appendix 2

Long-Range Naval Vessel Inventory

Summarizing from section VI of the main report, the overarching plan in support of the *National Defense Strategy* continues to be the *Navy the Nation Needs*, and the three driving elements continue to be readiness, capability and capacity, all of which must remain balanced and scalable in order to field credible naval power. Whether growing or shrinking the force, a disciplined approach ensures force structure growth (capacity) accounts for commensurate, properly phased investments in readiness and capability – including manning, support, training, infrastructure, networks, and operations.

The FY2020 shipbuilding plan is complemented by the *2018 Shipyard Infrastructure Optimization Plan* and the *Annual Long Range Plan for the Maintenance and Modernization of Naval Vessels for Fiscal Year 2020* under three enduring shipbuilding imperatives explained in the main report: (1) steady, sustainable growth that establishes baseline acquisition profiles to promote predictability and efficiency; (2) aggressive growth that more quickly attains the requirement through additional industrial capacity and increased resources; and, (3) service life extensions that help manage ship inventories (ramps and dips).

Tables A2-1 thru A2-4 and figures A2-1 and A2-2 depict the construction and delivery plan assuming steady, sustainable procurement. The mid- and far-term periods beyond FY2024 become less precise, but provide a base from which to respond to changes in future technology, candidate service life extensions, or threat-based fleet design and architecture decisions. The plan values agility, adaptability, and commonality as key attributes for future platforms – providing warfighting commanders composable capabilities in contested environments across all phases of warfare. This plan results in the battle force inventory shown in Table A2-4, indicating the projected number of ships in service on the last day of each fiscal year. This plan addresses the Navy's most critical shipbuilding needs:

- Reaches and sustains the aggregate inventory of 355 battle force ships 20 years earlier than last year's plan.
- Removes the previous inventory dip and provides a continuous ramp to 355 ships, resulting in a predictable forecast for fleet planners, shipbuilders and the numerous supporting acquisition programs and enablers.
- Includes the two-ship aircraft carrier procurement (CVN 80 and CVN 81), garnering significant savings while protecting the industrial base for the more capable *Ford*-class.
- Includes the positive combined impact of the shipbuilding imperatives and stable, on-time funding (absent a continuing resolution), providing a more predictable backdrop for the industrial base.
- Provides near, mid, and long-term visibility into timeframes for introducing new or evolved platforms such as the next generation attack and payload based submarines, small and large surface combatants, and logistics and support ships.

Figure A2-1. PB2020 vs. PB2019 Comparison

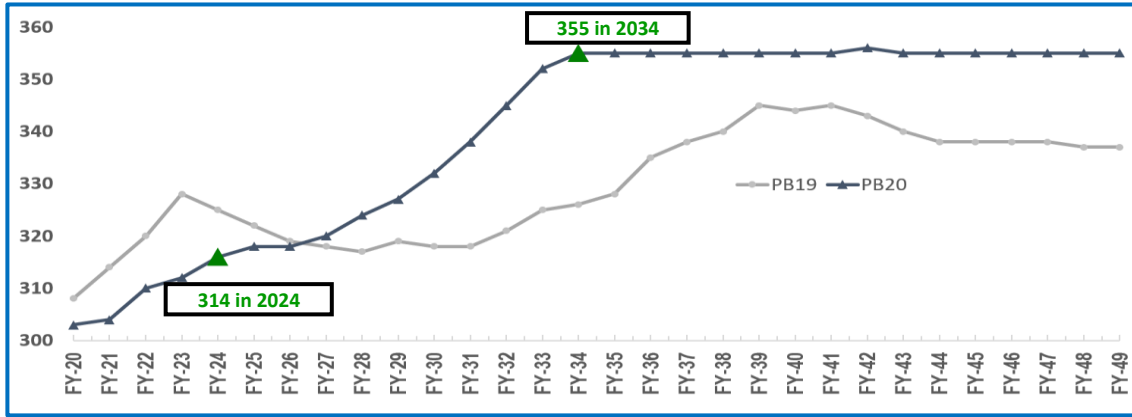
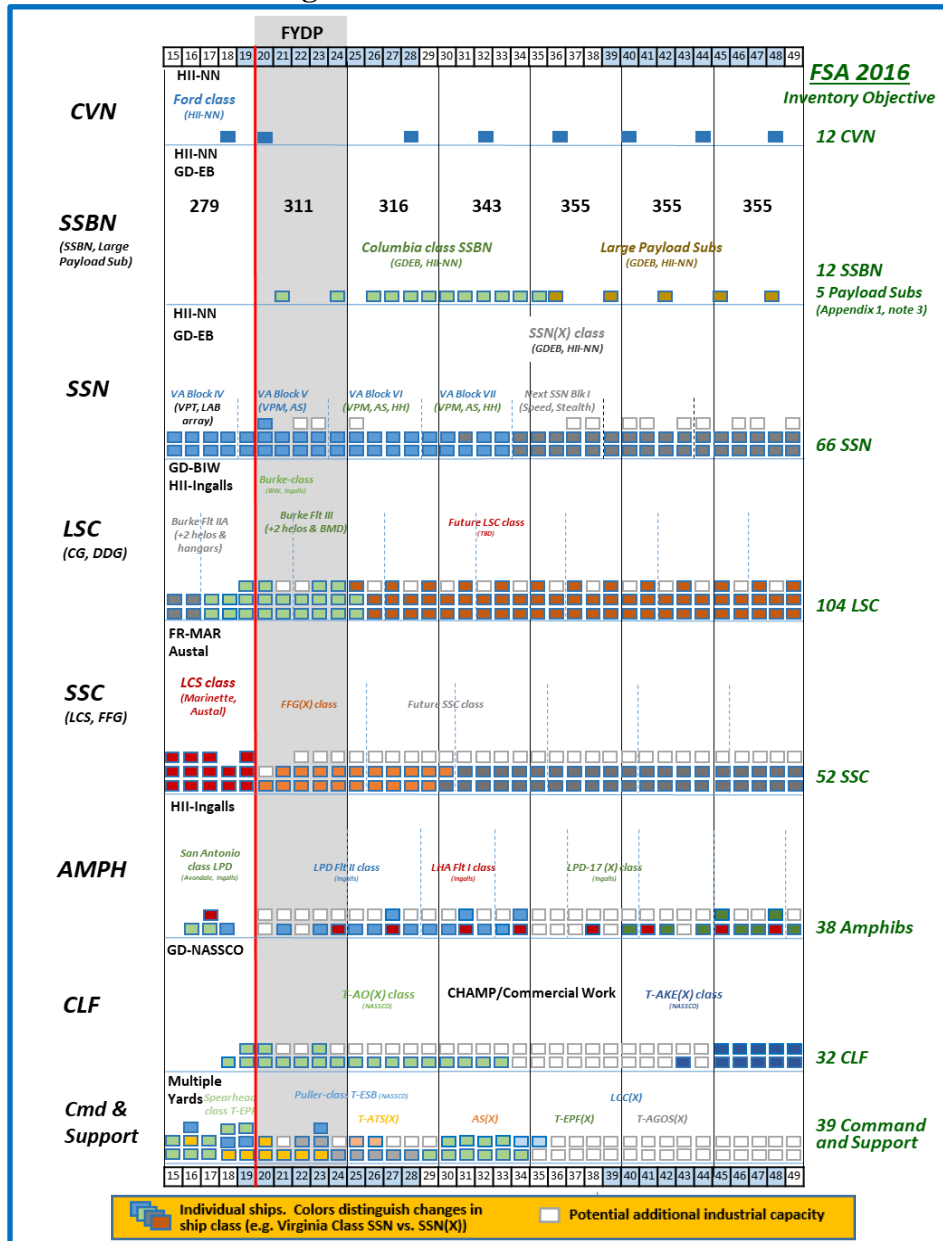


Figure A2-2. Procurement Profile



Appendix 3

Shipbuilding Industrial Base

Defense Industrial Base

Over the previous six decades 14 defense-related new construction shipyards have closed, 3 have left the defense industry, and one new shipyard has opened (Table A3-1). Today, the Navy contracts primarily with seven private new construction shipyards under four prime contractors to build our future battle force – far less capacity than our principal competitors. Reduced funding over time caused a parallel contraction of the even more fragile sub-vendor base. Although efforts are underway to quantify this fragility in the context of long-term health and responsiveness, the work is slow and complex. The Navy will continue to research and pursue opportunities across all participants in both the defense and commercial industrial base (see September 2018 Report to Congress *Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States*).

To summarize the full explanation provided in Appendix 4 of last year’s report, and to keep a clear eye on historical context, the “boom and bust” profiles of the last 60 plus years resulted in sharp peaks followed by significant valleys (sometimes breaks) in production. The historic examples shown in last year’s plan provided insight into why workforce experience and efficiency has become more difficult to reconstitute, and how that has fundamentally contributed to longer, more expensive shipbuilding timelines. The buildup in the 1950s and 1980s, followed by “bust” periods of little production, each led to the loss of portions of our shipbuilding industrial base. The “boom” periods also led to large-scale, block obsolescence as types/classes of ships reached (or will reach) the end of their service lives simultaneously, ultimately driving the need for another “boom” to recover. We are at a level of fragility that, without consistent and continuous commitment to steady acquisition profiles as proposed in this plan the industrial base will continue to struggle and some elements may not recover from another “boom/bust” cycle.

The stable, affordable baseline shipbuilding profiles that must be protected to preserve our industrial base and establish an aggressive, forward-looking, competitive posture are shown in Appendix 2 of this report. These profiles promote, above all else, a stable, efficient workforce that can adapt to incorporating new requirements, complete modernization and maintenance efforts on time, respond to emerging disruptive capabilities, and adeptly move to new platform designs. Industry recognizes its critical role and has shown a strong desire to drive improved performance to meet Navy’s needs. The Navy’s role is to partner with industry to define and establish workable requirements and to partner with Congress to sustain predictable profiles. This in turn provides clarity and confidence that will inform industry investment in capital improvement and expansion, research and development, and a world-class workforce.

Commercial Industrial Base

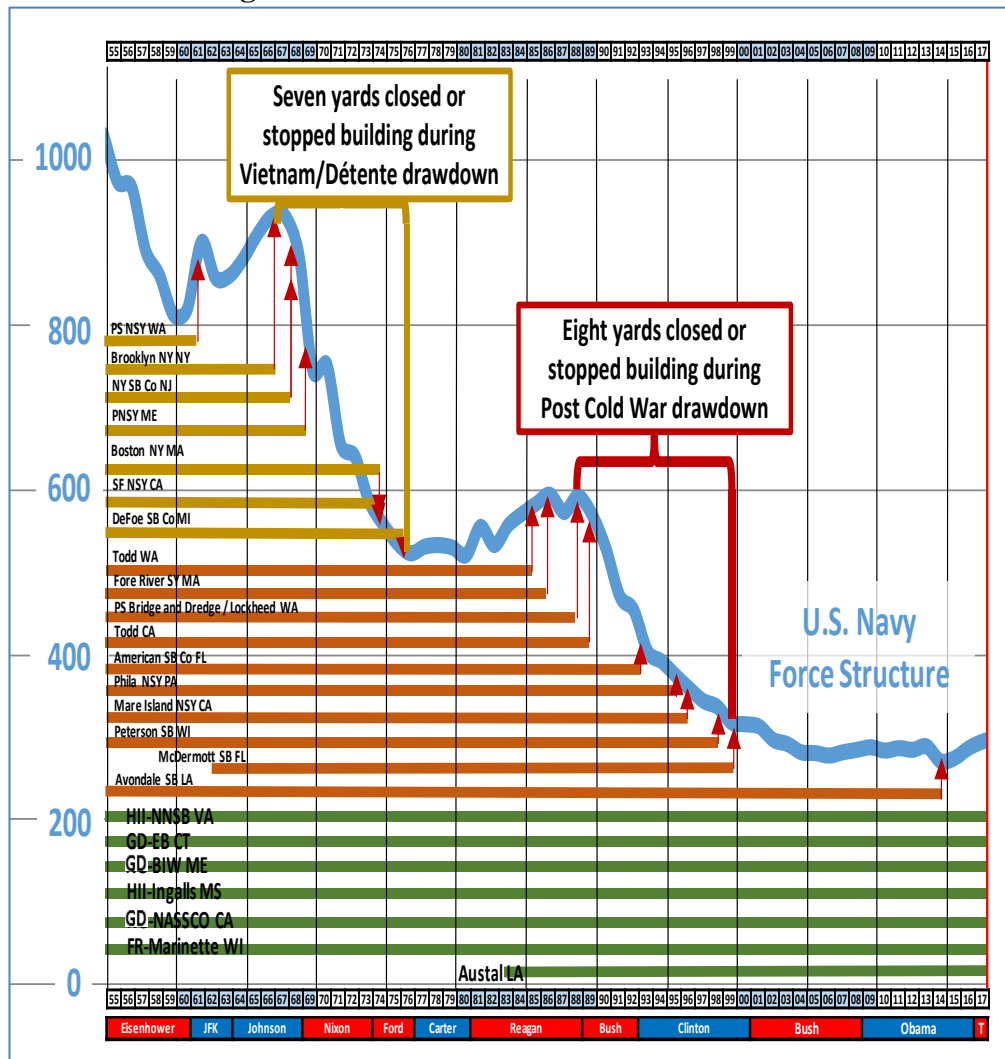
On the heels of recovering the battle force, recapitalizing the auxiliary and sealift fleet in support of DMO has become a top priority, and this operational concept is anticipated to generate requirement growth in multiple logistics lines. Regrettably, the same austerity factors that drove the investment imbalance across readiness–capability–capacity of the battle force, also deferred timely reinvestment in the auxiliary and sealift fleet. In parallel, the commercial industry supporting our auxiliaries and sealift has atrophied due to increased foreign competition through modernized

facilities and inexpensive labor. A contributing factor was policy legislation that ended U.S. Government shipyard subsidies, putting the U.S. industry at a considerable disadvantage compared to subsidized overseas competitors.

Three U.S. shipyards currently build ocean-going commercial ships – NASSCO (San Diego), VT Halter (Pascagoula) and Philly Shipyard (Philadelphia). To varying degrees, these shipyards have developed processes similar to their overseas competitors, but still face steep relative penalties in labor rates, environmental controls, and insurance. The combined effect is a limited set of options for long-term recapitalization of the U.S. sealift fleet, options that generally include service life extensions of ships already 40-50 years old, limited authority to purchase inexpensive used, but foreign built vessels (less than 20 years old), or buying new U.S. built ships at a significant cost premium over foreign-built ships – all making it challenging and expensive to remain competitive.

The Navy looks forward to working with Congress and government agencies to first bolster the U.S. commercial shipbuilding industry, and then to open the aperture on near-term options regarding purchasing or leasing used ships.

Figure A3-1 New Construction Industrial Base



Appendix 4

Annual Funding for Ship Construction

The funding in this report is in FY19 constant dollars using a 2.8 percent shipbuilding composite inflation rate (SCIR).¹ Figure A4-1 depicts the estimated funding required to achieve the battle force inventories proposed in Appendix 2. Average ship construction funding is \$20.3B per year across the FYDP, and \$26B to \$28B per year beyond the FYDP in order to sustain steady acquisition profiles (shipbuilding 1st imperative), and also account for the serial production of *Columbia* and the evolving DMO logistics requirement discussed in Appendix 7. The fiscal impact of *Columbia*, last recapitalized from FY1974 to FY1989, begins in FY2023 with advanced procurement, and then increases in FY2026 with annual full procurements. This represents Navy's largest fiscal challenge for near-term future budgets and could impact the pace of procuring other ship types – potentially causing a drop below the steady profiles in Appendix 2.

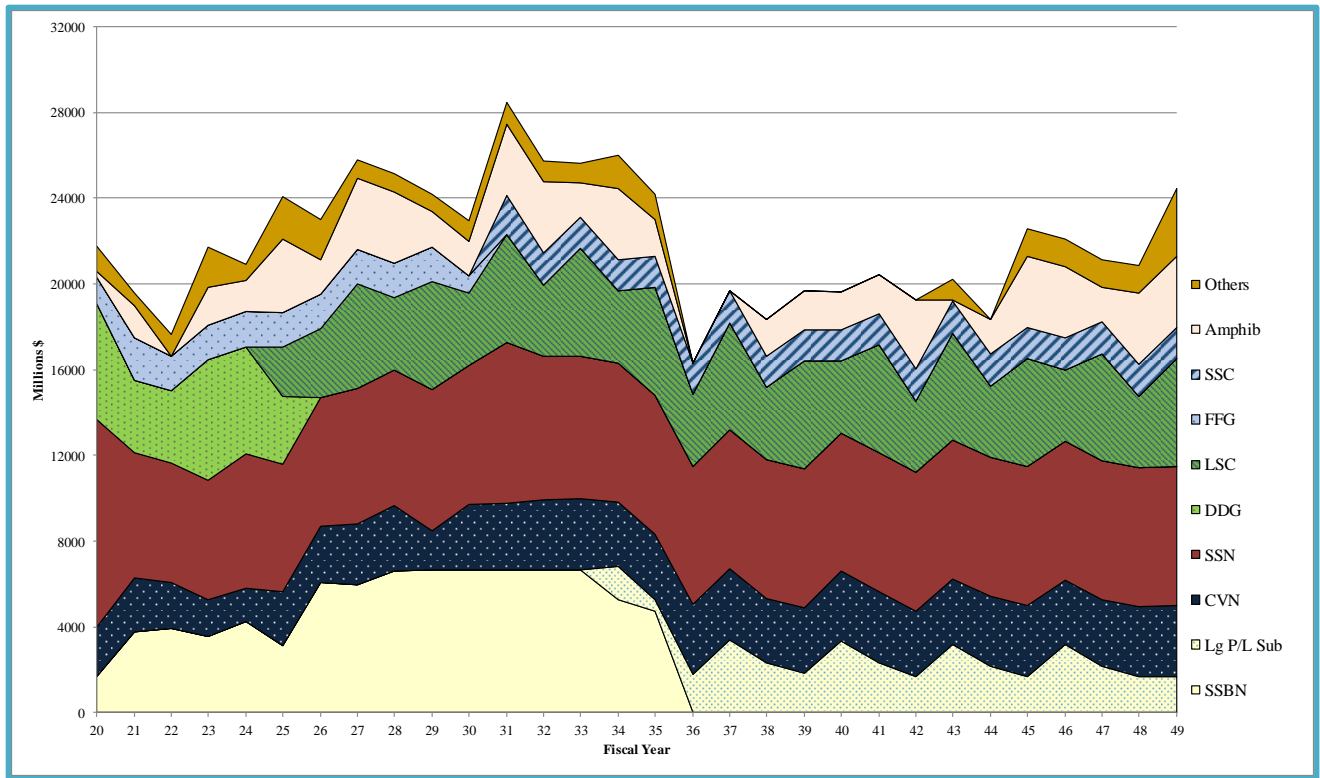
The cost to sustain a larger Navy is in addition to shipbuilding funding and is phased within the appropriate accounts across the FYDP to match ship deliveries (manning, support, training, infrastructure, etc.). Appendix 5 illuminates the cost of owning and operating a significantly larger Navy and discusses estimated operations and sustainment costs, projected to FY2034 when the fleet reaches 355 ships. Appendix 7 discusses the growing logistics requirement in the context of DMO and illustrates opportunities being pursued to recapitalize the auxiliary fleet.

As a result of the healthy adjustments in this year's plan that removed the inventory dip from FY2026 to FY2031, the resulting steady ramp to 355 has begun to smooth some of the peaks and valleys from last year's plan, trending towards more predictability and efficiency. The peaks during the first half of the 30-year plan are predominantly driven by the next generation LSC and the introduction of *Columbia*; and, during the second half by the completion of *Columbia* and the start of the next generation payload-based submarine.

Next generation ships and submarines are in the early stages of requirements definition, and their uncertainty compounds deeper into the plan. Costs are estimated and their impact on overall force mix will be determined within the FSA process. The baseline acquisition profiles provide a hedge against this uncertainty and reinforces long-term workforce stability for thoughtful, agile modernization and a clearer forecast of when to evolve to the next ship design.

¹ The shipbuilding composite inflation rate is a weighted average of shipbuilding costs across the shipbuilding industrial base. This inflation rate is developed using historic shipbuilding costs and projected future pricing for each shipyard. While historically it has been up to three percentage points higher than general inflation, this gap is projected to narrow to less than one percentage in the future.

Figure A4-1. Annual Funding for Ship Construction (FY2020-2049)



Appendix 5

Sustainment Cost

In response to NDAA FY2019 direction, this appendix illuminates cost considerations of owning and operating a larger force in support of the constitutional imperative to “provide and maintain a Navy.” The Navy has been getting smaller for the last four decades, recently falling below 280 total ships, with aggressive measures now in place to reverse this trend in response to the reemergence of Great Power Competition and the attendant larger, threat-based FSA requirement of 355 battle force ships. Coincident with the relatively new dynamic of purchasing more ships to grow the force instead of simply replacing ships or shrinking the force, is the responsibility to “own” the additional inventory when it arrives.

Consistent annual funding in the shipbuilding account is foundational for an efficient industrial base in support of steady growth and long-term maintenance planning, but equally important is the properly phased, additional funding needed for operations and sustainment accounts as each new ship is delivered – the much larger fiscal burden over the life of a ship and the essence of the challenge to remain balanced across the three integral elements of readiness–capability–capacity. Because the Navy has been shrinking not growing, and because of the disconnected timespan from purchase to delivery, often five years or more and often beyond the FYDP, there is risk of underestimating the aggregate sustainment costs looming over the horizon that must now be carefully considered in fiscal forecasting.

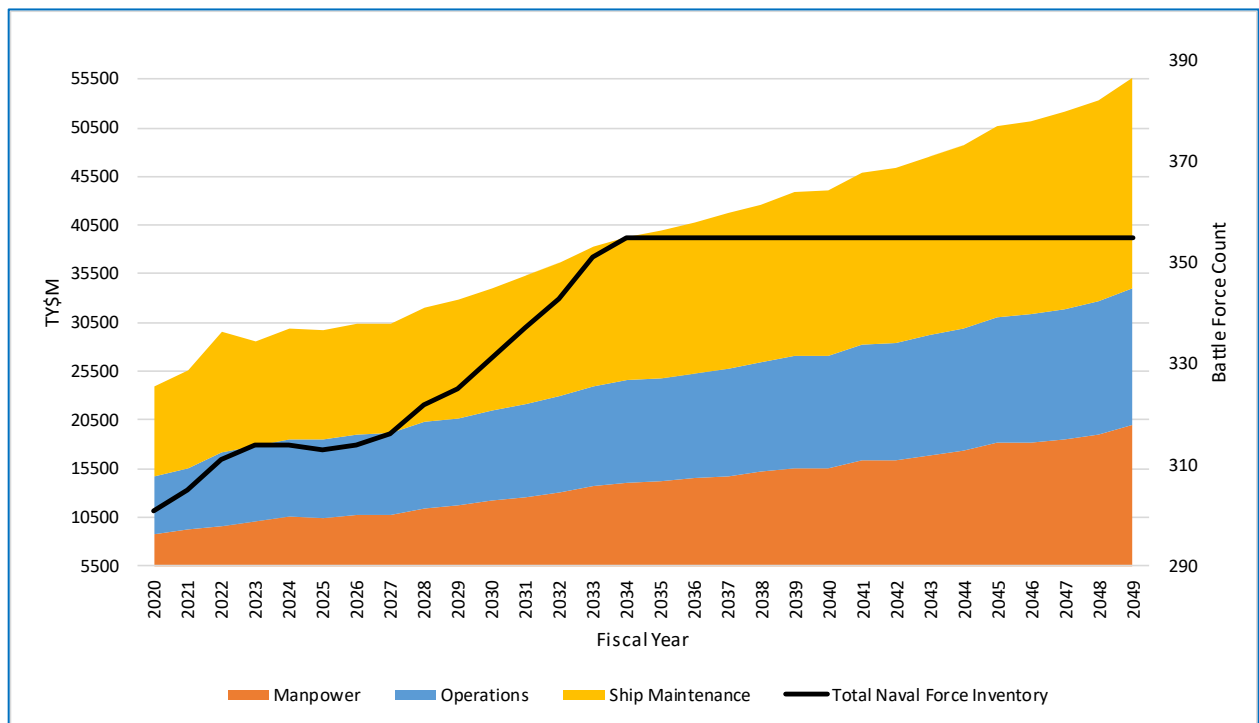
For a ship, the rough rule of thumb for cost is 30 percent for procurement and 70 percent for operating and sustainment; for example, a ship that costs \$1B to buy costs \$3.3B to own, amortized over its lifespan. Accordingly, multi-ship deliveries can add hundreds of millions of dollars to a budget year, and then require the same funding per year thereafter, compounded by additional deliveries in subsequent years and only offset by ship retirements, which lag deliveries when growing the force. A similar dynamic occurs when the life of a ship is extended. Sustainment resources programmed to shift from a retiring ship to a new ship must now stay in place – for the duration of the extension. The burden continues to grow until equilibrium is reached at the desired higher inventory, when deliveries match retirements and all resourcing accounts reach steady-state at a higher, enduring sustainment cost.

For perspective, the current budget, among the largest ever, supports a modern fleet of approximately 300 ships, nearly 20 percent fewer than the goal of 355. The battle force inventory shown in Appendix 3 rises from 301 ships in FY2020 to 314 ships in FY2024, and then 355 in FY2034. The programmed sustainment cost in Table A5-1 is \$24B in FY2020 and rises to \$30B in FY2024 in TY\$. When the battle force inventory reaches 355 in FY2034, estimated cost to sustain that fleet will approach \$40B (TY\$), 32% higher than in FY2024. For now, included in this sustainment estimate are only personnel, planned maintenance, and some operations; representing those costs tied directly to owning and operating a ship, easily modeled today, and already line-item accounted for in the budget. Equally important additional costs, but not yet included in the future estimate, are those not easily associated with individual ships and require complex modeling for long-term forecasting (beyond 3 to 5 years), such as the balance of the operations accounts (market and schedule driven), modernization and ordnance (threat and technology driven), infrastructure and training (services spread across many ships), aviation detachments, networks and cyber support, plus others. The sustainment cost in Figure A5-1 represents the FYDP programmed cost for direct costs discussed above, and then inflated forward using Office of the Secretary of Defense indices applied

to the deliveries in Appendix 2.

Less of a challenge when shrinking the force, the Navy is now working towards developing the complex model needed to capture indirect costs for growing the force. Until then, macro ratios are helpful in estimating rough orders of magnitude beyond the FYDP and for identifying future areas of concern. Similar to procurement, estimates will be less precise deeper into the plan. Recovering from the long-term investment imbalance has proven to be costly, particularly in the readiness accounts. As readiness becomes more accurately defined, the modeling will improve and so will the ability to more accurately forecast. However, no matter the method, the anticipated cost of sustaining the proper mix of 355 ships is anticipated to be substantial, and reform efforts and balanced scalability will continue to be the drivers going forward. An example is the *Ford*-class, which has implemented designs that reduce the cost of sustainment by over \$100M per year compared to the previous *Nimitz* class, equating to over \$4B in savings across the life of the ship.

Figure A5-1. Annual Funding for Sustainment (FY2020-2049)¹



¹ Shows personnel, maintenance and operations programmed in the FYDP for ships in the battle force by ship type. Beyond the FYDP, the funding is inflated from FY24, again by projected ship type (mix varies by year).

Appendix 6

Decommissionings, Dismantlings, and Disposals during FY2020-FY2024 Future-Years Defense Program (FYDP)

Ships to be placed out of service during the FYDP.

Table A6-1 lists the battle force ships to be placed out of service within the FYDP, and their planned disposition. Balanced with steady procurement, the healthy replacement of old with new provides increasing capability over time and ensures no unanticipated gaps in warfighting capability. When matched with steady acquisition profiles, the retirement plan is useful in managing inventory without unintended, excessive reduction in ship count due to a previous “boom” era that results in a glut of ships leaving inventory over a short period of time.

Table A6-1. Ships planned to be placed out of service¹ during the FYDP

Inactivation Year (FY) – Total Ships	Ship Name/Designation/Hull Number	Disposition
2020 – 5 Ships	USS OLYMPIA (SSN 717)	Dismantle
	USS LOUISVILLE (SSN 724)	Dismantle
	USS CHAMPION (MCM 4) ²	LSA
	USS SCOUT (MCM 8)	LSA
	USS ARDENT (MCM 12)	LSA
2021 – 8 Ships	USS BUNKER HILL (CG 52)	OCIR ³
	USS MOBILE BAY (CG 53)	OCIR
	USS ANTIETAM (CG 54)	OCIR
	USS LEYTE GULF (CG 55)	OCIR
	USS HELENA (SSN 725)	Dismantle
	USNS SIOUX (T-ATF 171)	Dismantle
	USNS APACHE (T-ATF 172)	Dismantle
	USNS WALTER S DIEHL (T-AO 193)	Dismantle
2022 – 8 Ships	USS OKLAHOMA CITY (SSN 723)	Dismantle
	USS PROVIDENCE (SSN 719)	Dismantle
	USS SAN JACINTO (CG 56)	TBD
	USS LAKE CHAMPLAIN (CG 57)	TBD
	USS PATRIOT (MCM 7)	Dismantle
	USS PIONEER (MCM 9)	Dismantle
	USS SAN JUAN (SSN 751)	Dismantle
	USNS CATAWBA (T-ATF 168)	Dismantle
2023 – 11 Ships	USS CHICAGO (SSN 721)	Dismantle
	USS KEY WEST (SSN 722)	Dismantle
	USS PASADENA (SSN 752)	Dismantle
	USS ALBANY (SSN 753)	Dismantle
	USNS LEROY GRUMMAN (T-AO 195)	OSIR
	USS SENTRY (MCM 3)	Dismantle
	USS DEVASTATOR (MCM 6)	Dismantle
	USS WARRIOR (MCM 10)	Dismantle
	USS GLADIATOR (MCM 11)	Dismantle
	USS DEXTROUS (MCM 13)	Dismantle
	USS CHIEF (MCM 14)	Dismantle

2024 – 9 Ships	USS HARRY S TRUMAN (CVN 75)	Dismantle
	USS PHILIPPINE SEA (CG 58)	TBD
	USS PRINCETON (CG 59)	TBD
	USS NEWPORT NEWS (SSN 750)	Dismantle
	USS TOPEKA (SSN 754)	Dismantle
	USS ALEXANDRIA (SSN 757)	Dismantle
	USS ASHEVILLE (SSN 758)	Dismantle
	USNS JOSHUA HUMPHREYS (T-AO 188)	OSIR
	USNS GRASP (T-ARS 51)	Dismantle

Notes:

1. US Navy vessels are commissioned ships that are decommissioned and removed from active status. USNS vessels are non-commissioned vessels that are placed out of service.
2. MCM ships in FY20 are CONUS based and will used as Logistic Support Asset (LSA) to provide parts (no longer manufactured) for the permanently deployed overseas MCM ships.
3. Out of Commission in Reserve (OCIR) ships will be retained on the Naval Vessel Register as reactivation candidates, which would include an SLE effort.

Ships planned for dismantling and disposal during the FYDP

Prior to final disposition, ships reaching the end of their service lives are evaluated for additional use through intra-agency or inter-agency transfer, foreign military sales (FMS), fleet training, or weapons testing. Ships designated for FMS are retained in a hold status for no more than two years in accordance with Navy policy.

The Navy intends to dismantle the ships listed in Table A6-2 within the FYDP. Specific dates will be determined when the ships are contracted for scrapping or recycling.

Table A6-2. Ships Planned for Disposal by Dismantling

Ex-PONCE (AFSB(I) 15)	Ex-DENVER (LPD 9)
Ex-HAYES (AG 195)	Ex-JUNEAU (LPD 10)
Ex-NAVAJO (ATF 169)	Ex-SHREVEPORT (LPD 12)
Ex-MOHAWK (ATF 170)	Ex-NASHVILLE (LPD 13)
Ex-TICONDEROGA (CG 47)	Ex-BOULDER (LST 1190)
Ex-YORKTOWN (CG 48)	Ex-CANON (PG 90)
Ex-KITTY HAWK (CV 63)	USS CHAMPION (MCM 4)
Ex-JOHN F KENNEDY (CV 67)	USS SCOUT (MCM 8)
Ex-BARRY (DD 933)	USS ARDENT (MCM 12)
Ex-CHARLES F ADAMS (DDG 2)	USNS WALTER S DIEHL (T-AO 193)
Ex-BOONE (FFG 28)	USNS SIOUX (ATF 171)
Ex-STEPHEN W GROVES (FFG 29)	USNS APACHE (ATF 172)
Ex-JOHN L HALL (FFG 32)	USNS CATAWBA (ATF 168)
Ex-UNDERWOOD (FFG 36)	USS SENTRY (MCM 3)
Ex-NICHOLAS (FFG 47)	USS DEVASTATOR (MCM 6)
Ex-HAWES (FFG 53)	USS PATRIOT (MCM 7)
Ex-SAMUEL B ROBERTS (FFG 58)	USS PIONEER (MCM 9)
Ex-CHARLESTON (LKA 113)	USS WARRIOR (MCM 10)
Ex-MOBILE (LKA 115)	USS GLADIATOR (MCM 11)
Ex-EL PASO (LKA 117)	USS DEXTROUS (MCM 13)
Ex-CLEVELAND (LPD 7)	USS CHIEF (MCM 14)
Ex-DUBUQUE (LPD 8)	USNS GRASP (T-ARS 51)

Table A6-3 lists the ships that will be used for fleet training in support of Rim of the Pacific (RIMPAC) and Valiant Shield training exercises that will occur during the FYDP. The training will include using selected decommissioned ships as targets for live-fire weapons employment, referred to as a “sinking exercise” (SINKEX). The Chief of Naval Operations (CNO) guidelines authorize SINKEXs when: (1) the event is required to satisfy Title 10 requirements for ship survivability or weapons lethality evaluation; or (2) the event supports major joint or multi-national exercises or evaluation of significant new multi-unit tactics or tactics and weapons combinations.

Table A6-3. Ships Planned for use in Future Fleet Training Exercises

Ex-CURTS (FFG 38)	Ex-FORD (FFG 54)
Ex-RODNEY M DAVIS (FFG 60)	Ex-INGRAHAM (FFG 61)
Ex-VANDEGRIFT (FFG 48)	Ex-DURHAM (LKA 114)

Summary

Per the annual Ship Disposition Review conducted on January 16th, 2019, Navy will retire 41 battle force ships within the FYDP (Table A6-1), with several awaiting final disposition as discussed above. 50 previously retired ships will be processed for disposal, 44 through dismantling (Table A6-2), and 6 through fleet training support (Table A6-3).

Appendix 7

Auxiliary and Sealift Vessel Plan

Auxiliary and sealift vessels provide support to the battle force, shore-based facilities, and broader national defense missions. Recapitalizing the auxiliary and sealift fleet in support of DMO has become a top priority. The initial reviews of the requirements to support this operational maritime concept indicate potential growth across the five lines of effort: refuel, rearm, resupply, repair, and revive. Coincident is the review of the level of effort needed to distribute logistics into a contested maritime environment following safe transfer by the logistics fleet – smaller, faster, multi-mission transports likely resident within the future battle force. The work to fully flesh out the requirement is ongoing, but the aggregate is expected to be no less than the current requirement, reinforcing the urgency to recapitalize the current fleet. This appendix focuses on the non-battle force shortfalls, including aviation support vessels, hospital ships, and roll-on/roll-off (RO/RO) sealift vessels featured in the March 2018 report *Sealift That the Nation Needs*.

CHAMPs

The Common Hull Auxiliary Multi-Mission Platforms (CHAMPs) concept is a new-construction design effort using common hulls to potentially recapitalize five different missions: sealift, aviation logistics support, hospital, repair tender, and command and control. Aviation and hospital ships have or will be extended to the 2030s and will eventually be replaced by CHAMPs or a commercial derivative. Repair tenders and command ships will also be replaced by CHAMPs, but are accounted for in the battle force and not included in this appendix.

The Navy has funded CHAMPs development and has approved top level requirements (TLRs) as the basis for industry studies. The request for proposal for these studies was released 2nd quarter of FY2019 and both Capability Development Documents (CDD) and Concepts of Operations (CONOP) reviews are in progress. Although early in the process, upfront collaboration with industry on CHAMP options has indicated two hull designs may be needed to meet both RO/RO and non-RO/RO requirements, in lieu of significant compromise and increased cost across the five mission areas. As program options and costs mature, additional detail will become available.

This appendix shows an initial procurement of the sealift variant in FY2025 and delivery in FY2028, with the intention to accelerate procurement for a FY2026 delivery. This acceleration would meet the conditions of the FY2019 NDAA option authorizing Navy to buy an additional five used, foreign built vessels if able to deliver a new, U.S. built product by FY2026, a potentially expensive and problematic option within the context of the struggling U.S. commercial shipbuilding industry discussed in Appendix 3. The limited set of options being pursued in earnest to recapitalize the fleet per the *Sealift That the Nation Needs* generally include service life extensions of ships already 40-50 years old, limited authority to purchase inexpensive used, but foreign built vessels (less than 20 years old), or buying new U.S. built ships at a significant cost premium over foreign-built ships – all making it challenging and expensive to remain competitive.

The Navy looks forward to working with Congress and government agencies to first bolster the U.S. commercial shipbuilding industry, and then to open the aperture on near-term options regarding purchasing or leasing used ships.

Sealift and Auxiliary Recapitalization

Tables A7-1 and A7-2 show the intended plan for the procurement of new sealift and non-battle force auxiliaries through the CHAMPs effort, and the procurement of used sealift as an option to maintain inventory. The *Sealift that the Nation Needs* report defines the overall requirement of 18 new and 26 used sealift vessels. As approved by Congress, Navy will procure two used, foreign-built ships within the FYDP, and has conditioned-based authority to buy five more. Tables A7-3 and A7-4 show the anticipated retirement plan and long-range inventory.

Table A7-1. Long-Range Procurement Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift (New)						1		1	1	1	2	2	2	2	2	2	2													
Sealift (Used)		1	1			2	2		2	3	3	1	2	2	3	2		2												
Aviation									1	1																				
Hospital														1	1															
Total Procurement Plan		1	1			3	2	1	4	5	5	3	4	5	6	4	2													

Table A7-2. Long-Range Delivery Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift (New)									1	1	1	1	2	2	2	2	2	2	2											
Sealift (Used)			1	1			2	2		2	3	3	1	2	2	3	2		2											
Aviation												1	1																	
Hospital																		1	1											
Total Deliveries			1	1			2	2	1	3	4	5	4	4	4	5	5	3	4											

Table A7-3. Long-Range Auxiliary Retirement Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift						-1	-5	-3	-2	-5	-4	-3	-6	-1	-4	-6	-5			-1										
Aviation												-1	-1																	
Hospital																		-1	-1											
Total Retirements						-1	-5	-3	-2	-5	-4	-4	-7	-1	-4	-6	-6	-1		-1										

Table A7-4. Long-Range Auxiliary Inventory

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift	62	62	63	64	64	63	60	59	58	56	56	57	54	57	57	56	55	57	61	60	60	60	60	60	60	60	60	60	60	60
Aviation	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Hospital	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total Inventory	66	66	67	68	68	67	64	63	62	60	60	61	58	61	61	60	59	61	65	64	64	64	64	64	64	64	64	64	64	